PSP/IS⊙IS Energetic Particle Data - User Guide

Prepared by: Bala Poduval, Jonathan Niehof & Wouter de Wet
Bala.Poduval@unh.edu; Jonathan.Niehof@unh.edu; Wouter.deWet@unh.edu

Release Version – Release 13
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3 GENERAL LIST OF VARIABLES

3.1 psp_isois-epihi_l2-het-rates10 ........................................ 61
3.2 psp_isois-epihi_l2-het-rates300 ....................................... 61
3.3 psp_isois-epihi_l2-het-rates3600 ..................................... 62
3.4 psp_isois-epihi_l2-het-rates60 ....................................... 65
3.5 psp_isois-epihi_l2-let1-rates10 ...................................... 68
3.6 psp_isois-epihi_l2-let1-rates300 ..................................... 68
3.7 psp_isois-epihi_l2-let1-rates3600 .................................... 69
3.8 psp_isois-epihi_l2-let1-rates60 ...................................... 73
3.9 psp_isois-epihi_l2-let2-rates10 ...................................... 76
3.10 psp_isois-epihi_l2-let2-rates300 ................................... 76
3.11 psp_isois-epihi_l2-let2-rates3600 .................................. 77
3.12 psp_isois-epihi_l2-let2-rates60 ..................................... 78
3.13 psp_isois-epihi_l2-second-rates .................................... 80
3.14 psp_isois-epilo_l2-ic .................................................... 81
3.15 psp_isois-epilo_l2-pe .................................................... 83
3.16 psp_isois_l2-ephem ..................................................... 84
3.17 psp_isois_l2-summary ................................................... 84

4 CDF CONTENTS

4.1 psp_isois-epilo_l2-ic ....................................................... 86
   4.1.1 Primary variables .................................................. 86
   4.1.2 Other data ......................................................... 87
   4.1.3 Other support ..................................................... 99
4.2 psp_isois-epilo_l2-pe ..................................................... 99
   4.2.1 Primary variables .................................................. 99
   4.2.2 Other data ......................................................... 99
   4.2.3 Other support ..................................................... 107
4.3 psp_isois-epihi_l2-het-rates10 ....................................... 107
   4.3.1 Primary variables .................................................. 107
   4.3.2 Other data ......................................................... 108
   4.3.3 Other support ..................................................... 112
4.4 psp_isois-epihi_l2-het-rates300 ..................................... 112
   4.4.1 Primary variables .................................................. 112
   4.4.2 Other data ......................................................... 112
   4.4.3 Other support ..................................................... 116
4.5 psp_isois-epihi_l2-het-rates3600 .................................... 116
   4.5.1 Primary variables .................................................. 116
   4.5.2 Other data ......................................................... 118
   4.5.3 Other support ..................................................... 138
4.6 psp_isois-epihi_l2-het-rates60 ..................................... 138
   4.6.1 Primary variables .................................................. 138
   4.6.2 Other data ......................................................... 139
   4.6.3 Other support ..................................................... 153
4.7 psp_isois-epihi_l2-let1-rates10 ..................................... 153
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.7.1</td>
<td>Primary variables</td>
<td>154</td>
</tr>
<tr>
<td>4.7.2</td>
<td>Other data</td>
<td>154</td>
</tr>
<tr>
<td>4.7.3</td>
<td>Other support</td>
<td>158</td>
</tr>
<tr>
<td>4.8</td>
<td>psp_isois-epihi_l2-let1-rates300</td>
<td>158</td>
</tr>
<tr>
<td>4.8.1</td>
<td>Primary variables</td>
<td>158</td>
</tr>
<tr>
<td>4.8.2</td>
<td>Other data</td>
<td>158</td>
</tr>
<tr>
<td>4.8.3</td>
<td>Other support</td>
<td>165</td>
</tr>
<tr>
<td>4.9</td>
<td>psp_isois-epihi_l2-let1-rates3600</td>
<td>165</td>
</tr>
<tr>
<td>4.9.1</td>
<td>Primary variables</td>
<td>165</td>
</tr>
<tr>
<td>4.9.2</td>
<td>Other data</td>
<td>167</td>
</tr>
<tr>
<td>4.9.3</td>
<td>Other support</td>
<td>188</td>
</tr>
<tr>
<td>4.10</td>
<td>psp_isois-epihi_l2-let1-rates60</td>
<td>188</td>
</tr>
<tr>
<td>4.10.1</td>
<td>Primary variables</td>
<td>189</td>
</tr>
<tr>
<td>4.10.2</td>
<td>Other data</td>
<td>191</td>
</tr>
<tr>
<td>4.10.3</td>
<td>Other support</td>
<td>206</td>
</tr>
<tr>
<td>4.11</td>
<td>psp_isois-epihi_l2-let2-rates10</td>
<td>206</td>
</tr>
<tr>
<td>4.11.1</td>
<td>Primary variables</td>
<td>207</td>
</tr>
<tr>
<td>4.11.2</td>
<td>Other data</td>
<td>207</td>
</tr>
<tr>
<td>4.11.3</td>
<td>Other support</td>
<td>209</td>
</tr>
<tr>
<td>4.12</td>
<td>psp_isois-epihi_l2-let2-rates300</td>
<td>209</td>
</tr>
<tr>
<td>4.12.1</td>
<td>Primary variables</td>
<td>210</td>
</tr>
<tr>
<td>4.12.2</td>
<td>Other data</td>
<td>210</td>
</tr>
<tr>
<td>4.12.3</td>
<td>Other support</td>
<td>214</td>
</tr>
<tr>
<td>4.13</td>
<td>psp_isois-epihi_l2-let2-rates3600</td>
<td>214</td>
</tr>
<tr>
<td>4.13.1</td>
<td>Primary variables</td>
<td>214</td>
</tr>
<tr>
<td>4.13.2</td>
<td>Other data</td>
<td>215</td>
</tr>
<tr>
<td>4.13.3</td>
<td>Other support</td>
<td>225</td>
</tr>
<tr>
<td>4.14</td>
<td>psp_isois-epihi_l2-let2-rates60</td>
<td>225</td>
</tr>
<tr>
<td>4.14.1</td>
<td>Primary variables</td>
<td>226</td>
</tr>
<tr>
<td>4.14.2</td>
<td>Other data</td>
<td>227</td>
</tr>
<tr>
<td>4.14.3</td>
<td>Other support</td>
<td>235</td>
</tr>
<tr>
<td>4.15</td>
<td>psp_isois-epihi_l2-second-rates</td>
<td>235</td>
</tr>
<tr>
<td>4.15.1</td>
<td>Primary variables</td>
<td>235</td>
</tr>
<tr>
<td>4.15.2</td>
<td>Other data</td>
<td>235</td>
</tr>
<tr>
<td>4.15.3</td>
<td>Other support</td>
<td>242</td>
</tr>
<tr>
<td>4.16</td>
<td>psp_isois_l2-ephem</td>
<td>242</td>
</tr>
<tr>
<td>4.16.1</td>
<td>Primary variables</td>
<td>242</td>
</tr>
<tr>
<td>4.16.2</td>
<td>Other data</td>
<td>242</td>
</tr>
<tr>
<td>4.16.3</td>
<td>Other support</td>
<td>245</td>
</tr>
<tr>
<td>4.17</td>
<td>psp_isois_l2-summary</td>
<td>245</td>
</tr>
<tr>
<td>4.17.1</td>
<td>Primary variables</td>
<td>245</td>
</tr>
<tr>
<td>4.17.2</td>
<td>Other data</td>
<td>245</td>
</tr>
<tr>
<td>4.17.3</td>
<td>Other support</td>
<td>246</td>
</tr>
</tbody>
</table>

5 EPI-Lo DECODER RING 247
List of Tables

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2.1</td>
<td>psp_isois-epilo l2-ic</td>
<td>14</td>
</tr>
<tr>
<td>2.2.2</td>
<td>psp_isois-epilo l2-pe</td>
<td>16</td>
</tr>
<tr>
<td>2.3.1</td>
<td>psp_isois-epihi l2-het-rates10</td>
<td>19</td>
</tr>
<tr>
<td>2.3.2</td>
<td>psp_isois-epihi l2-het-rates300</td>
<td>20</td>
</tr>
<tr>
<td>2.3.3</td>
<td>psp_isois-epihi l2-het-rates3600</td>
<td>21</td>
</tr>
<tr>
<td>2.3.4</td>
<td>psp_isois-epihi l2-het-rates3600 contd</td>
<td>22</td>
</tr>
<tr>
<td>2.3.5</td>
<td>psp_isois-epihi l2-het-rates3600 contd</td>
<td>22</td>
</tr>
<tr>
<td>2.3.6</td>
<td>psp_isois-epihi l2-het-rates3600 contd</td>
<td>23</td>
</tr>
<tr>
<td>2.3.7</td>
<td>psp_isois-epihi l2-het-rates3600 contd</td>
<td>24</td>
</tr>
<tr>
<td>2.3.8</td>
<td>psp_isois-epihi l2-het-rates3600 contd</td>
<td>25</td>
</tr>
<tr>
<td>2.3.9</td>
<td>psp_isois-epihi l2-het-rates3600 contd</td>
<td>26</td>
</tr>
<tr>
<td>2.3.10</td>
<td>psp_isois-epihi l2-het-rates3600 contd</td>
<td>27</td>
</tr>
<tr>
<td>2.3.11</td>
<td>psp_isois-epihi l2-het-rates3600 contd</td>
<td>28</td>
</tr>
<tr>
<td>2.3.12</td>
<td>psp_isois-epihi l2-het-rates60</td>
<td>29</td>
</tr>
<tr>
<td>2.3.13</td>
<td>psp_isois-epihi l2-het-rates60 contd</td>
<td>30</td>
</tr>
<tr>
<td>2.3.14</td>
<td>psp_isois-epihi l2-het-rates60 contd</td>
<td>30</td>
</tr>
<tr>
<td>2.3.15</td>
<td>psp_isois-epihi l2-het-rates60 contd</td>
<td>31</td>
</tr>
<tr>
<td>2.3.16</td>
<td>psp_isois-epihi l2-het-rates60 contd</td>
<td>32</td>
</tr>
<tr>
<td>2.3.17</td>
<td>psp_isois-epihi l2-het-rates60 contd</td>
<td>33</td>
</tr>
<tr>
<td>2.3.18</td>
<td>psp_isois-epihi l2-het-rates60 contd</td>
<td>34</td>
</tr>
<tr>
<td>2.3.19</td>
<td>psp_isois-epihi l2-het-rates60 contd</td>
<td>35</td>
</tr>
<tr>
<td>2.3.20</td>
<td>psp_isois-epihi l2-het-rates60 contd</td>
<td>36</td>
</tr>
<tr>
<td>2.3.21</td>
<td>psp_isois-epihi l2-let1-rates10</td>
<td>37</td>
</tr>
<tr>
<td>2.3.22</td>
<td>psp_isois-epihi l2-let1-rates300</td>
<td>38</td>
</tr>
<tr>
<td>2.3.23</td>
<td>psp_isois-epihi l2-let1-rates3600</td>
<td>39</td>
</tr>
<tr>
<td>2.3.24</td>
<td>psp_isois-epihi l2-let1-rates3600 contd</td>
<td>39</td>
</tr>
<tr>
<td>2.3.25</td>
<td>psp_isois-epihi l2-let1-rates3600 contd</td>
<td>40</td>
</tr>
<tr>
<td>2.3.26</td>
<td>psp_isois-epihi l2-let1-rates3600 contd</td>
<td>41</td>
</tr>
<tr>
<td>2.3.27</td>
<td>psp_isois-epihi l2-let1-rates3600 contd</td>
<td>42</td>
</tr>
<tr>
<td>2.3.28</td>
<td>psp_isois-epihi l2-let1-rates3600 contd</td>
<td>42</td>
</tr>
<tr>
<td>2.3.29</td>
<td>psp_isois-epihi l2-let1-rates3600 contd</td>
<td>43</td>
</tr>
<tr>
<td>2.3.30</td>
<td>psp_isois-epihi l2-let1-rates3600 contd</td>
<td>43</td>
</tr>
<tr>
<td>2.3.31</td>
<td>psp_isois-epihi l2-let1-rates3600 contd</td>
<td>43</td>
</tr>
<tr>
<td>2.3.32</td>
<td>psp_isois-epihi l2-let1-rates3600 contd</td>
<td>44</td>
</tr>
<tr>
<td>2.3.33</td>
<td>psp_isois-epihi l2-let1-rates60</td>
<td>45</td>
</tr>
<tr>
<td>2.3.34</td>
<td>psp_isois-epihi l2-let1-rates60 contd</td>
<td>46</td>
</tr>
<tr>
<td>2.3.35</td>
<td>psp_isois-epihi l2-let1-rates60 contd</td>
<td>46</td>
</tr>
<tr>
<td>2.3.36</td>
<td>psp_isois-epihi l2-let1-rates60 contd</td>
<td>47</td>
</tr>
<tr>
<td>2.3.37</td>
<td>psp_isois-epihi l2-let1-rates60 contd</td>
<td>47</td>
</tr>
</tbody>
</table>
List of Figures

1  EPI-Lo Instrument .................................................. 13
2  EPI-Lo Skymap ......................................................... 15
3  EPI-Hi Instrument & FOV ............................................ 18
4  EPI-Lo Decoder Ring for LUT Regime 0 to 5. ..................... 248
5  EPI-Lo Decoder Ring for LUT Regime 6 to present. ............. 249
1 INTRODUCTION

This user guide contains detailed information on the various quantities measured by the Integrated Science Investigation of the Sun (IS⊙IS) instrument suite on board the Parker Solar Probe (PSP) and how to access them from the data repository. These are the Level 2 data from the EPI-Lo (Energetic Particle Instrument - Low Energy) and EPI-Hi (Energetic Particle Instrument - High Energy) instruments. This document is divided into seven sections, including this introduction and references. Also included in the Introduction is an account of photon contamination (§ 1.3). The terms of using the PSP/IS⊙IS data is presented in § 1.1. The various properties of the solar energetic particles detected in a wide range of energies and the associated attributes such as cadence, energy bins, look directions and sectors in each CDF file that are useful for science analysis are tabulated and presented in § 2. All the variables currently available in the data repository for the scientific community are listed in § 3 and § 4 consists of a compilation of all the information of the variables from the metadata in each CDF file. The variables listed in § 3 are dynamically linked to their detailed descriptions in § 4. The EPI-Lo Decoder Ring is presented in § 5 and a list acronyms in § 6, followed by References.

1.1 TERMS OF USE: IS⊙IS DATA

Production of Integrated Science Investigation of the Sun (IS⊙IS) data is funded as part of NASA’s Parker Solar Probe mission under contract NNN06AA01C. Use of any IS⊙IS data should include the following acknowledgement and also refer to the publication provided below.

Acknowledgement:
“Thanks to the Integrated Science Investigation of the Sun (IS⊙IS) Science Team (PI: David McComas, Princeton University).”

Reference Publication:
1.2 RELEASE NOTES

1.2.1 RELEASE 1
Proper analysis of this first release of the data requires knowledge of several caveats and possible instrumental effects.

- Pitch angles are using preliminary calibrations from the FIELDS magnetic field instrument. This may result in errors in pitch angle determination up to about 1.5 degrees.

- EPI-Hi and EPI-Lo data use different units for energies and thus for fluxes. EPI-Hi data are reported MeV for protons and electrons, and MeV/nuc for heavy ions. EPI-Lo uses keV for all species except for time-of-flight only data, which uses keV/nuc. These differences are important when combining data across the two sensors.

- Ions heavier than helium and electrons are likely to have substantial background, including from other species, and are thus provided as count rates only until commissioning of these species can be completed for inclusion in a future release.

- EPI-Hi data below approximately 2MeV may be subject to instrumental effects that are currently being quantified. At these energies, the incident energy may be under reported by as much as 10% and the flux may be underreported by as much as 30%.

- EPI-Hi hourly (3600) data is compiled on the hour according to the spacecraft clock. The first integration after turn-on may be substantially shorter than an hour depending on when turn-on occurred. This may result in poor counting statistics from a short integration and unrealistic spectra for this first integration. The same effect is present, but less apparent, for the first integration of shorter periods.

- Spacecraft position is provided for every timebase in a file. Position is in HCI (variable names starting with HCl_R, HCl_Lat, HCl_Lon for each timebase) and HGC (names starting with HGC_R, HGC_Lat, HGC_Lon). Particle flow direction for each look direction is provided as unit vectors in HCI and RTN, as well as pitch angle, also on every timebase; variable names start with HCI, RTN, and PA.

1.2.2 RELEASE 2
Released 2020-01-27.
This release extends the dataset through 2019-10-10 (after third encounter). Files included cover the entire mission; thus it supersedes release 1. Contact the SOC for access to release 1 data if needed for comparison.

- Pitch angles for 2019 use updated FIELDS calibrations. The 2018 pitch angles have not changed from release 1, as FIELDS calibrations from 2018 required no updating.

- The summary product (psp_isois_l2-summary) includes a new variable, A_Heavy_Rate_TS. This is a total heavy-ion count rate from the EPI-Hi LET1A telescope.
1.2.3 RELEASE 3
Released 2020-04-14.
This release extends the dataset through 2020-01-06. This includes the end of Orbit 3 and beginning of Orbit 4, including Venus Flyby 2, but with no new encounter data. Files included cover the entire mission; thus it supersedes previous releases. Contact the SOC for access to release 1 and 2 data if needed for comparison.

- Much of the CDF metadata has been updated to provide better descriptions and make data easier to find. In particular, pitch angle and related pointing data are tagged as data rather than support_data to make them more visible in many tools. Variable names have not been changed.

- Updated calibration tables for EPI-Lo have been applied. This results in small (a few percent) changes in energy channels and fluxes throughout the mission.

1.2.4 RELEASE 4
Released 2020-08-04.
This release extends the dataset through 2020-04-29. This includes Encounter 4 and the rest of orbit 4. Files included cover the entire mission; thus this release supersedes all previous releases. Contact the SOC for access to release 1-3 data if needed for comparison.

- The EPI-Hi instrument was off for operational reasons from 2019-10-07 through 2020-02-12.

- Due to a dust impact on 2019-04-03 around 16:45Z, look direction 31 of the EPI-Lo TOF-only products (channel T) is highly susceptible to UV photon contamination after this time (see http://dx.doi.org/10.3847/1538-4365/ab643d). Release 3 removed calibrated fluxes for this look direction after this time. In release 4, L31 is also excluded from count rate products that are summed over look direction. This includes H_CountRate_ChAnT_SP in psp_isois_12-summary and related quicklook plots. This exclusion is for all time, so that rates before and after the dust impact can be compared. Look directions 34 and 35, although they retain intact foils, can also be heavily contaminated by UV and are excluded from summed count rate products as well.

- During the EPI-Lo high voltage ramp-up immediately after turn-on (approximately 15 minutes), count rates and fluxes are not accurate measurements of the incident population. These periods have been filtered out from the flux and count rate variables.

- All pitch angle variables now have a corresponding “spiral angle” variable, containing the angle the particle flow direction makes with the outward nominal Parker Spiral. “Nominal” is defined as 400km/s v_sw with corotation breakdown at 10R_S. For EPI-Lo, these variables are named like SA_ChAnX; for EPI-Hi, names are similar to LET1_A_SA and LET1_A_R1_SECT_SA (for non-sectored and sectored rates, respectively.)

- Many small metadata updates have been made for greater clarity; variable names remain the same.
– EPI-Hi energy unit labeling is consistent (MeV/nuc for ions heavier than protons; MeV for all else) and all energy labels have consistent formatting.

1.2.5 RELEASE 5

Released 2020-09-24.

This release includes data through 2020-04-29, with no additional dates since release 4. This includes Encounter 4 and the rest of orbit 4. Files included cover the entire mission; thus this release supersedes all previous releases. Contact the SOC for access to release 1-4 data if needed for comparison.

• Release 4 was made using the EPI-Lo calibration data from release 2; release 5 uses the latest calibration data. This results in small (a few percent) changes in energy channels and fluxes throughout the mission, similar to release 3.

• Release 4 also included fluxes for look direction 31 of the time-of-flight products after the dust impact on 2019-04-03; these fluxes are largely from UV photon contamination and should not be used. They are properly filtered from release 5.

• EPI-Hi data are the same as release 4, but the files are reproduced in release 5 to avoid confusion.

• IS⊙IS summary data are largely the same as release 4, but may have small changes in energy channels in the variables related to EPI-Lo.

1.2.6 RELEASE 6

Released 2020-11-16.

This release extends the dataset through 2020-08-13. This includes Encounter 5 and the rest of orbit 5. Files included cover the entire mission; thus this release supersedes all previous releases. Contact the SOC for access to release 1-5 data if needed for comparison.

• Data may include brief periods of counts generated internally to the instrument for calibration purposes. These will be filtered in a future release and are noted in the Data Anomalies & Quality list (https://spp-isois.sr.unh.edu/Released-Data-Anomalies-and-Quality-Notes.html).

• Pitch angles for the periods 2019 Jan through Aug and 2020 Jan through Feb were added for this release.

1.2.7 RELEASE 7

Released 2021-04-05.

This release extends the dataset through 2021-01-04. This includes Encounter 6 and the rest of orbit 6. Files included cover the entire mission; thus this release supersedes all previous releases. Contact the SOC for access to release 1-6 data if needed for comparison.
• EPI-Hi LET electron count rate variables are now included. These match the naming scheme for the HET electron variables, e.g. \texttt{A\_Electrons\_Rate} is the count rate for electrons in LET1-A.

• Most quantities that are included as a count rate are now also reported as counts per integration, for those interested in performing their own statistical analysis. These variables have descriptions with simply “counts”, units of “counts”, and variable names with “Counts” or no specific notation. Examples are \texttt{A\_H} for EPI-Hi A-side protons or \texttt{H\_Counts\_ChanP} for EPI-Lo triple-coincidence protons. Count rate variables have “Rate” or “CountRate” in the name, “count rate” in the description, and units of “counts/s”. Examples \texttt{A\_H\_Rate}; \texttt{H\_CountRate\_ChanP}. Count rates are properly corrected for instrument livetime; counts are not.

• EPI-Lo calibrations were updated based on observations from the large event of 29 November 2020. This is not the final calibration that will result from that event, but it is significant enough of an improvement that we are releasing it now.
  – Updated efficiencies were calculated for H, He, O, and Fe. These incorporate contributions from grid transmission fraction, scattering, and MCP detection efficiency. Updates primarily affect the ion composition triple coincidence channels P and C. The ion composition TOF-only channel T was corrected based on the updated channel P values.
  – Updated instrument geometric factors were calculated, including large-scale instrument geometry, not finer corrections such as grid transmission. Flatfielding corrections were calculated from a period of high isotropy (November 30, 2020 19:00 to December 1, 2020 02:00)

• Due to a dust impact on 2020-12-30 between 02:00 and 07:00Z (while EPI-Lo was off), look direction 35 of the EPI-Lo TOF-only products (channel T) is highly susceptible to UV photon contamination after this time. Release 7 removed calibrated fluxes for this look direction after this time. This look direction was excluded from look-averaged TOF-only products starting in release 3.

• The large event of 2020-11-30 through 2020-12-02 was the first event of the mission where EPI-Hi switched into operational modes for handling high rates. These modes have not been fully calibrated: count rate and flux data for this period should not be used without consulting the EPI-Hi team.

1.2.8 RELEASE 8

Released 2021-06-28.

This release extends the dataset through 2021-03-27. This includes Encounter 7 and the rest of orbit 7. Files included cover the entire mission; thus this release supersedes all previous releases. Contact the SOC for access to release 1-7 data if needed for comparison.

• The large event of 2020-11-30 through 2020-12-02 was the first event of the mission where EPI-Hi switched into operational modes for handling high rates. These modes have not been
fully calibrated: count rate and flux data for this period should not be used without consulting the EPI-Hi team.

1.2.9 RELEASE 9

Released 2021-09-20.

This release contains data quality enhancements only and ends on 2021-03-27. Files included cover the entire mission; thus this release supersedes all previous releases. Contact the SOC for access to release 1-8 data if needed for comparison.

- EPI-Hi processing and calibrations have been improved for high rate periods, the most notable of which to date is the large event of 2020-11-30 through 2020-12-02.
  - Count rates and fluxes are corrected to account for the fraction of particle detections which are not fully processed by the flight software. This is described in more detail in the data user guide.
  - Calibrations for high rate operational modes have been updated. HET calibrations for dynamic threshold mode 1 are those used by Cohen et al. (2021, https://doi.org/10.1051/0004-6361/202140967). HET modes 2 and 3, and all high rate modes of LET1 and LET2, do not have mature calibrations at this time, so fluxes are not reported for the high rate modes.

- Minor adjustments to EPI-Lo telemetry processing may result in slightly higher (of order one percent) count rates and fluxes during active times.

- EPI-Lo ion composition (IC) files have new count rate variables for N and Ne, in anticipation of refined tracks for these species. These variables contain no records until the refined tracks are implemented on-orbit.

- Due to ongoing dust effects, several more look directions are excluded from the look-averaged TOF-only products in the summary file. The complete list is now 21, 24-29, 31, 34, 35, and 39.

1.2.10 RELEASE 10

Released 2021-10-26.

This release extends the dataset through 2021-07-24. This includes all of orbit 8, including Encounter 8, and part of the inbound leg of orbit 9. Files included cover the entire mission; thus this release supersedes all previous releases. Contact the SOC for access to release 1-9 data if needed for comparison.

No changes have been made to the processing of the data; caveats remain the same.

- EPI-Lo species identification tables were updated on 2021-06-14. Ion composition (IC) files after this day will have records populated in the N and Ne count rate variables added in release 9.
1.2.11 RELEASE 11

Released 2022-02-07.

This release extends the dataset through 2021-11-04. This includes the rest of orbit 9, including Encounter 9, and part of the inbound leg of orbit 10, including Venus Flyby 5. Files included cover the entire mission; thus this release supersedes all previous releases. Contact the SOC for access to release 1-10 data if needed for comparison.

No changes have been made to the processing of the EPI-Hi data; caveats remain the same. The following updates have been made to EPI-Lo data.

- Updated EPI-Lo energy channel assignments and efficiencies for all species and energies before 14 June 2021, reflecting the imprecise on-board energy normalization that was in use at that time. The resulting energies are much more strongly dependent on look direction.
- Minor updates to the calculation of EPI-Lo livetimes, resulting in flux increases of order 1% in some circumstances.
- Corrected EPI-Lo energy assignments for electron channels after 14 June 2021 (release 10 erroneously used development tables which were not uploaded).

1.2.12 RELEASE 12

Released 2022-04-25.

This release extends the dataset through 2022-01-23. This includes the rest of orbit 10, including Encounter 10, and part of the inbound leg of orbit 11. Files included cover the entire mission; thus this release supersedes all previous releases. Contact the SOC for access to release 1-11 data if needed for comparison.

The following changes and caveats apply to both EPI-Hi and EPI-Lo data, or to IS⊙IS suite products:

- H_CountRate_Chant-related variables have been removed from the psp_isois_12-summary files, as these time-of-flight only rates contain substantial background. They have been replaced with H_CountRate_Chap-derived variables, containing protons with a triple coincidence (TOFxE) requirement. These contain all look directions and a similar energy range to the previous ChanT variables. As a reminder, these summary files are intended to support high-level surveys for periods of interest and should not be used for science analysis.
- Pitch angles are not available after 2021-12-31.

The following changes apply to EPI-Hi:

- Calibrations for high rate operational modes have been updated. HET calibrations H and He for dynamic threshold mode 1 have been updated; initial LET calibrations are included for H and He in dynamic threshold mode 1.
- HET calibrations for H and He in dynamic threshold mode 0 (the normal mode for the lowest count rates) have been updated to account for the non-flat response of the instrument.

- Processing of the data at EPI-Hi dynamic threshold changes has been updated to ensure proper timing of the transition.

No changes have been made to processing of the EPI-Lo data.

1.2.13 RELEASE 13

Release 2022-08-01.

This release extends the dataset through 2022-04-29. This includes the rest of orbit 11, including Encounter 11, and part of the inbound leg of orbit 12. Files included cover the entire mission; thus this release supersedes all previous releases. Contact the SOC for access to release 1-12 data if needed for comparison.

- Pitch angles are included for all times where FIELDS data are available, including times omitted in release 12.

- EPI-Lo calibrations have been updated for apertures with thick entrance foils (L23, L30–L33, L40). The energy binning for these look directions is substantially different from others, particularly at lower energies, and care should be used when combining data from multiple look directions.

1.3 PHOTON CONTAMINATION

EPI-Lo was designed to investigate the physics of energetic particles, however in the special lowest-energy “time-of-flight only” product used in this study, it also responds to solar photons in a subset of approximately sunward–looking apertures lacking special light–attenuating foils. This topic is discussed in detail by Hill et al. (2019) but we provide some details here.

1.3.1 PHOTONS AND DUST

The EPI-Lo design is robust against the detrimental effects of ambient dust or light entering any of EPI-Lo’s eighty apertures. The mitigation for light contamination includes employing thicker start foils in the six look directions dominated by photospheric light that is Thomson scattering off electrons near the Sun, and thus visible away from the solar disk where there is no shielding from PSP’s thermal protection system (TPS). In addition to thicker foils, we employ baffles and multiple coincidence logic to cut down photon contamination. Also, to protect against dust and resulting dust–hole–admitted light, an extra “collimator foil” was added to all collimator turrets so that pinholes from dust impacts either penetrate only the collimator foil (for the smallest dust grains \( \leq 100 \) nm) or only admit light from very tiny solid angles where these holes line up, resulting in a greatly reduced geometry factor for post-impact light contamination than would occur with only one foil. The first dust impact directly detectable by EPI-Lo (i.e., an impact resulting in noticeable light–admitting damage) took place after the second perihelion on 2019–04–03 (DOY 093) 16:45 in the L31 direction (see Figure 2 for description of EPI-Lo look directions). This L31 hole resulted
in elevated photon background in one look direction but at a level that has not diminish EPI-Lo’s scientific capabilities. This dust impact is discussed in more detail by Szalay et al. (2019).

A second dust impact occurred in the L35 direction on 2020-12-30 (DOY 365) sometime between 02:00 and 07:00 when the instrument was off. This hole is larger than the L31 hole and is under current investigation.

During Orbit 8, two more dust impacts were detected. L55 on 2021-04-19 12:00 and L21 on 2021-04-27 18:29. TOF-only products have increased in noise, but triple-coincidence products are not impacted by photon contamination.

1.3.2 LOOK DIRECTIONS

We divided the field of view (FOV) into three independent sets of look directions: the generally sunward-looking Bright Look directions with very clear photon viewing (composed of the look directions L22, L25, L34–L37, L44, and L46); the Dim Look directions surrounding the bright area, where there are reduced indications of photons (composed of look directions L24, L26, L27, L41, L45, L47); and the Dark Look direction region, where there is no strong sign of photons (composed of the apertures that are neither the bright look direction or the dim look direction lists and which are mostly composed of wedges W0, W1, and W5–W7, which look away from the Sun). Explicitly, the list of dark look directions is L00–L21, L23, L28–L33, L38–L40, L42, L43, and L48–L79, with the sum of the Bright, Dim, and Dark look directions incorporating all 80 apertures. Although the bright look directions are roughly those most directed at the Sun, an important distinction is that the six apertures closest to the Sun with thicker light-blocking start foils (L23, L30–L33, and L40) are not included in the bright FOV or dim FOV because the thick foils effectively block the scattered light.

1.3.3 ENERGY RANGES

In addition to the division of the FOV, the energy channels are also split into three independent ranges: Low Energy (channels T030 and T031, 1-4 keV/nuc detected energy, based on the TOF measurement, corresponding to incident energies below 34 keV when H is assumed), where accidentals dominate during quiet times; Medium Energy (channels T016–T029, 4-350 keV/nuc detected and 34–370 keV for incident H), where foreground ion measurements are the strongest; and High Energy (channels T001–T015, 350 keV/nuc – 37 MeV/nuc detected and 370 keV – 39 MeV for incident H), where crosstalk events dominate during quiet times. Although the upper energy limit is high, no ions were detected above a few hundred keV/nuc (confirmed by EPI-Hi observations). The reason that accidental coincidences are associated with lower energy intensifications is because randomly distributed start and stop events that accidentally satisfy the TOF logic result in a flat distribution in TOF-space, but because of the inverse square relationship between energy and TOF, a large fraction of the longer end of the TOF range corresponds to a small, low-energy range of energies.

1.3.4 PROXIES

With these definitions we found that a good proxy for the clean ion signal is found by combining Low Energy/Dark Look Directions, Medium-Energy/Dim Look Directions, and Medium-Energy/Dark Look Directions and a good proxy for photon contamination is the Low-Energy/Bright
Look Direction measurements. That is, Ion Proxy = Low Dark + Medium Dim + Medium Dark and Photon Proxy = Low Bright.

1.3.5 SUMMARY

EPI-Lo measures ion intensity, energy, composition, and anisotropy, by design, and also responds to photons that are most likely scattered by zodiacal dust. Utilizing thicker start foils to suppress photon contamination unfortunately degrades low–energy ion response, so this mitigation was used sparingly; consequently, there are several generally sunward apertures with thin start foils where photons produce backgrounds, mostly through accidental coincidence of uncorrelated transmitted photon start and stop triggers. The result is that EPI-Lo responds to SEPs and solar photons, and through directional and energy filtering as well as accidental coincidence calculations, the ion signal can be largely separated from the photon backgrounds, as we have detailed.
2 SUMMARY: SCIENCE DATA

In this section, the energetic particle measurements of PSP/IS⊙IS that are useful for science investigations are presented. The various quantities measured by the EPI-Lo (Energetic Particle Instrument - Low Energy) and EPI-Hi (Energetic Particle Instrument - High Energy) instruments are tabulated in Tables 2.2.1 – 2.3.57.

2.1 EPHEMERIS AND POINTING

A high-level view of the spacecraft position and attitude can be found in the psp_isois_12-ephem file. The central attitude question is usually “is the spacecraft in a nominal orientation?”. For this the first variable of concern is Sun_Angle (4.16.2.14), the angle between the spacecraft TPS (thermal protection system, heat shield) and the Sun-spacecraft line. Normally this is 0 unless some distance from the Sun; a simple flag to determine this is the variable Umbra_Pointing (4.16.2.15). If the spacecraft is in umbra orientation, the Roll_Angle (4.16.2.9) variable is a simple rotation around the Sun-spacecraft axis. Nominally IS⊙IS is on the ram-facing side, roll angle is 0, and this is indicated by Ram_Pointing (4.16.2.8).

If the spacecraft is not in umbra orientation, the roll angle is still defined but is much less intuitively useful; the ephemeris defines a Clock_Angle (4.16.2.1) which describes in which direction the TPS is off-pointing from the Sun. The TPS tilted up out of the ecliptic in the 12 o’clock position is zero clock angle. Down out of the ecliptic, 180/-180 degrees. “Left” when sun-facing (i.e. anti-ram) is 90 degrees; and “right” (TPS into ram), 90.

The ephemeris also includes basic spacecraft location in HGC and HCI and the direction of the main EPI-Lo instrument, LET1A, LET2C, HETA relative to the nominal Parker Spiral. These values are also included in each science data file.

Each science data file, for each cadence included in a file, includes ephemeris and attitude information on the same cadence, i.e. at the point-in-time of the Epoch variable. For any quantitative treatment of particle direction, using these variables is highly recommended rather than trying to infer direction from the ephemeris files.

Spacecraft position is provided in HGC and HCI spherical polar coordinates after Fränz and Harper, 2002 (https://www2.mps.mpg.de/homes/fraenz/systems/). For EPI-Hi, there is only one cadence per file and these are simply named like HCI_R, HCI_Lat, HCI_Lon and similarly for HGC. For EPI-Lo, each channel has its own cadence and set of variables, e.g. HCI_Lat_ChanP.

Pointing information is provided in several forms. Each is provided for each aperture of EPI-Lo (all 80 apertures for channels with a valid start pulse and 8 wedges for those without), the main telescope boresight for each EPI-Hi telescope, and a geometrically nominal “center direction” for the EPI-Hi sectored rates. Note that the angular response of the EPI-Hi sectored rates is complex and simply assuming all incident particles are coming from the center direction is likely to be highly inaccurate.

For each of these directions, unit vectors are provided representing the direction of travel of an incident particle that is coming straight into the instrument, as represented in the RTN coordinate system. For instrument look direction, multiply each component of the unit vector by -1. No corrections are made for aberration due to spacecraft motion. The variables for these unit vectors include
RTN. For EPI-Lo, there is one variable (containing an array) for each channel, e.g. RTN_ChanP. For EPI-Hi, there is one for each telescope end, e.g. HET_A_RTN as well as an array for sectored rates, e.g. HET_A_R17_SECT_RTN. There are similar variables representing the particle motion direction in HCI coordinates (with HCI instead of RTN); again, no aberration corrections are made.

Particle directions are also expressed as a pitch angle, i.e. the angle between particle motion and the ambient magnetic field. The field is taken from the FIELDS instrument and averaged over the IS⊙IS integration period by the FIELDS team. 0 represents particles directed parallel to the field; 180, antiparallel. Only 0-180 is used; there is no gyrophase information. EPI-Lo variables are named like PA_ChanP; EPI-Hi, like HET_A_PA, HET_A_R17_SECT_PA. In addition to the ambient field, a similar angle is calculated from the nominal Parker Spiral. This is assumed to always point outwards (i.e. no hemispheric or solar cycle polarity is applied) and is derived from a 400km/s constant solar wind with corotation breakdown at 10R⊙. These are named with SA (for “spiral angle”) instead of PA.

2.2 EPI-LO SCIENCE DATA

Figure 1 shows the EPI-Lo instrument layout and Figure 2 depicts the view of the sky of the 80 apertures. The files containing the EPI-Lo data are named as: <mission>_<suite-instrument>_<data level>_<file-descriptor> (e.g., psp_isois-epilo_l2_ic). There are four primary science data files corresponding to the four modes (depicted by <file-descriptor>) of observation: ion composition (ic), ion energy (ie), particle composition (pc) and particle energy (pe). The tables in this section summarize the science data available for the following EPI-Lo data files:

- psp_isois-epilo_l2-ic (ion composition)
- psp_isois-epilo_l2-pe (particle energy)

Species without energy ranges specified are measured in this mode but are not yet commissioned. They will be included in future releases.

EPI-Lo constantly (eight times per second) cycles between “modes” with slightly different techniques for measuring the ambient plasma; the effective result is an apparent simultaneous measurement with all four modes. Modes with “composition” in the name trigger off a valid measurement from the TOF system; in these modes, a simultaneous valid measurement in a SSD may also be present (and is used if so), but is not required. Modes named “energy” trigger off a valid energy signal in a solid state detector; in these modes, a valid TOF measurement (or at least the corresponding start signals) may be used if present, but is not required. There are two sets of SSDs: the “particle” detectors have an aluminum flashing that rejects low-energy ions (improving the fraction of counts which are electrons); the “ion” detectors lack this flashing. Which SSD is checked for a signal depends on the current instrument mode. Thus the four modes: ion composition, particle energy, particle composition, ion energy. Only ion composition and particle composition have calibrated data at this time.

EPI-Lo products are integrated over different periods by “channel” (described below). These integration periods usually change a few times per orbit: upon encounter entrance and exit, and when updates are made to manage data allocation. For this reason, each channel has its own Epoch variable (and associated DELTA) which should always be used rather than assuming a cadence.
Similarly, EPI-Lo energies may vary by look direction, and vary occasionally in time when new tables are uploaded. The actual energy value recorded in the file should be examined rather than making assumptions about the energy channels. The energy labels thus also vary in look direction and time. Because these variables *may* change in time and look, they are included as fully-populated arrays for every time and look direction. The most notable change with look direction is the higher minimum energy (and resulting changes to the lowest bins) for the look directions with thick foils: L23, L30–L33, and L40.

The size of the energy variables reflects the maximum possible number of energy bins for that species and channel; the actual number of bins used may be smaller. Bins which are not used are given fill values for energy, and should be ignored. Similarly, bins which are not fully calibrated may be included. Fluxes corresponding to these bins are populated with fill but there may be count rates and best current evaluation of incident energy. This may include bins of zero width. Most science users should ignore any energy bins where the flux is entirely fill.

Figure 1: The EPI-Lo Instrument (see McComas et al., 2016, for details).
2.2.1 FILE: PSP_ISOIS-EPILO_L2-IC

This file contains the EPI-Lo ion composition (ic) data for various particle species such as C, Fe, H, $^3$He, $^4$He, Mg, O and Si. The variable name is structured as <species>_<quantity>_channel>, where, <species> is one of the particle species; <quantity> takes ‘Counts’, ‘CountRate’ (counts/s) or ‘Flux’ (cm$^{-2}$ sr$^{-1}$ sec$^{-1}$ keV$^{-1}$); and <channel> takes one of the values in Column 2. The Columns ‘Look Direction’ and ‘Energy’ imply the available look directions (0 – 79) and energy ranges, respectively, in the data file. For details on look directions, see McComas et al. (2016).

Examples: C_CountRate_ChannD; H_Flux_ChannT.

Channels C, D, and P are triple-coincidence, or TOFxE, measurements, all measuring ions with a valid time of flight and a signal in the ion SSD. The difference is in their cadence. P is the highest cadence and used exclusively for protons. Other ions are split between C (moderate cadence) and D (slowest cadence of the three).

Channel R is a derived product from channel P. It is telemetered more frequently and constructed by joining adjacent bins from channel P. It is only of use when very high time resolution is required.

Channel T is a TOF-only channel, measuring all ions with a valid time of flight but no signal in the ion SSD. Incident energies are thus calculated in keV/nucleon and fluxes are calculated using the efficiencies and geometric factors for protons. This may be very wrong in the presence of a substantial population with Z>1. Because of the double coincidence requirement (rather than triple), counting statistics may be quite good at the price of poorer background rejection. By contrast the P channels are quite “clean”, but with lower count rates.

<table>
<thead>
<tr>
<th>Species</th>
<th>Channel</th>
<th>Size</th>
<th>Count Rate</th>
<th>Counts</th>
<th>Flux</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Look Direction 80</td>
<td>Energy (keV) (bins)</td>
<td>Look Direction 80</td>
</tr>
<tr>
<td>C</td>
<td>D</td>
<td>80x48</td>
<td>0 – 79</td>
<td>178 – 22872 (21)</td>
<td>0 – 79</td>
</tr>
<tr>
<td>Fe</td>
<td>C</td>
<td>80x48</td>
<td>0 – 79</td>
<td>431 – 24868 (41)</td>
<td>0 – 79</td>
</tr>
<tr>
<td>H</td>
<td>R</td>
<td>80x48</td>
<td>0 – 79</td>
<td>67 – 8736 (14)</td>
<td>0 – 79</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>80x48</td>
<td>0 – 79</td>
<td>67 – 10252 (39)</td>
<td>0 – 79</td>
</tr>
<tr>
<td></td>
<td>T</td>
<td>80x48</td>
<td>0 – 79</td>
<td>21 – 46367 (32)</td>
<td>0 – 79</td>
</tr>
<tr>
<td>He3</td>
<td>D</td>
<td>80x48</td>
<td>0 – 79</td>
<td>95 – 22536 (44)</td>
<td>0 – 79</td>
</tr>
<tr>
<td>He4</td>
<td>C</td>
<td>80x48</td>
<td>0 – 79</td>
<td>83 – 22540 (44)</td>
<td>0 – 79</td>
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<td>Mg</td>
<td>D</td>
<td>80x48</td>
<td>0 – 79</td>
<td>218 – 23672 (22)</td>
<td>0 – 79</td>
</tr>
<tr>
<td>Ne</td>
<td>D</td>
<td>80x48</td>
<td>0 – 79</td>
<td>830 – 23392 (6)</td>
<td>0 – 79</td>
</tr>
<tr>
<td>O</td>
<td>C</td>
<td>80x48</td>
<td>0 – 79</td>
<td>205 – 23114 (43)</td>
<td>0 – 79</td>
</tr>
<tr>
<td>Si</td>
<td>D</td>
<td>80x48</td>
<td>0 – 79</td>
<td>327 – 23946 (20)</td>
<td>0 – 79</td>
</tr>
</tbody>
</table>

Table 2.2.1: PSP_ISOIS-EPILO_L2-IC: The EPI-Lo ion composition (ic) data for C, Fe, H, He3, He4, Mg, Ne, O and Si in channels D, C, R, P and T.
Figure 2: EPI-Lo Skymap (see McComas et al., 2016, for details).
2.2.2 FILE: PSP_ISOIS-EPILO_L2-PE

EPI-Lo particle energy (pe) data for different particle species, C, electron, H, $^3$He, He, and O. The general form of the variable name is: `<species>_<quantity>_<channel>`. Here, `<species>` refers to one of the particle species; `<quantity>` takes `Counts`, `CountRate` (counts/s) or `Flux` ($\text{cm}^{-2} \text{ sr}^{-1} \text{ sec}^{-1} \text{ keV}^{-1}$); and `<channel>` takes one of the values in Column 2.

Examples: C_Flux_ChanN; O_Counts_ChanX; Electron_CountRate_ChanE.

Channel E is the primary electron measurement, although there is substantial ion background. It does not require a valid start pulse, and thus there is limited direction information, only the knowledge that the particle was incident from one of the eight wedges. Channel F is a high-time-resolution variant of channel E; it consists of several channel E bins combined but telemetered more frequently.

Channel G contains particles with a valid SSD measurement and start pulse; as such, it has full directional information. However, incident electrons trigger a start pulse with very low efficiency, so count rates are quite low. As with channels E and F, the non-electron component is also quite high.

<table>
<thead>
<tr>
<th>Species</th>
<th>Channel</th>
<th>Size</th>
<th>Count Rate</th>
<th>Counts</th>
<th>Flux</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>X</td>
<td>8 x 48</td>
<td>0 – 7 (8)</td>
<td>–</td>
<td>0 – 7 (8)</td>
</tr>
<tr>
<td>electron</td>
<td>E</td>
<td>8 x 48</td>
<td>0 – 7 (8)</td>
<td>27 – 375 (16)</td>
<td>0 – 7 (8)</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>80 x 48</td>
<td>0 – 79 (80)</td>
<td>27 – 375 (16)</td>
<td>0 – 79 (80)</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>8 x 48</td>
<td>0 – 7 (8)</td>
<td>33 – 375 (9)</td>
<td>0 – 7 (8)</td>
</tr>
<tr>
<td>H</td>
<td>E</td>
<td>8 x 48</td>
<td>0 – 7 (8)</td>
<td>–</td>
<td>0 – 7 (8)</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>80 x 48</td>
<td>0 – 79 (80)</td>
<td>–</td>
<td>0 – 79 (80)</td>
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<tr>
<td></td>
<td>F</td>
<td>8 x 48</td>
<td>0 – 7 (8)</td>
<td>–</td>
<td>0 – 7 (8)</td>
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<tr>
<td>X</td>
<td>X</td>
<td>8 x 64</td>
<td>0 – 7 (8)</td>
<td>–</td>
<td>0 – 7 (8)</td>
</tr>
<tr>
<td>$^3$He</td>
<td>X</td>
<td>8 x 48</td>
<td>0 – 7 (8)</td>
<td>–</td>
<td>0 – 7 (8)</td>
</tr>
<tr>
<td>He</td>
<td>X</td>
<td>8 x 48</td>
<td>0 – 7 (8)</td>
<td>–</td>
<td>0 – 7 (8)</td>
</tr>
<tr>
<td>O</td>
<td>X</td>
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<td>0 – 7 (8)</td>
<td>–</td>
<td>0 – 7 (8)</td>
</tr>
</tbody>
</table>

Table 2.2.2: PSP_ISOIS-EPILO_L2-PE. The EPI-Lo particle energy (pe) data for electron, H, $^3$He, He and O in channels E, G, F and X.
2.3 EPI-HI SCIENCE DATA

The following tables summarize the science data for the EPI-Hi Instrument. The files are named as: `<mission>_<suite-instrument>_<data level>_<file-descriptor>`

The EPI-Hi instrument consists of three telescopes HET, LET1 and LET2. The HET and LET1 telescopes have two sides (A, B) and let2 has one side (C). Sides A on LET1 and HET look sunward along the Parker Spiral and sides B on LET1 and HET look antisunward. Side C LET2 looks in the spacecraft ram direction. Full pointing information (RTN/HCI) is available in the L2 files (see McComas et al., 2016, and Figure 3). The numerical values following rates in the `<file-descriptor>` represent the cadence in seconds (e.g., rates10; rates300). If no value is present, the cadence is assumed to be 1 second. Listed below are the EPI-Hi data files. The 60 s cadence products containing only the engineering singles are excluded from public release.

EPI-Hi science rates are accumulated at several cadences. The 10 s and 1 s rates are an encounter–only product. The 60 s rates are also, at a baseline, encounter–only. The 3600 s rates are the main cruise phase product. EPI-Hi produces several engineering rates that overflow their counters when accumulated for 3600 s. For those, a 1/60 sample of the 60 s rates are included in cruise data. The 60 s products are thus produced for the whole mission but those containing no science data are excluded from the public release.

<table>
<thead>
<tr>
<th>HET</th>
<th>LET1</th>
<th>LET2</th>
</tr>
</thead>
<tbody>
<tr>
<td>psp_isois-epihi_l2-het-rates10</td>
<td>psp_isois-epihi_l2-let1-rates10</td>
<td>psp_isois-epihi_l2-let2-rates10</td>
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<td>psp_isois-epihi_l2-het-rates300</td>
<td>psp_isois-epihi_l2-let1-rates300</td>
<td>psp_isois-epihi_l2-let2-rates300</td>
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<tr>
<td>psp_isois-epihi_l2-het-rates3600</td>
<td>psp_isois-epihi_l2-let1-rates3600</td>
<td>psp_isois-epihi_l2-let2-rates3600</td>
</tr>
<tr>
<td>psp_isois-epihi_l2-het-rates60</td>
<td>psp_isois-epihi_l2-let1-rates60</td>
<td>psp_isois-epihi_l2-let2-rates60</td>
</tr>
</tbody>
</table>

HET, LET1 & LET2

The front-end logic for each telescope is capable of accepting candidate particle detection events at a higher rate than the telescope’s flight software can process. During periods of high count rates, then, some of these events are not processed and the measured count rate is depressed relative to the incident. EPI-Hi fluxes and science count rates are corrected for this effect, starting in release 9. Counts (per sample) are uncorrected.

2.3.1 FILE: PSP_ISOIS-EPIHI_L2-HET-RATES10

This file contains the 10 s data of energetic particle Counts, Flux (cm$^{-2}$ sr$^{-1}$ sec$^{-1}$ MeV$^{-1}$) and Count Rate (counts/s) for electrons, H, He and NEUT_DET for sides A and B, for different ranges (R1 – R7) of the High Energy Telescope (HET). The naming convention of the variables in the data files is: `<side>_<species>_<quantity>` for those quantities independent of range. Here, `<side>` stands for A or B; `<species>` stands for the particle species (electrons, H, He, etc.); and `<quantity>` represents Counts (not used in variable names, in general), Flux or Rate. For those parameters measured as a function of range, the naming convention is: `<range><side>_<species>_<quantity>`, where, `<range>` goes from R1 to R7 and `<side>` takes either A or B. Variable names without ranges (e.g., A_Electrons_Flux) or with double digit range (e.g., R17) have the values integrated over all
Figure 3: The EPI-Hi instrument and field of view. Sides A on LET1 and HET look sunward along the Parker Spiral while sides B on LET1 and HET look antisunward. Side C on LET2 looks in the spacecraft ram direction. Full pointing information (RTN/HCI) is available in the L2 files (see McComas et al., 2016, for details on the sides A, B and C given in the tables.) the available ranges (R1 to R7, in general).
Examples: A_H (measured quantity is “counts”); A_Electrons_Flux; R1A_Electrons_Rate.
Table 2.3.1: Table 2.3.1: PSP_ISOIS-EPHI_L2-HET-RATES10. The 10 s HET data of particle Counts, Flux and Count Rate for electrons, H, He and NEUT_DET for sides A and B, and for ranges R1 – R7.
2.3.2 FILE: PSP_ISOIS-EPIHI_L2-HET-RATES300

This file provides the 300 s rates of energetic particle Counts, Flux (cm$^{-2}$ sr$^{-1}$ sec$^{-1}$ MeV$^{-1}$) and Count Rate (counts/s) for CNO, FeGroup and NetoSi ions for ranges R1 – R7 of the High Energy Telescope (HET) for sides A and B. The variables (summarized in Table 2.3.2) are named as: <side>_<species>_<quantity> for those quantities independent of range. Here, <side> stands for A or B; <species> stands for the particle species (CNO_SECT, FeGroup_SECT and NetoSi_SECT), and <quantity> represents Counts (not used in the variable names, in general), Flux or Rate. Examples: A_CNO_SECT (measured quantity is “counts”); A_FeGroup_SECT_Flux; A_NetoSi_SECT_Rate.

<table>
<thead>
<tr>
<th>Side</th>
<th>Quantity</th>
<th>CNO_SECT</th>
<th>FeGroup_SECT</th>
<th>NetoSi_SECT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>E-bins</td>
<td>E-range (MeV/nuc)</td>
<td>Sectors (bins)</td>
</tr>
<tr>
<td>A/B</td>
<td>Count</td>
<td>2</td>
<td>36–68</td>
<td>0–8</td>
</tr>
<tr>
<td></td>
<td>Flux</td>
<td>2</td>
<td>36–68</td>
<td>0–8</td>
</tr>
<tr>
<td></td>
<td>Count Rate</td>
<td>2</td>
<td>36–68</td>
<td>0–8</td>
</tr>
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</table>

Table 2.3.2: PSP_ISOIS-EPIHI_L2-HET-RATES300. The 300 s cadence HET data of particle Counts, Flux and Count Rate for CNO, FeGroup and NetoSi ions for sides A and B, and integrated over ranges R1 – R7.

2.3.3 FILE: PSP_ISOIS-EPIHI_L2-HET-RATES3600

In this file, the 3600 s cadence data of particle Counts, Flux (cm$^{-2}$ sr$^{-1}$ sec$^{-1}$ MeV$^{-1}$) and Count Rate (counts/s) measured by High Energy Telescope (HET) are available. The names of variables (summarized in Tables 2.3.3 – 2.3.11) follow the general pattern: <side>_<species>_<quantity>, where, <side> stands for A or B; <species> stands for the particle species (Al, Ar, C, etc., in column 2); and <quantity> represents Counts, Flux or Count Rate. Note that “Count” is not used in the variable names, in general. Variable names without ranges (e.g., A_C) or with double digit range (e.g., R17) have the values integrated over all the available ranges (R1 to R7, in general: e.g., B_H_SECT_Flux has values averaged over R1 – R7 in Table 2.3.3).

Examples: A_C, NEUT1, NEUT2_DET, (measured quantity is “counts”); B_FeGroup_SECT_Flux; PENa_C_Rate; R1A_32to50_Flux.
<table>
<thead>
<tr>
<th>Side</th>
<th>Species</th>
<th>Count</th>
<th>Flux</th>
<th>Count Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Size</td>
<td>Range SECT</td>
<td>Energy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(bins)</td>
<td>(bins)</td>
<td>(MeV/nuc)</td>
</tr>
<tr>
<td>A/B</td>
<td>Al</td>
<td>15</td>
<td>–</td>
<td>21 – 236</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>15</td>
<td>–</td>
<td>12 – 140</td>
</tr>
<tr>
<td></td>
<td>CNO_SECT</td>
<td>2x25</td>
<td>0 – 8 (9)</td>
<td>36 – 68</td>
</tr>
<tr>
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<td>Electrons</td>
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<td>–</td>
<td>0 – 10</td>
</tr>
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<td>Electron_SECT</td>
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<td>2 – 3</td>
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<td>H_SECT</td>
<td>2x25</td>
<td>0 – 8 (9)</td>
<td>18 – 34</td>
</tr>
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<td>He_SECT</td>
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</tr>
<tr>
<td></td>
<td>Mg</td>
<td>15</td>
<td>–</td>
<td>21 – 236</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>15</td>
<td>–</td>
<td>12 – 140</td>
</tr>
<tr>
<td></td>
<td>Ne</td>
<td>15</td>
<td>–</td>
<td>18 – 198</td>
</tr>
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<td>NetoSi_SECT</td>
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<td>0 – 8 (9)</td>
<td>57 – 57</td>
</tr>
<tr>
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<td>S</td>
<td>16</td>
<td>–</td>
<td>21 – 280</td>
</tr>
<tr>
<td></td>
<td>Si</td>
<td>15</td>
<td>–</td>
<td>21 – 236</td>
</tr>
<tr>
<td></td>
<td>NEUT1</td>
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<td>0 – 495</td>
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<td>NEUT2_DET</td>
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<td>–</td>
<td>0 – 495</td>
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Table 2.3.3: PSP_ISOIS-EPIHI_L2-HET-RATES3600. The 3600 s cadence HET data of the particle Counts, Flux and Count Rates for different particle species for sides A and B and ranges R1 – R7. R17 implies integration of the measured values over ranges R1 – R7.
### Table 2.3.4: PSP_ISOIS-EPIHI_L2-HET-RATES3600 (contd.). Here, ‘x’ stands for sides A & B.

<table>
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<th>Count Rate</th>
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<td></td>
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<td>Energy</td>
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<tr>
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<td></td>
<td>(bins)</td>
<td>(MeV/nuc)</td>
</tr>
<tr>
<td>A/B</td>
<td>PENx_C</td>
<td>9</td>
<td>45 – 583</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td></td>
<td>PENx_He</td>
<td>9</td>
<td>27 – 521</td>
</tr>
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<td></td>
<td>PENx_Mg</td>
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<td>64 – 646</td>
</tr>
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<td></td>
<td>PENx_N</td>
<td>9</td>
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</tr>
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<td></td>
<td>PENx_Ne</td>
<td>8</td>
<td>64 – 612</td>
</tr>
<tr>
<td></td>
<td>PENx_O</td>
<td>9</td>
<td>54 – 612</td>
</tr>
<tr>
<td></td>
<td>PENx_Si</td>
<td>9</td>
<td>76 – 687</td>
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</table>

Table 2.3.5: PSP_ISOIS-EPIHI_L2-HET-RATES3600 (contd.). Here ‘xxx’ stands for R1A & R1B.

<table>
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<th>Count Rate</th>
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<td>Energy</td>
<td>Size</td>
</tr>
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<td></td>
<td></td>
<td>(bins)</td>
<td>(MeV/nuc)</td>
<td>(bins)</td>
</tr>
<tr>
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<td>6</td>
<td>14 – 538</td>
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</tr>
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<td>14 – 538</td>
<td>6</td>
</tr>
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</tr>
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<td>11 – 484</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>xxx_C</td>
<td>12</td>
<td>6 – 463</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>xxx_Ca</td>
<td>11</td>
<td>11 – 484</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>xxx_Cr</td>
<td>12</td>
<td>11 – 495</td>
<td>12</td>
</tr>
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<td>xxx_Fe</td>
<td>11</td>
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<td>11</td>
</tr>
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<td>0 – 15 seg</td>
<td>–</td>
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</tr>
<tr>
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<td>xxx_N</td>
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<td>6 – 463</td>
<td>12</td>
</tr>
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<td>xxx_Na</td>
<td>11</td>
<td>8 – 469</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>xxx_Ne</td>
<td>11</td>
<td>8 – 469</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>xxx_Ne_BIN</td>
<td>4x8 (4)</td>
<td>23 – 65</td>
<td>–</td>
</tr>
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<td></td>
<td>xxx_Ne_BIN(MASS)</td>
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<td>0 – 7 seg</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>xxx_Ni</td>
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<td>14 – 507</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>xxx_O</td>
<td>11</td>
<td>7 – 463</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>xxx_S</td>
<td>12</td>
<td>10 – 484</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>xxx_Si</td>
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<td>10 – 476</td>
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### Table 2.3.6: PSP_ISOIS-EPIHI_L2-HET-RATES3600 (contd.). Here, ‘xxx’ stands for R2A and R2B.

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<th>Count Rate</th>
</tr>
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<td>Energy</td>
<td>Size</td>
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<td></td>
<td></td>
<td>(bins)</td>
<td>(MeV/nuc)</td>
<td>(bins)</td>
</tr>
<tr>
<td>A/B</td>
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<td>23–538</td>
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<td>14–495</td>
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</tr>
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<td>xxx_Electrons</td>
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<td>0–433</td>
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</tr>
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<td>xxx_Fe</td>
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<td>23–538</td>
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<td>6–463</td>
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<td>0–15 seg</td>
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</tr>
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<td>16–521</td>
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</tr>
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<td>xxx_Si</td>
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<td>16–507</td>
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<td>Count Rate</td>
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<td>(MeV/nuc)</td>
<td>(bins)</td>
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<td>23–65</td>
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<tr>
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<td>xxx_He_BIN (MASS)</td>
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<td>–</td>
<td>–</td>
</tr>
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<td></td>
<td>xxx_Mg</td>
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<td>23–507</td>
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Table 2.3.7: PSP_ISOIS-EPIHI_L2-HET-RATES3600 (contd.). Here, ‘xxx’ stands for R3A and R3B.
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Table 2.3.8: PSP_ISOIS-EPIHI_L2-HET-RATES3600 (contd.). Here, ‘xxx’ stands for R4A and R4B.
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<td>(bins)</td>
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Table 2.3.9: PSP_ISOIS-EPHI_L2-HET-RATES3600 (contd.). Here, ‘xxx’ stands for R5A and R5B.
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Table 2.3.10: PSP_ISOIS-EPIHI_L2-HET-RATES3600 (contd.). Here, ‘xxx’ stands for R6A and R6B.
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Table 2.3.11: PSP_ISOIS-EPIHI_L2-HET-RATES3600 (contd.). Here, ‘xxx’ stands for R7A and R7B.
2.3.4 FILE: PSP_ISOIS-EPIHI_L2-HET-RATES60

This file contains the 60-second cadence data of particle Counts, Flux (cm\(^{-2}\) sr\(^{-1}\) sec\(^{-1}\) MeV\(^{-1}\)) and Count Rate (counts/s) for Al, Ar, C, Ca, Cr, Electrons, Fe, H, He, Mg, N, Na, Ne, Ni, O, S and Si ions for ranges R1 – R7 of the High Energy Telescope (HET) for sides A and B. The measured values are summarized in Tables 2.3.12 – 2.3.20. The variable names follow the structure: \(<side>_<species>_<quantity>\), where, \(<side>\) stands for A or B; \(<species>\) stands for the particle species; and \(<quantity>\) represents Counts (not used in the variable names, in general), Flux or Count Rate. Variable names without ranges (e.g., A_C) or with double digit range (e.g., R17) have their values integrated over all the available ranges (R1 to R7, in general).

Examples: A_Fe (measured quantity is “counts”); B_Electron_SECT_Flux; PENB_Mg_Flux; R7A_Ni_Rate.

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<th>Count Rate</th>
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<td>(MeV/nuc)</td>
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Table 2.3.12: PSP_ISOIS-EPIHI_HET-RATES60. The HET 60 s cadence data for various particle species. R17 implies integration of the measured values over ranges R1 – R7.
Table 2.3.13: PSP_ISOIS-EPIHI_L2-HET-RATES60 (contd.). Here, ‘x’ stands for sides A & B.

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Table 2.3.15: PSP_ISOIS-EPIHI_L2-HET-RATES60 (contd.). Here, ‘xxx’ stands for R2A and R2B.
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Table 2.3.16: PSP_ISOIS-EPIHI_L2-HET-RATES60 (contd.). Here, ‘xxx’ stands for R3A and R3B.
Table 2.3.17: PSP_ISOIS-EPIHI_L2-HET-RATES60 (contd.). Here, ‘xxx’ stands for R4A and R4B.
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Table 2.3.19: PSP_ISOIS-EPIHI_L2-HET-RATES60 (contd.). Here, ‘xxx’ stands for R6A and R6B.
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<td>Size</td>
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Table 2.3.20: PSP_ISOIS-EPIHI_L2-HET-RATES60 (contd.). Here, ‘xxx’ stands for R7A and R7B.
2.3.5 FILE: PSP_ISOIS-EPIHI_L2-LET1-RATES10

This file contains the 10-second cadence data of particle Counts, Flux \((cm^{-2} \text{ sr}^{-1} \text{ sec}^{-1} \text{ MeV}^{-1})\) and Count Rate (counts/s) for Electrons, H and He ions for various ranges (R1 – R7) of the Low Energy Telescope (LET1), for sides A and B. The measured values are summarized in Table 2.3.21. The variable names follow the pattern: \(<\text{side}>_<\text{species}>_<\text{quantity}>\), where, \(<\text{side}>\) stands for A or B; \(<\text{species}>\) stands for the particle species; and \(<\text{quantity}>\) represents Counts (not used in the variable names, in general), Flux or Count Rate, for variables independent of range (R1, R2, etc.). The variables for different ranges has the structure: \(<\text{range}>_<\text{side}>_<\text{species}>_<\text{quantity}>\). For electrons, the structure is: \(<\text{Electrons}>_<\text{range}>_<\text{side}>\). Variable names without ranges (e.g., A_C) or with double digit range (e.g., R17) have the values integrated over all the available ranges (e.g., R1 to R7, in general).

Examples: A_He (measured quantity is “count”); Electrons_R6B_Rate; and R1A_He_Rate.

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<td>E-range (MeV/nuc) (bins)</td>
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<td>A/B</td>
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<td>Count</td>
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<td>20</td>
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<tr>
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<td></td>
<td>Flux</td>
<td>16</td>
<td>1 - 12 (16)</td>
<td>20</td>
</tr>
<tr>
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<td>16</td>
<td>1 - 12 (16)</td>
<td>20</td>
</tr>
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<td>8</td>
<td>1 - 3 (8)</td>
<td>8</td>
</tr>
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<td>1 - 3 (8)</td>
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<td>2 - 12 (13)</td>
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<td>1 - 3 (10)</td>
<td>10</td>
</tr>
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<td>1 - 3 (10)</td>
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<td>R4</td>
<td>Count</td>
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<td>1 - 4 (10)</td>
<td>10</td>
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<td>1 - 4 (10)</td>
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Table 2.3.21: PSP_ISOIS-EPIHI_L2-LET1-RATES10. The LET1 10 s data of various energetic particle species.
2.3.6 FILE: PSP_ISOIS-EPIHI_L2-LET1-RATES300

This file contains the 300 s cadence data of particle Counts, Flux (cm$^{-2}$ sr$^{-1}$ sec$^{-1}$ MeV$^{-1}$) and Count Rate (counts/s) for various particle species for ranges R1 & R26 (integrated over ranges R2 to R6) measured by the Low Energy Telescope (LET1), for sides A and B. The measured values are summarized in Table 2.3.22. The variable nomenclature is: <range><side>_<species>_<quantity>, where, <range> denotes the range (R1 to R7), <side> stands for A or B; <species> takes one of the particle species; and <quantity> represents Counts (not used in variable names, in general), Flux or Count Rate. Variable names without ranges (e.g., A_C) or with double digit range (e.g., R26) have the values integrated over all the available ranges (e.g., R2 to R6).

Examples: R1B_NetoSi_SECT_Rate; R26A_CNO_SECT_Flux.

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<th>NetoSi_SECT</th>
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<td>(bins)</td>
<td>(bins)</td>
<td>(bins)</td>
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</tr>
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</tr>
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<td>6 - 24</td>
<td>3</td>
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<td>6 - 24</td>
</tr>
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<td>0 - 24 (25)</td>
</tr>
<tr>
<td></td>
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<td>6 - 24</td>
<td>3</td>
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Table 2.3.22: PSP_ISOIS-EPIHI_L2-LET1-RATES300. The LET1 300 s cadence measurements of various energetic particle species for ranges R1 and integrated over ranges R2 – R6 (R26).

2.3.7 FILE: PSP_ISOIS-EPIHI_L2-LET1-RATES3600

This file contains the 3600 s cadence measurements of particle Counts, Count Rate (counts/sec) and Flux (cm$^{-2}$ sr$^{-1}$ sec$^{-1}$ MeV$^{-1}$) for Al, Ar, C, Ca, Cr, Fe, H, He, Mg, N, Na, Ne, Ni, O, S and Si by the Low Energy Telescope (LET1), for sides A and B for different ranges (R1 – R6). The measured values are summarized in Tables 2.3.23 – 2.3.32 and the variables are named as: <side>_<species>_<quantity>. Here, <side> stands for A or B; <species> stands for the particle species; and <quantity> represents Counts (not used in variable names, in general), Flux or Rate. Variable names without ranges (e.g., A_C) or with double digit range (e.g., R35) have their values integrated over all the available ranges (e.g., R3 to R5).

Examples: A_C_Flux; PENB_C_Rate; R1A_32to50_Flux; Electrons_R5B.
Table 2.3.23: PSP_ISOIS-EPIHI_L2-LET1-RATES3600. The 3600 s cadence LET1 data for various particle species for sides A and B.

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<th>Count</th>
<th>Flux</th>
<th>Count Rate</th>
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</thead>
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<td>C</td>
<td>27</td>
<td>1–99</td>
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<td>Ca</td>
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<td>1–140</td>
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<td>He</td>
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<td>1–50</td>
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<td>S</td>
<td>29</td>
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<td>Si</td>
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Table 2.3.24: PSP_ISOIS-EPIHI_L2-LET1-RATES3600 (contd.). Here ‘x’ denotes sides A & B.

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<td>Energy (MeV/nuc)</td>
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Table 2.3.25: PSP_ISOIS-EPIHI_L2-LET1-RATES3600 (contd.). Here, ‘xxx’ denotes R1A and R1B.

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<td>1 – 259</td>
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<td>1 – 259</td>
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<td>1 – 261</td>
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<td>1 – 260</td>
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<td>0 – 264</td>
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### Table 2.3.26: PSP_ISOIS-EPIHI_L2-LET1-RATES3600 (contd.). Here, ‘xxx’ denotes R2A and R2B.

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<td>xxx_32to50</td>
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<td>18</td>
<td>2 – 279</td>
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<td>xxx_C</td>
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<td>18</td>
<td>1 – 272</td>
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<td>20</td>
<td>2 – 288</td>
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<td>xxx_He</td>
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<td>17</td>
<td>1 – 266</td>
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<td>0 – 7 seg</td>
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<td>–</td>
<td>–</td>
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<td>xxx_O</td>
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<td>1 – 272</td>
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<td>2 – 288</td>
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<td>2 – 288</td>
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<td>xxx_Si</td>
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Table 2.3.27: PSP_ISOIS-EPIHI_L2-LET1-RATES3600 (contd.). Here, ‘xxx’ stands for R3A and R3B.

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<td>8 – 32</td>
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<td>xxx_He_BIN (MASS)</td>
<td>16 bins</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>xxx_Ne_BIN</td>
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<td>xxx_Ne_BIN (MASS)</td>
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A/B

Table 2.3.28: PSP_ISOIS-EPIHI_L2-LET1-RATES3600 (contd.). Here, ‘xxxx’ stands for R35A and R35B which implies the values are integrated over ranges R3 – R5 for sides A and B.

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<td>Energy (MeV/nuc)</td>
<td>Size (bins)</td>
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<td>xxxxx_32to50</td>
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<td>8 – 384</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>xxxxx_Al</td>
<td>13</td>
<td>8 – 310</td>
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</tr>
<tr>
<td></td>
<td>xxxxx_Ar</td>
<td>13</td>
<td>10 – 320</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>xxxxx_C</td>
<td>14</td>
<td>5 – 294</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>xxxxx_Ca</td>
<td>14</td>
<td>10 – 332</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>xxxxx_Cr</td>
<td>14</td>
<td>10 – 332</td>
<td>14</td>
</tr>
<tr>
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</tr>
<tr>
<td></td>
<td>xxxxx_H</td>
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<td>xxxxx_He</td>
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<td>xxxxx_Mg</td>
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<td>xxxxx_N</td>
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<td>xxxxx_Na</td>
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<td>xxxxx_Ne</td>
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<td>xxxxx_Ni</td>
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<td>Count Rate</td>
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<td>Energy (MeV/nuc)</td>
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Table 2.3.29: PSP_ISOIS-EPIHI_L2-LET1-RATES3600 (contd.). Here, ‘xxx’ stands for R4A and R4B.

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<td></td>
<td>Size (bins)</td>
<td>Energy (MeV/nuc)</td>
</tr>
<tr>
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<td>1 – 7</td>
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Table 2.3.30: PSP_ISOIS-EPIHI_L2-LET1-RATES3600 (contd.). Here, ‘xxx’ stands for R5A and R5B.

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</tr>
<tr>
<td></td>
<td>xxxx_He_BIN (MASS)</td>
<td>16 bins 0 - 15 seg</td>
</tr>
<tr>
<td></td>
<td>xxxx_Ne_BIN</td>
<td>6x8 (6)</td>
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<td>xxxx_Ne_BIN (MASS)</td>
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Table 2.3.31: PSP_ISOIS-EPIHI_L2-LET1-RATES3600 (contd.). Here, ‘xxxx’ stands for R45A and R45B and the values are integrated over ranges R4 – R5.
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<td>(MeV/nuc)</td>
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<td>32–332</td>
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<td>xxx_Cr</td>
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<td>32–332</td>
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<td>–</td>
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</tr>
<tr>
<td></td>
<td>0 - 15 seg</td>
<td>–</td>
<td>–</td>
<td>–</td>
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<td>23–320</td>
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<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>0 - 7 seg</td>
<td>–</td>
<td>–</td>
<td>–</td>
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<td>19–320</td>
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<td>xxx_S</td>
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<td>32–332</td>
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<td>32–332</td>
</tr>
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<td>xxx_Si</td>
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<td>27–332</td>
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Table 2.3.32: PSP_ISOIS-EPIHI_L2-LET1-RATES3600 (contd.). Here, ‘xxx’ stands for R6A and R6B.
2.3.8 FILE: PSP_ISOIS-EPIHI_L2-LET1-RATES60

This file contains the LET1 (Low Energy Telescope) 60 s cadence measurements of particle Counts, Flux ($\text{cm}^{-2} \text{sr}^{-1} \text{sec}^{-1} \text{MeV}^{-1}$) and Count Rate (counts/s) of Al, Ar, C, Ca, Cr, Fe, H, He, Mg, N, Na, Ne, Ni, O, S and Si for sides A and B. The values of these variables are summarized in Tables 2.3.33 – 2.3.29. The variables are named as: <side>_<species>_<quantity>, where, <side> stands for A or B; <species> stands for the particle species; and <quantity> represents Count, Flux or Rate (“Count” is not used in the variable names, in general). Variable names without ranges (e.g. A_C) or with double digit range (e.g. R35) have the values integrated over all the available ranges (e.g. R3 to R5).

Examples: A_C_Flux, PENB_C_Rate, R1A_32to50_Flux.

<table>
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<th>Count Rate</th>
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<td>Size</td>
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<td>(bins)</td>
<td>(MeV/nuc)</td>
<td>(bins)</td>
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<td>1 – 50</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>Mg</td>
<td>28</td>
<td>1 – 118</td>
<td>28</td>
</tr>
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<td>1 – 99</td>
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<td>1 – 118</td>
<td>28</td>
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<td>Ne</td>
<td>28</td>
<td>1 – 118</td>
<td>28</td>
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<td></td>
<td>Ni</td>
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<td>1 – 198</td>
<td>33</td>
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<td></td>
<td>O</td>
<td>28</td>
<td>1 – 118</td>
<td>28</td>
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<td>S</td>
<td>29</td>
<td>1 – 140</td>
<td>29</td>
</tr>
<tr>
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<td>Si</td>
<td>29</td>
<td>1 – 140</td>
<td>29</td>
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Table 2.3.33: PSP_ISOIS-EPIHI_L2-LET1-RATES60. The LET1 measurements of different particle species at a cadence of 60 s for sides A and B.
<table>
<thead>
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<th>Count</th>
<th>Count Rate</th>
</tr>
</thead>
<tbody>
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<td></td>
<td></td>
<td>Size</td>
<td>Energy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(bins)</td>
<td>(MeV/nuc)</td>
</tr>
<tr>
<td>A/B</td>
<td>PENx_C</td>
<td>9</td>
<td>45 – 583</td>
</tr>
<tr>
<td></td>
<td>PENx_Fe</td>
<td>9</td>
<td>108 – 793</td>
</tr>
<tr>
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<td>PENx_H</td>
<td>9</td>
<td>27 – 521</td>
</tr>
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<td>PENx_He</td>
<td>9</td>
<td>27 – 521</td>
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<td>PENx_Mg</td>
<td>9</td>
<td>64 – 646</td>
</tr>
<tr>
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<td>PENx_N</td>
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</tr>
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<td>PENx_Ne</td>
<td>8</td>
<td>64 – 612</td>
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<td>PENx_O</td>
<td>9</td>
<td>54 – 612</td>
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<tr>
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<td>PENx_Si</td>
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<td>76 – 687</td>
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Table 2.3.34: PSP_ISOIS-EPIHI_L2-LET1-RATES60 (contd.). Here, ‘x’ stands for sides A & B.

<table>
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<th>Flux</th>
<th>Count Rate</th>
</tr>
</thead>
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<td>Size</td>
<td>Range SECT</td>
<td>Energy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(bins)</td>
<td>(bins)</td>
<td>(MeV/nuc)</td>
</tr>
<tr>
<td>A/B</td>
<td>xxx_29to32</td>
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<td>–</td>
<td>0 – 264</td>
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<tr>
<td></td>
<td>xxx_32to50</td>
<td>7</td>
<td>–</td>
<td>0 – 264</td>
</tr>
<tr>
<td></td>
<td>xxx_Al</td>
<td>14</td>
<td>–</td>
<td>1 – 260</td>
</tr>
<tr>
<td></td>
<td>xxx_Ar</td>
<td>15</td>
<td>–</td>
<td>1 – 261</td>
</tr>
<tr>
<td></td>
<td>xxx_C</td>
<td>12</td>
<td>–</td>
<td>1 – 261</td>
</tr>
<tr>
<td></td>
<td>xxx_Ca</td>
<td>16</td>
<td>–</td>
<td>1 – 261</td>
</tr>
<tr>
<td></td>
<td>xxx_Cr</td>
<td>17</td>
<td>–</td>
<td>1 – 261</td>
</tr>
<tr>
<td></td>
<td>xxx_Fe</td>
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<td>1 – 261</td>
</tr>
<tr>
<td></td>
<td>xxx_H</td>
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<td>–</td>
<td>0 – 258</td>
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<tr>
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<td>xxx_He</td>
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<td>0 – 258</td>
</tr>
<tr>
<td></td>
<td>xxx_Mg</td>
<td>14</td>
<td>–</td>
<td>1 – 260</td>
</tr>
<tr>
<td></td>
<td>xxx_N</td>
<td>12</td>
<td>–</td>
<td>1 – 259</td>
</tr>
<tr>
<td></td>
<td>xxx_Na</td>
<td>13</td>
<td>–</td>
<td>1 – 259</td>
</tr>
<tr>
<td></td>
<td>xxx_Ne</td>
<td>13</td>
<td>–</td>
<td>1 – 259</td>
</tr>
<tr>
<td></td>
<td>xxx_Ni</td>
<td>17</td>
<td>–</td>
<td>1 – 261</td>
</tr>
<tr>
<td></td>
<td>xxx_O</td>
<td>13</td>
<td>–</td>
<td>1 – 259</td>
</tr>
<tr>
<td></td>
<td>xxx_S</td>
<td>15</td>
<td>–</td>
<td>1 – 259</td>
</tr>
<tr>
<td></td>
<td>xxx_Si</td>
<td>14</td>
<td>–</td>
<td>1 – 260</td>
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<tr>
<td></td>
<td>xxx_g50</td>
<td>7</td>
<td>–</td>
<td>0 – 264</td>
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Table 2.3.35: PSP_ISOIS-EPIHI_L2-LET1-RATES60 (contd.). Here, ‘xxx’ stands for R1A and R1B.
### Table 2.3.36: PSP_ISOIS-EPIHI_L2-LET1-RATES60 (contd.). Here, ‘xxxx’ stands for R26A and R26B. The variables have values integrated over ranges R2 – R6.

<table>
<thead>
<tr>
<th>Side</th>
<th>Species</th>
<th>Count</th>
<th>Flux (1/cm² sr sec MeV)</th>
<th>Count Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Size (bins)</td>
<td>Range SECT (bins)</td>
<td>Energy (MeV/nuc)</td>
</tr>
<tr>
<td>xxxx_H_SECT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>xxxxx_H_SECT</td>
<td>3x25 (3 bins)</td>
<td>R26 0 – 24 (25)</td>
<td>3 – 12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3x25 (3 bins)</td>
<td>R26 0 – 24 (25)</td>
<td>3 – 12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3x25 (3 bins)</td>
<td>R26 0 – 24 (25)</td>
<td>3 – 12</td>
<td></td>
</tr>
<tr>
<td>A/B xxxxx_He_SECT</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>xxxxx_He_SECT</td>
<td>3x25 (3 bins)</td>
<td>R26 0 – 24 (25)</td>
<td>3 – 12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3x25 (3 bins)</td>
<td>R26 0 – 24 (25)</td>
<td>3 – 12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3x25 (3 bins)</td>
<td>R26 0 – 24 (25)</td>
<td>3 – 12</td>
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<td>8 x 25 (8 bins)</td>
<td>R26 0 – 24 (25)</td>
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### Table 2.3.37: PSP_ISOIS-EPIHI_L2-LET1-RATES60 (contd.). Here, ‘xxx’ stands for R2A and R2B.

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<tr>
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<td>1 – 320</td>
</tr>
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<td></td>
<td>xxx_Al</td>
<td>18</td>
<td>2 – 279</td>
</tr>
<tr>
<td></td>
<td>xxx_Ar</td>
<td>20</td>
<td>2 – 288</td>
</tr>
<tr>
<td></td>
<td>xxx_C</td>
<td>18</td>
<td>1 – 272</td>
</tr>
<tr>
<td></td>
<td>xxx_Ca</td>
<td>20</td>
<td>2 – 288</td>
</tr>
<tr>
<td></td>
<td>xxx_Cr</td>
<td>20</td>
<td>2 – 288</td>
</tr>
<tr>
<td></td>
<td>xxx_Fe</td>
<td>20</td>
<td>2 – 288</td>
</tr>
<tr>
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<td>xxx_H</td>
<td>17</td>
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</tr>
<tr>
<td></td>
<td>xxx_He</td>
<td>17</td>
<td>1 – 266</td>
</tr>
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<td></td>
<td>xxx_Mg</td>
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</tr>
<tr>
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<td>xxx_S</td>
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<td>2 – 288</td>
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<td>18</td>
<td>2 – 279</td>
</tr>
<tr>
<td></td>
<td>xxx_gt50</td>
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<td>1 – 320</td>
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Table 2.3.38: PSP_ISOIS-EPIHI_L2-LET1-RATES60 (contd.). Here, ‘xxxx’ stands for R35A and R35B. The values are integrated over ranges R3 – R5.

<table>
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<td>Size</td>
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<td>(MeV/nuc)</td>
<td>(bins)</td>
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<tr>
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<td>8 – 384</td>
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</tr>
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<td>xxxx_Al</td>
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<td>8 – 310</td>
<td>13</td>
</tr>
<tr>
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<td>xxxx_Ar</td>
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</tr>
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<td>xxxx_C</td>
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</tr>
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<td>xxxx_Ca</td>
<td>14</td>
<td>10 – 332</td>
<td>14</td>
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<tr>
<td></td>
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<td>xxxx_He</td>
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<td>xxxx_N</td>
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<td>5 – 294</td>
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<td>xxxx_O</td>
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<td>6 – 301</td>
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<td>xxxx_S</td>
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<td>xxxx_Si</td>
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<td>8 – 384</td>
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### Table 2.3.39: PSP_ISOIS-EPIHI_L2-LET1-RATES60 (contd.). Here, ‘xxx’ stands for R6A and R6B.

<table>
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<td>Size</td>
</tr>
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<td></td>
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<td>(MeV/nuc)</td>
<td>(bins)</td>
</tr>
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<td>32–384</td>
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</tr>
<tr>
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<td>xxx_32to50</td>
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</tr>
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<td>xxx_Al</td>
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<td>23–320</td>
<td>8</td>
</tr>
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<td>xxx_Ar</td>
<td>7</td>
<td>32–332</td>
<td>7</td>
</tr>
<tr>
<td></td>
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<td>16–310</td>
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<td>xxx_Mg</td>
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<td>23–320</td>
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<tr>
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<td>16–310</td>
<td>9</td>
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<td>xxx_Ne_BIN</td>
<td>3x8 (3)</td>
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<td></td>
<td>xxx_Ne_BIN (MASS)</td>
<td>8 bins</td>
<td>46–92</td>
<td>–</td>
</tr>
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<td></td>
<td>xxx_Ni</td>
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<td>38–364</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>xxx_O</td>
<td>9</td>
<td>19–320</td>
<td>9</td>
</tr>
<tr>
<td></td>
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<td>xxx_gt50</td>
<td>4</td>
<td>32–384</td>
<td>4</td>
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</table>
2.3.9 FILE: PSP_ISOIS-EPIHI_L2-LET2-RATES10

This file contains the 10-second cadence data of particle Counts, Flux \((\text{cm}^{-2} \text{ sr}^{-1} \text{ sec}^{-1} \text{ MeV}^{-1})\) and Count Rate \((\text{counts/s})\) for Electrons, H and He ions for various ranges \((R1 – R7)\) of the single-sided (depicted as C) Low Energy Telescope (LET2). Table 2.3.40 summarizes the measured values. The variable names follow the structure: \(<\text{side}>_<\text{species}>_<\text{quantity}>\), where, \(<\text{side}>\) stands for \(C\); \(<\text{species}>\) stands for the particle species, and \(<\text{quantity}>\) represents Counts (not used in the variable names, in general), Flux or Rate for those variables independent of range. The variable names for different ranges \((R1 – R5)\) are of the form: \(<\text{range}>_<\text{side}>_<\text{species}>_<\text{quantity}>\). For electrons, the structure is: \(<\text{Electrons}>_<\text{range}>_<\text{side}>\). Variable names without ranges (e.g., A_C) or with double digit range (e.g., R17) have the values integrated over all the available ranges (e.g., R1 to R7).

Examples: C_He (measured quantity is “count”); Electrons_R3C_Rate; R1C_He_Rate.

<table>
<thead>
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<th>Side</th>
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<th>Quantity</th>
<th>Electrons</th>
<th>H</th>
<th>He</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<td>E-range (MeV/nuc) (bins)</td>
<td>E-bins</td>
</tr>
<tr>
<td>C</td>
<td>R1</td>
<td>Count</td>
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<td>1 - 12 (16)</td>
<td>20</td>
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<td></td>
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<td>Flux</td>
<td>16</td>
<td>1 - 12 (16)</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Count Rate</td>
<td>16</td>
<td>1 - 12 (16)</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>R2</td>
<td>Count</td>
<td>8</td>
<td>1 - 3 (8)</td>
<td>8</td>
</tr>
<tr>
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<td>Flux</td>
<td>8</td>
<td>1 - 3 (8)</td>
<td>8</td>
</tr>
<tr>
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<td></td>
<td>Count Rate</td>
<td>8</td>
<td>1 - 3 (8)</td>
<td>8</td>
</tr>
<tr>
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<td>R35</td>
<td>Count</td>
<td>13</td>
<td>2 - 12 (13)</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flux</td>
<td>13</td>
<td>2 - 12 (13)</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Count Rate</td>
<td>13</td>
<td>2 - 12 (13)</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>R3</td>
<td>Count</td>
<td>10</td>
<td>1 - 3 (10)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flux</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Count Rate</td>
<td>10</td>
<td>1 - 3 (10)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>R4</td>
<td>Count</td>
<td>10</td>
<td>1 - 4 (10)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flux</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Count Rate</td>
<td>10</td>
<td>1 - 4 (10)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>R5</td>
<td>Count</td>
<td>9</td>
<td>1 - 4 (9)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flux</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Count Rate</td>
<td>9</td>
<td>1 - 4 (9)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2.3.40: PSP_ISOIS-EPIHI_L2-LET2-RATES10. The 10 s cadence data of LET2 for various energetic particle species.
2.3.10 FILE: PSP_ISOIS-EPIHI_L2-LET2-RATES300

This file contains the 300 s cadence data of particle Counts, Flux (cm\(^{-2}\) sr\(^{-1}\) sec\(^{-1}\) MeV\(^{-1}\)) and Count Rate (counts/s) for various particle species for ranges R1 & R26 (integrated over Ranges 2 – 6) measured by the single-sided (named C) Low Energy Telescope (LET2). The measured values are summarized in Table 2.3.41. The variable naming is: <range>_ <side>_ <species>_ <quantity>, where, <range> denotes the range (R1 and R26), <side> stands for C; <species> takes one of the particle species; and <quantity> represents Counts (not used in variable names, in general), Flux or Rate. Variable names without ranges (e.g., A_C) or with double digit range (e.g., R25) have the values integrated over all the available ranges (e.g., R2 to R5). Examples: R1C_NetoSi_SECT_Rate; R25C_CNO_SECT_Flux.

<table>
<thead>
<tr>
<th>Side</th>
<th>Range</th>
<th>Quantity</th>
<th>CNO_SECT</th>
<th>FeGroup_SECT</th>
<th>NetoSi_SECT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>E-bins</td>
<td>E-range (MeV/nuc)</td>
<td>Sectors (bins)</td>
</tr>
<tr>
<td>C</td>
<td>R1</td>
<td>Count</td>
<td>1</td>
<td>3 - 3</td>
<td>0 - 8 (9)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flux</td>
<td>1</td>
<td>3 - 3</td>
<td>0 - 8 (9)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Count Rate</td>
<td>1</td>
<td>3 - 3</td>
<td>0 - 8 (9)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Count Rate</td>
<td>3</td>
<td>6 - 24</td>
<td>0 - 24 (25)</td>
</tr>
</tbody>
</table>

R1 ENB_SECT – measured quantity is Counts; Size 3 x 9; E-bins: 3; E-range: 1 - 2 (MeV/nuc); Sectors: 0 - 8 (9).

R26 ENB_SECT – measured quantity is Counts; Size 4 x 25; E-bins: 4; E-range: 2 - 12 (MeV/nuc); Sectors: 0 - 24 (25).

Table 2.3.41: PSP_ISOIS-EPIHI_L2-LET2-RATES300. The LET2 300 s cadence measurements of various energetic particle species for ranges R1 and integrated over ranges R2 – R6 (R26).

2.3.11 FILE: PSP_ISOIS-EPIHI_L2-LET2-RATES3600

This file contains the 3600 s cadence data of particle Counts, Flux (cm\(^{-2}\) sr\(^{-1}\) sec\(^{-1}\) MeV\(^{-1}\)) and Count Rate (counts/s) for Al, Ar, C, Ca, Cr, Fe, H, He, Mg, N, Na, Ne, Ni, O, S and Si by the single sided (depicted as C) Low Energy Telescope (LET2). The measured values of these variables are summarized in Tables 2.3.42 – 2.3.49. The variables are named as: <side>_ <species>_ <quantity>, where, <side> stands for C; <species> represents the particle species; and <quantity> denotes Counts (not used in the variable names, in general), Flux or Rate. Variable names without ranges (e.g. C_Al) or with double digit range (e.g. R25) have the values integrated over all the available ranges (e.g. R2 to R5). Examples: C_Si_Flux; PENB_C_Rate; R1C_32to50_Flux; Electrons_R5C.
Table 2.3.42: PSP_ISOIS-EPIHI_L2-LET2-RATES3600. The 3600 s cadence data for various particle species for the single–sided (side C) telescope LET2.

<table>
<thead>
<tr>
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<th>Species</th>
<th>Count</th>
<th>Flux</th>
<th>Count Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Al</td>
<td>27</td>
<td>1–99</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Ar</td>
<td>29</td>
<td>1–118</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>25</td>
<td>1–70</td>
<td>25</td>
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<tr>
<td></td>
<td>Ca</td>
<td>30</td>
<td>1–140</td>
<td>30</td>
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<td></td>
<td>Cr</td>
<td>31</td>
<td>1–140</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>Fe</td>
<td>31</td>
<td>1–140</td>
<td>31</td>
</tr>
<tr>
<td>C</td>
<td>H</td>
<td>24</td>
<td>1–35</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>He</td>
<td>25</td>
<td>1–42</td>
<td>25</td>
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<td>Mg</td>
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<td>N</td>
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<td>27</td>
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<td>27</td>
</tr>
<tr>
<td></td>
<td>Ni</td>
<td>32</td>
<td>1–167</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>O</td>
<td>26</td>
<td>1–83</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>28</td>
<td>1–118</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>Si</td>
<td>28</td>
<td>1–117</td>
<td>28</td>
</tr>
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</table>

Table 2.3.43: PSP_ISOIS-EPIHI_L2-LET2-RATES3600 (contd.). Here, ‘x’ stands for side C.

<table>
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<th>Count Rate</th>
</tr>
</thead>
<tbody>
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<td></td>
<td></td>
<td>Size (bins)</td>
<td>Energy (MeV/nuc)</td>
</tr>
<tr>
<td></td>
<td>PENx_C</td>
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<td>23–364</td>
</tr>
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<td></td>
<td>PENx_Fe</td>
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<td>45–471</td>
</tr>
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<td></td>
<td>PENx_He</td>
<td>11</td>
<td>11–310</td>
</tr>
<tr>
<td></td>
<td>PENx_Mg</td>
<td>10</td>
<td>38–408</td>
</tr>
<tr>
<td></td>
<td>PENx_N</td>
<td>11</td>
<td>23–364</td>
</tr>
<tr>
<td></td>
<td>PENx_Ne</td>
<td>11</td>
<td>27–384</td>
</tr>
<tr>
<td></td>
<td>PENx_O</td>
<td>11</td>
<td>27–384</td>
</tr>
<tr>
<td></td>
<td>PENx_Si</td>
<td>10</td>
<td>38–408</td>
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<td>Species</td>
<td>Count</td>
<td>Flux</td>
</tr>
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<td>---------------</td>
<td>-------</td>
<td>------</td>
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<tr>
<td></td>
<td></td>
<td>Size</td>
<td>Range</td>
</tr>
<tr>
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<td></td>
<td>(bins)</td>
<td>SECT</td>
</tr>
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<td>7</td>
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<td>xxx_32to50</td>
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<td>32–50</td>
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<td>xxx_Al</td>
<td>14</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>xxx_Ar</td>
<td>15</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>xxx_C</td>
<td>12</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>xxx_Ca</td>
<td>16</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>xxx_CNO_Sect</td>
<td>1x9</td>
<td>R1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1bin)</td>
<td>3–3</td>
</tr>
<tr>
<td></td>
<td>xxx_Cr</td>
<td>17</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>xxx_Fe</td>
<td>17</td>
<td>–</td>
</tr>
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<td>xxx_FeGroup_Sect</td>
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<td>R1</td>
</tr>
<tr>
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<td></td>
<td>(1bin)</td>
<td>3–3</td>
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<tr>
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</tr>
<tr>
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<td>xxx_H_Sect</td>
<td>1x9</td>
<td>R1</td>
</tr>
<tr>
<td></td>
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<td>2–2</td>
</tr>
<tr>
<td></td>
<td>xxx_He</td>
<td>12</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>xxx_He_Sect</td>
<td>1x9</td>
<td>R1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1bin)</td>
<td>2–2</td>
</tr>
<tr>
<td></td>
<td>xxx_He_BIN</td>
<td>5x16 (5) 16 bins 0–15 seg</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>xxx_He_BIN(MASS)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
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<td>xxx_Mg</td>
<td>14</td>
<td>–</td>
</tr>
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<td>xxx_N</td>
<td>12</td>
<td>–</td>
</tr>
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<td>xxx_Na</td>
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<td>–</td>
</tr>
<tr>
<td></td>
<td>xxx_Ne</td>
<td>13</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>xxx_Ne_BIN</td>
<td>5x8 (5) 8 bins 0–7 seg</td>
<td>–</td>
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<td>xxx_Ne_BIN(MASS)</td>
<td>–</td>
<td>–</td>
</tr>
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<td></td>
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<td>17</td>
<td>–</td>
</tr>
<tr>
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<td>xxx_O</td>
<td>13</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>xxx_S</td>
<td>15</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>xxx_Si</td>
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<td>–</td>
</tr>
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<td>xxx_NetoSi_Sect</td>
<td>1x9</td>
<td>R1</td>
</tr>
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<td></td>
<td>(1bin)</td>
<td>3–3</td>
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<td>xxx_gt50</td>
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Table 2.3.44: PSP_ISOIS-EPIHI_L2-LET2-RATES3600 (contd.). Here, ‘xxx’ stands for R1C.
<table>
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<th>Count Rate</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Size</td>
<td>Energy</td>
<td>Size</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Range SECT (bins)</td>
<td>(MeV/nuc)</td>
<td>Range SECT (bins)</td>
</tr>
<tr>
<td></td>
<td>xxx_NotSi_SECT</td>
<td>3x25</td>
<td>R25 – 24 (25)</td>
<td>6 – 24</td>
</tr>
</tbody>
</table>

Table 2.3.45: PSP_ISOIS-EPIHI_L2-LET2-RATES3600 (contd.). Here, ‘xxxx’ stands for R25C and the values are integrated over ranges R2 – R5.

<table>
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<th>Side</th>
<th>Species</th>
<th>Count</th>
<th>Flux</th>
<th>Count Rate</th>
</tr>
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<td></td>
<td></td>
<td>Size</td>
<td>Energy</td>
<td>Size</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Range SECT (bins)</td>
<td>(MeV/nuc)</td>
<td>Range SECT (bins)</td>
</tr>
<tr>
<td>C</td>
<td>xxx_29to32</td>
<td>8</td>
<td>1 – 320</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>xxx_32to50</td>
<td>8</td>
<td>1 – 320</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>xxx_Al</td>
<td>18</td>
<td>2 – 279</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>xxx_Ar</td>
<td>20</td>
<td>2 – 288</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>xxx_C</td>
<td>18</td>
<td>1 – 272</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>xxx_Ca</td>
<td>20</td>
<td>2 – 288</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>xxx_Cr</td>
<td>20</td>
<td>2 – 288</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>xxx_Fe</td>
<td>20</td>
<td>2 – 288</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>xxx_H</td>
<td>17</td>
<td>1 – 264</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>xxx_NotHe</td>
<td>17</td>
<td>1 – 266</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>xxx_NotHe_BIN</td>
<td>7x16 (7)</td>
<td>0 – 15 seg</td>
<td>2 – 16</td>
</tr>
<tr>
<td></td>
<td>xxx_NotHe_BIN (MASS)</td>
<td>16 bins</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>xxx_Mg</td>
<td>18</td>
<td>2 – 279</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>xxx_N</td>
<td>18</td>
<td>1 – 272</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>xxx_Na</td>
<td>18</td>
<td>1 – 275</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>xxx_NotNe</td>
<td>18</td>
<td>1 – 275</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>xxx_NotNe_BIN</td>
<td>8x8 (8)</td>
<td>0 – 7 seg</td>
<td>3 – 32</td>
</tr>
<tr>
<td></td>
<td>xxx_NotNe_BIN (MASS)</td>
<td>8 bins</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>xxx_Ni</td>
<td>21</td>
<td>2 – 294</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>xxx_O</td>
<td>17</td>
<td>1 – 272</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>xxx_S</td>
<td>20</td>
<td>2 – 288</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>xxx_Si</td>
<td>18</td>
<td>2 – 279</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>xxx_NotSi</td>
<td>8</td>
<td>1 – 320</td>
<td>8</td>
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Table 2.3.46: PSP_ISOIS-EPIHI_L2-LET2-RATES3600 (contd.). Here, ‘xxx’ stands for R2C.
### Table 2.3.47: PSP_ISOIS-EPIHI_L2-LET2-RATES3600 (contd.). LET2 electron measurements for ranges R3, R4 and R5.

<table>
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<th>Count</th>
<th>Count Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td>Energy (MeV/nuc)</td>
</tr>
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<td>Electrons_R3C</td>
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<td>0 – 6</td>
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<td>R3C_He_BIN</td>
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<td>8 – 32</td>
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<td>R3C_He_BIN (MASS)</td>
<td>16 bins</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 – 15 seg</td>
<td>–</td>
</tr>
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<td></td>
<td>R3C_Ne_BIN</td>
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<td>16 – 92</td>
</tr>
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<td>R3C_Ne_BIN (MASS)</td>
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<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 – 7 seg</td>
<td>–</td>
</tr>
<tr>
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<td>Electrons_R4C</td>
<td>16</td>
<td>0 – 7</td>
</tr>
<tr>
<td></td>
<td>Electrons_R5C</td>
<td>15</td>
<td>1 – 7</td>
</tr>
</tbody>
</table>

Table 2.3.48: PSP_ISOIS-EPIHI_L2-LET2-RATES3600 (contd.). Here, ‘xxxx’ stands for R35C which implies that the values are integrated over ranges R3 – R5.

<table>
<thead>
<tr>
<th>Side</th>
<th>Species</th>
<th>Count</th>
<th>Flux</th>
<th>Count Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>xxxx_29to32</td>
<td>6</td>
<td>8 – 384</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>xxxx_32to50</td>
<td>6</td>
<td>8 – 384</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>xxxx_Al</td>
<td>13</td>
<td>8 – 310</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>xxxx_Ar</td>
<td>13</td>
<td>10 – 320</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>xxxx_C</td>
<td>14</td>
<td>5 – 294</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>xxxx_Ca</td>
<td>14</td>
<td>10 – 332</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>xxxx_Cr</td>
<td>14</td>
<td>10 – 332</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>xxxx_Fe</td>
<td>14</td>
<td>10 – 332</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>xxxx_He</td>
<td>14</td>
<td>3 – 279</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>xxxx_Mg</td>
<td>13</td>
<td>8 – 310</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>xxxx_N</td>
<td>14</td>
<td>5 – 294</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>xxxx_Na</td>
<td>14</td>
<td>7 – 310</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>xxxx_Ne</td>
<td>14</td>
<td>7 – 310</td>
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<tr>
<td></td>
<td>xxxx_Ni</td>
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<td>10 – 347</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>xxxx_O</td>
<td>14</td>
<td>6 – 301</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>xxxx_S</td>
<td>13</td>
<td>10 – 320</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>xxxx_Si</td>
<td>14</td>
<td>8 – 320</td>
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</tr>
<tr>
<td></td>
<td>xxxx_gt50</td>
<td>6</td>
<td>8 – 384</td>
<td>6</td>
</tr>
</tbody>
</table>
Table 2.3.49: PSP_ISOIS-EPIHI_L2-LET2-RATES3600 (contd.). Here, ’xxxx’ stands for R45C and the values presented here are integrated over ranges R4 – R5.

### Table 2.3.50: PSP_ISOIS-EPIHI_L2-LET2-RATES60

The 60 s cadence measurements of the single–sided (side C) telescope LET2 for different particle species.

<table>
<thead>
<tr>
<th>Side</th>
<th>Species</th>
<th>Count</th>
<th>Flux</th>
<th>Count Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>xxxx_He_BIN</td>
<td>5x16 (5) 16 bins 0 - 15 seg</td>
<td>8 – 32</td>
<td></td>
</tr>
<tr>
<td></td>
<td>xxxx_He_BIN (MASS)</td>
<td>6x8 (6) 6 bins 0 - 7 seg</td>
<td>16 – 92</td>
<td></td>
</tr>
<tr>
<td></td>
<td>xxxx_Ne_BIN</td>
<td>6x8 (6) 6 bins 0 - 7 seg</td>
<td>16 – 92</td>
<td></td>
</tr>
<tr>
<td></td>
<td>xxxx_Ne_BIN (MASS)</td>
<td>6x8 (6) 6 bins 0 - 7 seg</td>
<td>16 – 92</td>
<td></td>
</tr>
</tbody>
</table>

This file contains the 60 s cadence measurements of particle Counts, Flux (cm$^{-2}$ sr$^{-1}$ sec$^{-1}$ MeV$^{-1}$) and Count Rate (counts/s) of Al, Ar, C, Ca, Cr, Fe, H, He, Mg, N, Na, Ne, Ni, O, S and Si coming from sides A and B made by the Low Energy Telescope (LET1). The values of these variables are summarized in Tables 2.3.33 – 2.3.29. The variables are named as: <side>_ <species> _ <quantity>, where, <side> stands for A or B; <species> stands for the particle species; and <quantity> represents Counts (not used in the variable names, in general), Flux or Rate. Variable names without ranges (e.g. A_C) or with double digit range (e.g. R25) have the values integrated over all the available ranges (e.g. R2 to R5).

Examples: A_C_Flux; PENB_C_Rate; R1A_32to50_Flux.
Table 2.3.51: PSP_ISOIS-EPIHI_L2-LET2-RATES60 (contd.). Here ‘x’ stands for side C.

<table>
<thead>
<tr>
<th>Side</th>
<th>Species</th>
<th>Counts</th>
<th>Count Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Size (bins)</td>
<td>Energy (MeV/nuc)</td>
</tr>
<tr>
<td>C</td>
<td>PENx_C</td>
<td>11</td>
<td>23 – 364</td>
</tr>
<tr>
<td></td>
<td>PENx_Fe</td>
<td>11</td>
<td>45 – 471</td>
</tr>
<tr>
<td></td>
<td>PENx_He</td>
<td>11</td>
<td>11 – 310</td>
</tr>
<tr>
<td></td>
<td>PENx_Mg</td>
<td>10</td>
<td>38 – 408</td>
</tr>
<tr>
<td></td>
<td>PENx_N</td>
<td>11</td>
<td>23 – 364</td>
</tr>
<tr>
<td></td>
<td>PENx_Ne</td>
<td>11</td>
<td>27 – 384</td>
</tr>
<tr>
<td></td>
<td>PENx_O</td>
<td>11</td>
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</tr>
<tr>
<td></td>
<td>PENx_Si</td>
<td>10</td>
<td>38 – 408</td>
</tr>
</tbody>
</table>

Table 2.3.52: PSP_ISOIS-EPIHI_L2-LET2-RATES60 (contd.). Here, ‘xxx’ stands for R1C.

<table>
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<th>Species</th>
<th>Count</th>
<th>Flux</th>
<th>Count Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Size (bins)</td>
<td>Range SECT (bins)</td>
<td>Energy (MeV/nuc)</td>
</tr>
<tr>
<td>C</td>
<td>xxx_29to32</td>
<td>7</td>
<td>29 – 32</td>
<td>0 – 264</td>
</tr>
<tr>
<td></td>
<td>xxx_32to50</td>
<td>7</td>
<td>32 – 50</td>
<td>0 – 264</td>
</tr>
<tr>
<td></td>
<td>xxx_Al</td>
<td>14</td>
<td></td>
<td>1 – 260</td>
</tr>
<tr>
<td></td>
<td>xxx_Ar</td>
<td>15</td>
<td></td>
<td>1 – 261</td>
</tr>
<tr>
<td></td>
<td>xxx_C</td>
<td>12</td>
<td></td>
<td>1 – 259</td>
</tr>
<tr>
<td></td>
<td>xxx_Ca</td>
<td>16</td>
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<td>1 – 261</td>
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</tr>
<tr>
<td></td>
<td>xxx_H</td>
<td>12</td>
<td></td>
<td>0 – 258</td>
</tr>
<tr>
<td></td>
<td>xxx_H_SET</td>
<td></td>
<td>1x9 (1 bin)</td>
<td>0 – 8 (9)</td>
</tr>
<tr>
<td></td>
<td>xxx_He</td>
<td>12</td>
<td></td>
<td>0 – 258</td>
</tr>
<tr>
<td></td>
<td>xxx_H_SET</td>
<td>1x9 (1 bin)</td>
<td>R1 0 – 8 (9)</td>
<td>2 – 2</td>
</tr>
<tr>
<td></td>
<td>xxx_Mg</td>
<td>14</td>
<td></td>
<td>1 – 260</td>
</tr>
<tr>
<td></td>
<td>xxx_N</td>
<td>12</td>
<td></td>
<td>1 – 259</td>
</tr>
<tr>
<td></td>
<td>xxx_Na</td>
<td>13</td>
<td></td>
<td>1 – 259</td>
</tr>
<tr>
<td></td>
<td>xxx_Ne</td>
<td>13</td>
<td></td>
<td>1 – 259</td>
</tr>
<tr>
<td></td>
<td>xxx_Ni</td>
<td>17</td>
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<td>1 – 261</td>
</tr>
<tr>
<td></td>
<td>xxx_O</td>
<td>13</td>
<td></td>
<td>1 – 259</td>
</tr>
<tr>
<td></td>
<td>xxx_S</td>
<td>15</td>
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<td>1 – 261</td>
</tr>
<tr>
<td></td>
<td>xxx_Si</td>
<td>14</td>
<td></td>
<td>1 – 259</td>
</tr>
<tr>
<td></td>
<td>xxx_gt50</td>
<td>7</td>
<td></td>
<td>0 – 264</td>
</tr>
</tbody>
</table>

R1 ENA_SET - measured quantity is Counts; Size 8 x 9; E-bins: 8; E-range: 1 - 3 (MeV/nuc); Sectors: 0 - 8 (9).
Table 2.3.53: PSP_ISOIS-EPIHI_L2-LET2-RATES60 (contd.). Here, ‘xxxx’ stands for R25C which implies that the values are integrated over ranges R2 – R5.

Table 2.3.54: PSP_ISOIS-EPIHI_L2-LET2-RATES60 (contd.). Here, ‘xxx’ stands for R2C.

<table>
<thead>
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<th>Flux</th>
<th>Count Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Size</td>
<td>Range</td>
<td>Energy</td>
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<td>R26</td>
<td>3 – 12</td>
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<tr>
<td></td>
<td>xxxx_He_SECT</td>
<td>3x25</td>
<td>R26</td>
<td>3 – 12</td>
</tr>
<tr>
<td></td>
<td>xxxx_ENA_SECT</td>
<td>8x25</td>
<td>R26</td>
<td>2 – 12</td>
</tr>
<tr>
<td>A/B</td>
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<td>1 – 320</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>xxx_32to50</td>
<td>8</td>
<td>1 – 320</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>xxx_Al</td>
<td>18</td>
<td>2 – 279</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>xxx_Ar</td>
<td>20</td>
<td>2 – 288</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>xxx_C</td>
<td>18</td>
<td>1 – 272</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>xxx_Ca</td>
<td>20</td>
<td>2 – 288</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>xxx_Cr</td>
<td>20</td>
<td>2 – 288</td>
<td>20</td>
</tr>
<tr>
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<td>xxx_Fe</td>
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<td>2 – 288</td>
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</tr>
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<td></td>
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<td>17</td>
<td>1 – 264</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>xxx_He</td>
<td>17</td>
<td>1 – 266</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>xxx_Mg</td>
<td>18</td>
<td>2 – 279</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>xxx_N</td>
<td>18</td>
<td>1 – 272</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>xxx_Na</td>
<td>18</td>
<td>1 – 275</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>xxx_Ne</td>
<td>18</td>
<td>1 – 275</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>xxx_Ni</td>
<td>21</td>
<td>2 – 294</td>
<td>21</td>
</tr>
<tr>
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<td>xxx_O</td>
<td>17</td>
<td>1 – 272</td>
<td>17</td>
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<tr>
<td></td>
<td>xxx_S</td>
<td>20</td>
<td>2 – 288</td>
<td>20</td>
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<tr>
<td></td>
<td>xxx_Si</td>
<td>18</td>
<td>2 – 279</td>
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<td>1 – 320</td>
<td>8</td>
</tr>
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</table>
Table 2.3.55: PSP_ISOIS-EPIHI_L2-LET2-RATES60 (contd.). LET2 electron measurements for ranges R3, R4 and R5.

<table>
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<th>Side</th>
<th>Species</th>
<th>Count</th>
<th>Count Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
<td>(bins)</td>
<td>(MeV/nuc)</td>
</tr>
<tr>
<td>C</td>
<td>Electrons_R3C</td>
<td>15</td>
<td>0–6</td>
</tr>
<tr>
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<td>R3C_He_BIN</td>
<td>5x16 (5)</td>
<td>8–32</td>
</tr>
<tr>
<td></td>
<td>R3C_He_BIN (MASS)</td>
<td>16 bins</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>R3C_Ne_BIN</td>
<td>6x8 (6)</td>
<td>16–92</td>
</tr>
<tr>
<td></td>
<td>R3C_Ne_BIN (MASS)</td>
<td>8 bins</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Electrons_R4C</td>
<td>16</td>
<td>0–7</td>
</tr>
<tr>
<td></td>
<td>Electrons_R5C</td>
<td>15</td>
<td>1–7</td>
</tr>
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</table>

Table 2.3.56: PSP_ISOIS-EPIHI_L2-LET2-RATES60 (contd.). Here, ‘xxxx’ stands for R35C which implies that the values are integrated over ranges R3 – R5.

<table>
<thead>
<tr>
<th>Side</th>
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<th>Count</th>
<th>Count Rate</th>
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<td>Energy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(bins)</td>
<td>(MeV/nuc)</td>
</tr>
<tr>
<td>C</td>
<td>xxxx_29to32</td>
<td>6</td>
<td>8–384</td>
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<td>xxxx_Cr</td>
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<td>10–332</td>
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<td>3–279</td>
</tr>
<tr>
<td></td>
<td>xxxx_Mg</td>
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<td>8–310</td>
</tr>
<tr>
<td></td>
<td>xxxx_N</td>
<td>14</td>
<td>5–294</td>
</tr>
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<td>7–310</td>
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<td>xxxx_Ni</td>
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<td>10–347</td>
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<td></td>
<td>xxxx_S</td>
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<td>10–320</td>
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<td>xxxx_Si</td>
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<td>8–320</td>
</tr>
<tr>
<td></td>
<td>xxxx_gt50</td>
<td>6</td>
<td>8–384</td>
</tr>
</tbody>
</table>
2.3.13 FILE: PSP_ISOIS-EPIHI_L2-SECOND-RATES

This file contains the 1 s cadence measurements of particle Counts, Flux (cm$^{-2}$ sr$^{-1}$ sec$^{-1}$ MeV$^{-1}$) and Count Rate (counts/s) of Electrons and H for sides A and B for the double–sided High Energy Telescope (HET) and the Low Energy Telescopes (LET1), and the single–sided Low Energy Telescope (LET2). The values of these variables are summarized in Table 2.3.57. The variables are named as: <tel>_<side>_<species>_<quantity>, where, <tel> stands for HET, LET1 or LET2; <side> stands for A, B or C; <species> stands for the particle species; and <quantity> represents Counts (not used in variable names, in general), Flux or Rate. Examples: HET_A_Electrons_Flux; LET1_B_H_Rate; LET2_C_H.

<table>
<thead>
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<th>Side</th>
<th>Range</th>
<th>Quantity</th>
<th>Electrons</th>
<th>H</th>
</tr>
</thead>
<tbody>
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<td></td>
<td></td>
<td></td>
<td>E-bins</td>
<td>E-bins</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E-range (MeV/nuc) (bins)</td>
<td>E-range (MeV/nuc) (bins)</td>
</tr>
<tr>
<td>C</td>
<td></td>
<td>Count</td>
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<td>1–3</td>
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<td></td>
<td>Flux</td>
<td>3</td>
<td>1–3</td>
</tr>
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<td></td>
<td></td>
<td>Count Rate</td>
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<td>1–3</td>
</tr>
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<td>Count</td>
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<td>1–3</td>
</tr>
<tr>
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<td></td>
<td>Flux</td>
<td>3</td>
<td>1–3</td>
</tr>
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<td>Count Rate</td>
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<td>1–3</td>
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<td>Count</td>
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<td>2</td>
<td>1–2</td>
</tr>
<tr>
<td>LET1_A</td>
<td></td>
<td>Count</td>
<td>2</td>
<td>1–2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flux</td>
<td>2</td>
<td>1–2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Count Rate</td>
<td>2</td>
<td>1–2</td>
</tr>
<tr>
<td>LET1_B</td>
<td></td>
<td>Count</td>
<td>2</td>
<td>1–2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flux</td>
<td>2</td>
<td>1–2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Count Rate</td>
<td>2</td>
<td>1–2</td>
</tr>
<tr>
<td>LET2_C</td>
<td></td>
<td>Count</td>
<td>2</td>
<td>1–2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flux</td>
<td>2</td>
<td>1–2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Count Rate</td>
<td>2</td>
<td>1–2</td>
</tr>
</tbody>
</table>

Table 2.3.57: PSP_ISOIS-EPIHI_L2-SECOND-RATES. The EPI-Hi 1 s data of Electrons and H for HET, LET1 and LET2.
3 GENERAL LIST OF VARIABLES

3.1 PSP_ISOIS-EPIHI_L2-HET-RATES10

A_Electrons
A_Electrons_Rate
A_H
A_H_Flux
A_H_Rate
A_He
A_He_Flux
A_He_Rate
B_Electrons
B_Electrons_Rate
B_H
B_H_Flux
B_H_Rate
B_He
B_He_Flux
B_He_Rate
HCI_Lat
HCI_lon
HCI_R
HET_A_HCI
HET_A_PA
HET_A_RTN
HET_A_SA
HET_B_HCI
HET_B_PA
HET_B_RTN
HET_B_SA
HGC_Lat
HGC_Lon
HGC_R

3.2 PSP_ISOIS-EPIHI_L2-HET-RATES300

A_CNO_SECT_Rate
A_FeGroup_SECT_Rate
A_NetoSi_SECT_Rate
B_CNO_SECT_Rate
B_FeGroup_SECT_Rate
B_NetoSi_SECT_Rate
HCl_Lat
3.3 PSP_ISOIS-EPIHI_L2-HET-RATES3600

A_Al
A_Al_Rate
A_Ar
A_Ar_Rate
A_C
A_CNO_SECT_Rate
A_C_Rate
A_Ca
A_Ca_Rate
A_Cr
A_Cr_Rate
A_Electrons
A_Electrons_Rate
A_Electrons_SECT_Rate
A_Fe
A_FeGroup_SECT_Rate
A_Fe_Rate
A_H
A_H_Flux
A_H_Rate
B_H_SECT_Rate
B_He
B_He_Flux
B_He_Rate
B_He_SECT_Flux
B_He_SECT_Rate
B_Mg
B_Mg_Rate
B_N
B_N_Rate
B_Na
B_Na_Rate
B_Ne
B_Ne_Rate
B_NetoSi_SECT_Rate
B_Ni
B_Ni_Rate
B_O
B_O_Rate
B_S
B_S_Rate
B_Si
B_Si_Rate
HCl_Lat
HCl_Lon
HCl_R
HET_A_HCI
HET_A_PA
HET_A_R17_SECT_HCI
HET_A_R17_SECT_PA
HET_A_R17_SECT_RTN
HET_A_R17_SECT_SA
HET_A_RTN
HET_A_SA
HET_B_HCI
HET_B_PA
HET_B_R17_SECT_HCI
HET_B_R17_SECT_PA
HET_B_R17_SECT_RTN
HET_B_R17_SECT_SA
HET_B_RTN
HET_B_SA
HGC_Lat
HGC_Lon
HGC_R
R1A_He_BIN
R1A_Ne_BIN
R1B_He_BIN
R1B_Ne_BIN
R2A_He_BIN
R2A_Ne_BIN
R2B_He_BIN
R2B_Ne_BIN
R3A_He_BIN
R3A_Ne_BIN
R3B_He_BIN
R3B_Ne_BIN
R4A_He_BIN
R4A_Ne_BIN
R4B_He_BIN
R4B_Ne_BIN
R5A_He_BIN
R5A_Ne_BIN
R5B_He_BIN
R5B_Ne_BIN
R6A_He_BIN
R6A_Ne_BIN
R6B_He_BIN
R6B_Ne_BIN
R7A_He_BIN
R7A_Ne_BIN
R7B_He_BIN
R7B_Ne_BIN

3.4 PSP_ISOIS-EPIHI_L2-HET-RATES60

A_Al
A_Al_Rate
A_Ar
A_Ar_Rate
A_C
A_C_Rate
A_Ca
A_Ca_Rate
A_Cr
A_Cr_Rate
A_Electrons
A_Electrons_Rate
A_Electrons_SECT_Rate
A\_Fe
A\_Fe\_Rate
A\_H
A\_H\_Flux
A\_H\_Rate
A\_H\_SECT\_Flux
A\_H\_SECT\_Rate
A\_He
A\_He\_Flux
A\_He\_Rate
A\_He\_SECT\_Flux
A\_He\_SECT\_Rate
A\_Mg
A\_Mg\_Rate
A\_N
A\_N\_Rate
A\_Na
A\_Na\_Rate
A\_Ne
A\_Ne\_Rate
A\_Ni
A\_Ni\_Rate
A\_O
A\_O\_Rate
A\_S
A\_S\_Rate
A\_Si
A\_Si\_Rate
B\_Al
B\_Al\_Rate
B\_Ar
B\_Ar\_Rate
B\_C
B\_C\_Rate
B\_Ca
B\_Ca\_Rate
B\_Cr
B\_Cr\_Rate
B\_Electrons
B\_Electrons\_Rate
B\_Electrons\_SECT\_Rate
B\_Fe
B\_Fe\_Rate
B\_H
B\_H\_Flux
B_H_Rate
B_H_SECT_Flux
B_H_SECT_Rate
B_He
B_He_Flux
B_He_Rate
B_He_SECT_Flux
B_He_SECT_Rate
B_Mg
B_Mg_Rate
B_N
B_N_Rate
B_Na
B_Na_Rate
B_Ne
B_Ne_Rate
B_Ni
B_Ni_Rate
B_O
B_O_Rate
B_S
B_S_Rate
B_Si
B_Si_Rate
HCI_Lat
HCI_Lon
HCI_R
HET_A_HCI
HET_A_PA
HET_A_R17_SECT_HCI
HET_A_R17_SECT_PA
HET_A_R17_SECT_RTN
HET_A_R17_SECT_SA
HET_A_RTN
HET_A_SA
HET_B_HCI
HET_B_PA
HET_B_R17_SECT_HCI
HET_B_R17_SECT_PA
HET_B_R17_SECT_RTN
HET_B_R17_SECT_SA
HET_B_RTN
HET_B_SA
HGC_Lat
HGC_Lon
3.5 PSP_ISOIS-EPIHI_L2-LET1-RATES10

A_Electrons
A_Electrons_Rate
A_H
A_H_Flux
A_H_Rate
A_He
A_He_Flux
A_He_Rate
B_Electrons
B_Electrons_Rate
B_H
B_H_Flux
B_H_Rate
B_He
B_He_Flux
B_He_Rate
HCI_Lat
HCI_Lon
HCI_R
HGC_Lat
HGC_Lon
HGC_R
LET1_A_HCI
LET1_A_PA
LET1_A_RTN
LET1_A_SA
LET1_B_HCI
LET1_B_PA
LET1_B_RTN
LET1_B_SA

3.6 PSP_ISOIS-EPIHI_L2-LET1-RATES300

HCI_Lat
HCI_Lon
HCI_R
HGC_Lat
HGC_Lon
HGC_R
LET1_A_HCI
LET1_A_PA
LET1_A_R1_SECT_HCI
LET1_A_R1_SECT_PA
LET1_A_R1_SECT_RTN
LET1_A_R1_SECT_SA
LET1_A_R26_SECT_HCI
LET1_A_R26_SECT_PA
LET1_A_R26_SECT_RTN
LET1_A_R26_SECT_SA
LET1_A_RTN
LET1_A_SA
LET1_B_HCI
LET1_B_PA
LET1_B_R1_SECT_HCI
LET1_B_R1_SECT_PA
LET1_B_R1_SECT_RTN
LET1_B_R1_SECT_SA
LET1_B_R26_SECT_HCI
LET1_B_R26_SECT_PA
LET1_B_R26_SECT_RTN
LET1_B_R26_SECT_SA
LET1_B_RTN
LET1_B_SA
R1A_CNO_SECT_Rate
R1A_FeGroup_SECT_Rate
R1A_NetoSi_SECT_Rate
R1B_CNO_SECT_Rate
R1B_FeGroup_SECT_Rate
R1B_NetoSi_SECT_Rate
R26A_CNO_SECT_Rate
R26A_FeGroup_SECT_Rate
R26A_NetoSi_SECT_Rate
R26B_CNO_SECT_Rate
R26B_FeGroup_SECT_Rate
R26B_NetoSi_SECT_Rate

3.7 PSP_ISOIS-EPIHI_L2-LET1-RATES3600

A_Al
A_Al_Rate
A_Ar
A_Ar_Rate
A_C
A_C_Rate
A_Ca
A_Ca_Rate
A_Cr
A_Cr_Rate
A_Electrons
A_Electrons_Rate
A_Fe
A_Fe_Rate
A_H
A_H_Flux
A_H_Rate
A_He
A_He_Flux
A_He_Rate
A_Mg
A_Mg_Rate
A_N
A_N_Rate
A_Na
A_Na_Rate
A_Ne
A_Ne_Rate
A_Ni
A_Ni_Rate
A_O
A_O_Rate
A_S
A_S_Rate
A_Si
A_Si_Rate
B_A1
B_A1_Rate
B_Ar
B_Ar_Rate
B_C
B_C_Rate
B_Ca
B_Ca_Rate
B_Cr
B_Cr_Rate
B_Electrons
B_Electrons_Rate
B_Fe
B_Fe_Rate
B_H
B_H_Flux
B_H_Rate
B_He
B_He_Flux
B_He_Rate
B_Mg
B_Mg_Rate
B_N
B_N_Rate
B_Na
B_Na_Rate
B_Ne
B_Ne_Rate
B_Ni
B_Ni_Rate
B_O
B_O_Rate
B_S
B_S_Rate
B_Si
B_Si_Rate
HCI_Lat
HCI_Lon
HCI_R
HGC_Lat
HGC_Lon
HGC_R
LET1_A_HCI
LET1_A_PA
LET1_A_R1_SECT_HCI
LET1_A_R1_SECT_PA
LET1_A_R1_SECT_RTN
LET1_A_R1_SECT_SA
LET1_A_R26_SECT_HCI
LET1_A_R26_SECT_PA
LET1_A_R26_SECT_RTN
LET1_A_R26_SECT_SA
LET1_A_RTN
LET1_A_SA
LET1_B_HCI
LET1_B_PA
LET1_B_R1_SECT_HCI
LET1_B_R1_SECT_PA
LET1_B_R1_SECT_RTN
R3B_He_BIN
R3B_Ne_BIN
R45A_He_BIN
R45A_Ne_BIN
R45B_He_BIN
R45B_Ne_BIN
R6A_He_BIN
R6A_Ne_BIN
R6B_He_BIN
R6B_Ne_BIN

3.8 PSP_ISOIS-EPIHI_L2-LET1-RATES60

A_Al
A_Al_Rate
A_Ar
A_Ar_Rate
A_C
A_C_Rate
A_Ca
A_Ca_Rate
A_Cr
A_Cr_Rate
A_Electrons
A_Electrons_Rate
A_Fe
A_Fe_Rate
A_H
A_H_Flux
A_H_Rate
A_He
A_He_Flux
A_He_Rate
A_Mg
A_Mg_Rate
A_N
A_N_Rate
A_Na
A_Na_Rate
A_Ne
A_Ne_Rate
A_Ni
A_Ni_Rate
A_O
A_O_Rate
A_S
A_S_Rate
A_Si
A_Si_Rate
B_Al
B_Al_Rate
B_Ar
B_Ar_Rate
B_C
B_C_Rate
B_Ca
B_Ca_Rate
B_Cr
B_Cr_Rate
B_Electrons
B_Electrons_Rate
B_Fe
B_Fe_Rate
B_H
B_H_Flux
B_H_Rate
B_He
B_He_Flux
B_He_Rate
B_Mg
B_Mg_Rate
B_N
B_N_Rate
B_Na
B_Na_Rate
B_Ne
B_Ne_Rate
B_Ni
B_Ni_Rate
B_O
B_O_Rate
B_S
B_S_Rate
B_Si
B_Si_Rate
HCL_Lat
HCL_Lon
HCL_R
HGC_Lat
HGC_Lon
HGC_R
LET1_A_HCI
LET1_A_PA
LET1_A_R1_SECT_HCI
LET1_A_R1_SECT_PA
LET1_A_R1_SECT_RTN
LET1_A_R1_SECT_SA
LET1_A_R26_SECT_HCI
LET1_A_R26_SECT_PA
LET1_A_R26_SECT_RTN
LET1_A_R26_SECT_SA
LET1_A_RTN
LET1_A_SA
LET1_B_HCI
LET1_B_PA
LET1_B_R1_SECT_HCI
LET1_B_R1_SECT_PA
LET1_B_R1_SECT_RTN
LET1_B_R1_SECT_SA
LET1_B_R26_SECT_HCI
LET1_B_R26_SECT_PA
LET1_B_R26_SECT_RTN
LET1_B_R26_SECT_SA
LET1_B_RTN
LET1_B_SA
R1A_H_SECT_Flux
R1A_H_SECT_Rate
R1A_He_SECT_Flux
R1A_He_SECT_Rate
R1B_H_SECT_Flux
R1B_H_SECT_Rate
R1B_He_SECT_Flux
R1B_He_SECT_Rate
R26A_H_SECT_Flux
R26A_H_SECT_Rate
R26A_He_SECT_Flux
R26A_He_SECT_Rate
R26B_H_SECT_Flux
R26B_H_SECT_Rate
R26B_He_SECT_Flux
R26B_He_SECT_Rate
3.9 PSP_ISOIS-EPIHI_L2-LET2-RATES10

C_Electrons
C_Electrons_Rate
C_H
C_H_Flux
C_H_Rate
C_He
C_He_Flux
C_He_Rate
HCl_Lat
HCl_Lon
HCl_R
HGC_Lat
HGC_Lon
HGC_R
LET2_C_HCI
LET2_C_PA
LET2_C_RTN
LET2_C_SA

3.10 PSP_ISOIS-EPIHI_L2-LET2-RATES300

HCl_Lat
HCl_Lon
HCl_R
HGC_Lat
HGC_Lon
HGC_R
LET2_C_HCI
LET2_C_PA
LET2_C_R1_SECT_HCI
LET2_C_R1_SECT_PA
LET2_C_R1_SECT_RTN
LET2_C_R1_SECT_SA
LET2_C_R25_SECT_HCI
LET2_C_R25_SECT_PA
LET2_C_R25_SECT_RTN
LET2_C_R25_SECT_SA
LET2_C_RTN
LET2_C_SA
R1C_CNO_SECT_Rate
R1C_FeGroup_SECT_Rate
R1C_NetoSi_SECT_Rate
R25C_CNO_SECT_Rate
R25C_FeGroup_SECT_Rate
R25C_NetoSi_SECT_Rate

3.11 **PSP_ISOIS-EPIHI_L2-LET2-RATES3600**

C_Al
C_Al_Rate
C_Ar
C_Ar_Rate
C_C
C_C_Rate
C_Ca
C_Ca_Rate
C_Cr
C_Cr_Rate
C_Electrons
C_Electrons_Rate
C_Fe
C_Fe_Rate
C_H
C_H_Flux
C_H_Rate
C_He
C_He_Flux
C_He_Rate
C_Mg
C_Mg_Rate
C_N
C_N_Rate
C_Na
C_Na_Rate
C_Ne
C_Ne_Rate
C_Ni
C_Ni_Rate
C_O
C_O_Rate
C_S
C_S_Rate
C_Si
C_Si_Rate
HCl_Lat
HCl_Lon
3.12 PSP_ISOIS-EPIHI_L2-LET2-RATES60

C_AI
C_AI_Rate
C_Ar
C_Ar_Rate
C_C
C_C_Rate
C_Ca
C_Ca_Rate
C_Cr
C_Cr_Rate
C_Electrons
C_Electrons_Rate
C_Fe
C_Fe_Rate
C_H
C_H_Flux
C_H_Rate
C_He
C_He_Flux
C_He_Rate
C_Mg
C_Mg_Rate
C_N
C_N_Rate
C_Na
C_Na_Rate
C_Ne
C_Ne_Rate
C_Ni
C_Ni_Rate
C_O
C_O_Rate
C_S
C_S_Rate
C_Si
C_Si_Rate
HCl_Lat
HCl_Lon
HCl_R
HGC_Lat
HGC_Lon
HGC_R
LET2_C_HCl
LET2_C_PA
LET2_C_R1_SECT_HCl
LET2_C_R1_SECT_PA
LET2_C_R1_SECT_RTN
LET2_C_R1_SECT_SA
3.13 PSP_ISOIS-EPIHI_L2-SECOND-RATES

HCI_Lat
HCI_Lon
HCI_R
HET_A_Electrons
HET_A_Electrons_Rate
HET_A_H
HET_A_HCI
HET_A_H_Rate
HET_A_PA
HET_A_RTN
HET_A_SA
HET_B_Electrons
HET_B_Electrons_Rate
HET_B_H
HET_B_HCI
HET_B_H_Rate
HET_B_PA
HET_B_RTN
HET_B_SA
HGC_Lat
HGC_Lon
HGC_R
LET1_A_Electrons
LET1_A_Electrons_Rate
LET1_A_H
LET1_A_HCI
LET1_A_H_Rate
LET1_A_PA
LET1_A_RTN
LET1_A_SA
LET1_B_Electrons
LET1_B_Electrons_Rate
LET1_B_H
LET1_B_HCI
LET1_B_H_Rate
LET1_B_PA
LET1_B_RTN
LET1_B_SA
LET2_C_Electrons
LET2_C_Electrons_Rate
LET2_C_H
LET2_C_HCI
LET2_C_H_Rate
LET2_C_PA
LET2_C_RTN
LET2_C_SA

3.14 PSP_ISOIS-EPIL0_L2-IC

C_CountRate_ChanD
C_Counts_ChanD
Fe_CountRate_ChanC
Fe_Counts_ChanC
HCI_ChanC
HCI_ChanD
HCI_ChanP
HCI_ChanR
HCI_ChanT
HCI_Lat_ChanC
HCI_Lat_ChanD
HCI_Lat_ChanP
HCI_Lat_ChanR
HCI_Lat_ChanT
HCI_Lon_ChanC
HCI_Lon_ChanD
HCI_Lon_ChanP
HCI_Lon_ChanR
HCI_Lon_ChanT
HCI_R_ChanC
HCI_R_ChanD
HCI_R_ChanP

81
HCl_R_ChanR
HCl_R_ChanT
HGC_Lat_ChanC
HGC_Lat_ChanD
HGC_Lat_ChanP
HGC_Lat_ChanR
HGC_Lat_ChanT
HGC_Lon_ChanC
HGC_Lon_ChanD
HGC_Lon_ChanP
HGC_Lon_ChanR
HGC_Lon_ChanT
HGC_R_ChanC
HGC_R_ChanD
HGC_R_ChanP
HGC_R_ChanR
HGC_R_ChanT
H_CountRate_ChanP
H_CountRate_ChanR
H_CountRate_ChanT
H_Counts_ChanP
H_Counts_ChanR
H_Counts_ChanT
H_Flux_ChanP
H_Flux_ChanR
H_Flux_ChanT
He3_CountRate_ChanC
He3_Counts_ChanC
He4_CountRate_ChanC
He4_Counts_ChanC
He4_Flux_ChanC
Look_Direction_80_DELTAMINUS
Look_Direction_80_DELTAPLUS
Mg_CountRate_ChanD
Mg_Counts_ChanD
N_CountRate_ChanD
N_Counts_ChanD
Ne_CountRate_ChanD
Ne_Counts_ChanD
O_CountRate_ChanC
O_Counts_ChanC
PA_ChanC
PA_ChanD
PA_ChanP
PA_ChanR
PA_ChanT
RTN_ChanC
RTN_ChanD
RTN_ChanP
RTN_ChanR
RTN_ChanT
SA_ChanC
SA_ChanD
SA_ChanP
SA_ChanR
SA_ChanT
Si_CountRate_ChanD
Si_Counts_ChanD

3.15 PSP_ISOIS-EPILO_L2-PE

Electron_CountRate_ChanE
Electron_CountRate_ChanF
Electron_CountRate_ChanG
Electron_Counts_ChanE
Electron_Counts_ChanF
Electron_Counts_ChanG
HCI_ChanE
HCI_ChanF
HCI_ChanG
HCI_Lat_ChanE
HCI_Lat_ChanF
HCI_Lat_ChanG
HCI_Lon_ChanE
HCI_Lon_ChanF
HCI_Lon_ChanG
HCI_R_ChanE
HCI_R_ChanF
HCI_R_ChanG
HGC_Lat_ChanE
HGC_Lat_ChanF
HGC_Lat_ChanG
HGC_Lon_ChanE
HGC_Lon_ChanF
HGC_Lon_ChanG
HGC_R_ChanE
HGC_R_ChanF
HGC_R_ChanG
H_COUNTRate_ChanE
3.16 PSP_ISOIS_L2-EPHEM

Clock_Angle
HCI_Lat
HCI_Lon
HCI_R
HGC_Lat
HGC_Lon
HGC_R
Ram_Pointing
Roll_Angle
Spiral_HETA
Spiral_LET1A
Spiral_LET2C
Spiral_Lo
Sun_Angle
Umbra_Pointing

3.17 PSP_ISOIS_L2-SUMMARY

A_H_Rate_TS
A_Heavy_Rate_TS
Electron_CountRate_ChanE
HET_A_Electrons_Rate_TS
HET_A_H_Rate_TS
H_CountRate_ChapP_SP
4 CDF CONTENTS

4.1 PSP_ISOIS-EPILO_L2-IC

ISOIS-EPILO>Integrated Science Investigation of the Sun, Energetic Particle Instrument Lo L2-ic>Level 2 ic EPI-Lo, Ion Composition mode.
1 minute to 1 hour
Cite McComas et al (2016), doi:10.1007/s11214-014-0059-1

4.1.1 PRIMARY VARIABLES

4.1.1.1 H Flux ChanP H flux channel P (HiResProtons) (cm⁻²sr⁻¹sec⁻¹keV⁻¹)
Size: 80 × 48 time-varying
particle_flux>differential_directional_number
Ion Composition mode.
Look_Direction_80 0 – 79 (80 bins)
H_ChanP_Energy 50 – 8374 keV (41 bins)

4.1.1.2 H Flux ChanR H flux channel R (HiTimeResProtons) (cm⁻²sr⁻¹sec⁻¹keV⁻¹)
Size: 80 × 48 time-varying
particle_flux>differential_directional_number
Ion Composition mode.
Look_Direction_80 0 – 79 (80 bins)
H_ChanR_Energy 56 – 8374 keV (15 bins)

4.1.1.3 H Flux ChanT H flux channel T (IonTOF) (cm⁻²sr⁻¹sec⁻¹(keV/nuc)⁻¹)
Size: 80 × 47 time-varying
particle_flux>differential_directional_number
Look_Direction_80 0 – 79 (80 bins)
H_ChanT_Energy 20 – 34454 keV/nuc (31 bins)

4.1.1.4 He4 Flux ChanC He4 flux channel C (Ions1) (cm⁻²sr⁻¹sec⁻¹keV⁻¹)
Size: 80 × 48 time-varying
particle_flux>differential_directional_number
Ion Composition mode.
Look\_Direction\_80 0 – 79 (80 bins)
He4\_ChanC\_Energy 61 – 18733 keV (46 bins)

4.1.2 OTHER DATA

4.1.2.1 \textbf{C\_CountRate\_ChanD} \ C count rate channel D (Ions2) (counts/sec)
Size: 80 × 48 time-varying
particle\_flux>\textit{differential\_directional\_number\_rate}
Ion Composition mode. Corrected for deadtime.
Look\_Direction\_80 0 – 79 (80 bins)
C\_ChanD\_Energy 182 – 17977 keV (21 bins)

4.1.2.2 \textbf{C\_Counts\_ChanD} \ C counts channel D (Ions2) (counts)
Size: 80 × 48 time-varying
particle\_flux>\textit{differential\_directional\_number\_rate}
Ion Composition mode. Raw counts per integration.
Look\_Direction\_80 0 – 79 (80 bins)
C\_ChanD\_Energy 182 – 17977 keV (21 bins)

4.1.2.3 \textbf{Fe\_CountRate\_ChanC} \ Fe count rate channel C (Ions1) (counts/sec)
Size: 80 × 48 time-varying
particle\_flux>\textit{differential\_directional\_number\_rate}
Ion Composition mode. Corrected for deadtime.
Look\_Direction\_80 0 – 79 (80 bins)
Fe\_ChanC\_Energy 435 – 21784 keV (40 bins)

4.1.2.4 \textbf{Fe\_Counts\_ChanC} \ Fe counts channel C (Ions1) (counts)
Size: 80 × 48 time-varying
particle\_flux>\textit{differential\_directional\_number\_rate}
Ion Composition mode. Raw counts per integration.
Look\_Direction\_80 0 – 79 (80 bins)
Fe\_ChanC\_Energy 435 – 21784 keV (40 bins)

4.1.2.5 \textbf{HCl\_ChanC} \ HCI flow direction ChanC
Size: 80 × 3 time-varying
position>direction
Look_Direction_80 0 – 79 (80 bins)

4.1.2.6  **HCI_ChanD**  
HCI flow direction ChanD  
Size: 80 × 3 time-varying  
position>direction  
Look_Direction_80 0 – 79 (80 bins)

4.1.2.7  **HCI_ChanP**  
HCI flow direction ChanP  
Size: 80 × 3 time-varying  
position>direction  
Look_Direction_80 0 – 79 (80 bins)

4.1.2.8  **HCI_ChanR**  
HCI flow direction ChanR  
Size: 80 × 3 time-varying  
position>direction  
Look_Direction_80 0 – 79 (80 bins)

4.1.2.9  **HCI_ChanT**  
HCI flow direction ChanT  
Size: 80 × 3 time-varying  
position>direction  
Look_Direction_80 0 – 79 (80 bins)

4.1.2.10  **HCI_Lat_ChanC**  
HCI latitude ChanC (degrees)  
time-varying  
position>latitude  

4.1.2.11  **HCI_Lat_ChanD**  
HCI latitude ChanD (degrees)  
time-varying  
position>latitude  
4.1.2.12 **HCI_Lat_ChanP**  
HCI latitude ChanP (degrees)
time-varying
position>latitude

4.1.2.13 **HCI_Lat_ChanR**  
HCI latitude ChanR (degrees)
time-varying
position>latitude

4.1.2.14 **HCI_Lat_ChanT**  
HCI latitude ChanT (degrees)
time-varying
position>latitude

4.1.2.15 **HCI_Lon_ChanC**  
HCI longitude ChanC (degrees)
time-varying
position>longitude

4.1.2.16 **HCI_Lon_ChanD**  
HCI longitude ChanD (degrees)
time-varying
position>longitude

4.1.2.17 **HCI_Lon_ChanP**  
HCI longitude ChanP (degrees)
time-varying
position>longitude

4.1.2.18 **HCI_Lon_ChanR**  
HCI longitude ChanR (degrees)
time-varying
position>longitude
4.1.2.19 **HCI_Lon ChanT**  
HCI longitude ChanT (degrees)

time-varying

position>longitude


4.1.2.20 **HCI_R ChanC**  
Heliocentric distance ChanC (AU)

time-varying

position>radial


4.1.2.21 **HCI_R ChanD**  
Heliocentric distance ChanD (AU)

time-varying

position>radial


4.1.2.22 **HCI_R ChanP**  
Heliocentric distance ChanP (AU)

time-varying

position>radial


4.1.2.23 **HCI_R ChanR**  
Heliocentric distance ChanR (AU)

time-varying

position>radial


4.1.2.24 **HCI_R ChanT**  
Heliocentric distance ChanT (AU)

time-varying

position>radial


4.1.2.25 **HGC_Lat ChanC**  
HGC latitude ChanC (degrees)

time-varying

position>latitude

4.1.2.26  **HGC_Lat_ChanD**  HGC latitude ChanD (degrees)
time-varying
position>latitude

4.1.2.27  **HGC_Lat_ChanP**  HGC latitude ChanP (degrees)
time-varying
position>latitude

4.1.2.28  **HGC_Lat_ChanR**  HGC latitude ChanR (degrees)
time-varying
position>latitude

4.1.2.29  **HGC_Lat_ChanT**  HGC latitude ChanT (degrees)
time-varying
position>latitude

4.1.2.30  **HGC_Lon_ChanC**  HGC longitude ChanC (degrees)
time-varying
position>longitude

4.1.2.31  **HGC_Lon_ChanD**  HGC longitude ChanD (degrees)
time-varying
position>longitude

4.1.2.32  **HGC_Lon_ChanP**  HGC longitude ChanP (degrees)
time-varying
position>longitude
4.1.2.33  **HGC_Lon_ChanR**   HGC longitude ChanR (degrees)  
  time-varying  
  position>longitude  

4.1.2.34  **HGC_Lon_ChanT**   HGC longitude ChanT (degrees)  
  time-varying  
  position>longitude  

4.1.2.35  **HGC_R_ChanC**   Heliocentric distance ChanC (AU)  
  time-varying  
  position>radial  

4.1.2.36  **HGC_R_ChanD**   Heliocentric distance ChanD (AU)  
  time-varying  
  position>radial  

4.1.2.37  **HGC_R_ChanP**   Heliocentric distance ChanP (AU)  
  time-varying  
  position>radial  

4.1.2.38  **HGC_R_ChanR**   Heliocentric distance ChanR (AU)  
  time-varying  
  position>radial  

4.1.2.39  **HGC_R_ChanT**   Heliocentric distance ChanT (AU)  
  time-varying  
  position>radial  
4.1.2.40 H_CountRate_ChannelP H count rate channel P (HiResProtons) (counts/sec)
Size: 80 × 48 time-varying
particle_flux>differential_directional_number_rate
Ion Composition mode. Corrected for deadtime.
Look_Direction_80 0 – 79 (80 bins)
H_ChanP_Energy 50 – 8374 keV (41 bins)

4.1.2.41 H_CountRate_ChannelR H count rate channel R (HiTimeResProtons) (counts/sec)
Size: 80 × 48 time-varying
particle_flux>differential_directional_number_rate
Ion Composition mode. Corrected for deadtime.
Look_Direction_80 0 – 79 (80 bins)
H_ChanR_Energy 56 – 8374 keV (15 bins)

4.1.2.42 H_CountRate_ChannelT H count rate channel T (IonTOF) (counts/sec)
Size: 80 × 47 time-varying
particle_flux>differential_directional_number_rate
Ion Composition mode. Corrected for deadtime. May contain significant photon counts, particu-
Look_Direction_80 0 – 79 (80 bins)
H_ChanT_Energy 20 – 34454 keV/nuc (31 bins)

4.1.2.43 H_Counts_ChannelP H counts channel P (HiResProtons) (counts)
Size: 80 × 48 time-varying
particle_flux>differential_directional_number_rate
Ion Composition mode. Raw counts per integration.
Look_Direction_80 0 – 79 (80 bins)
H_ChanP_Energy 50 – 8374 keV (41 bins)

4.1.2.44 H_Counts_ChannelR H counts channel R (HiTimeResProtons) (counts)
Size: 80 × 48 time-varying
particle_flux>differential_directional_number_rate
Ion Composition mode. Raw counts per integration.
Look_Direction_80 0 – 79 (80 bins)
H_ChanR_Energy 56 – 8374 keV (15 bins)
4.1.2.45  **H_Counts_ChannT**  H counts channel T (IonTOF) (counts)
Size: 80 × 47 time-varying
particle_flux>differential_directional_number_rate
Ion Composition mode. Raw counts per integration. May contain significant photon counts,
4365/ab643d.
Look_Direction_80_0 – 79 (80 bins)
H_ChannT_Energy 20 – 34454 keV/nuc (31 bins)

4.1.2.46  **He3_CountRate_ChannC**  He3 count rate channel C (Ions1) (counts/sec)
Size: 80 × 48 time-varying
particle_flux>differential_directional_number_rate
Ion Composition mode. Corrected for deadtime.
Look_Direction_80_0 – 79 (80 bins)
He3_ChannC_Energy 74 – 18729 keV (46 bins)

4.1.2.47  **He3_Counts_ChannC**  He3 counts channel C (Ions1) (counts)
Size: 80 × 48 time-varying
particle_flux>differential_directional_number_rate
Ion Composition mode. Raw counts per integration.
Look_Direction_80_0 – 79 (80 bins)
He3_ChannC_Energy 74 – 18729 keV (46 bins)

4.1.2.48  **He4_CountRate_ChannC**  He4 count rate channel C (Ions1) (counts/sec)
Size: 80 × 48 time-varying
particle_flux>differential_directional_number_rate
Ion Composition mode. Corrected for deadtime.
Look_Direction_80_0 – 79 (80 bins)
He4_ChannC_Energy 61 – 18733 keV (46 bins)

4.1.2.49  **He4_Counts_ChannC**  He4 counts channel C (Ions1) (counts)
Size: 80 × 48 time-varying
particle_flux>differential_directional_number_rate
Ion Composition mode. Raw counts per integration.
Look_Direction_80_0 – 79 (80 bins)
He4_ChannC_Energy 61 – 18733 keV (46 bins)
4.1.2.50  **Mg_CountRate_ChanD**  Mg count rate channel D (Ions2) (counts/sec)  
Size: 80 × 48 time-varying  
particle_flux>differential_directional_number_rate  
Ion Composition mode. Corrected for deadtime.  
Look_Direction_80 0 – 79 (80 bins)  
Mg_ChanD_Energy

4.1.2.51  **Mg_Counts_ChanD**  Mg counts channel D (Ions2) (counts)  
Size: 80 × 48 time-varying  
particle_flux>differential_directional_number_rate  
Ion Composition mode. Raw counts per integration.  
Look_Direction_80 0 – 79 (80 bins)  
Mg_ChanD_Energy

4.1.2.52  **N_CountRate_ChanD**  N count rate channel D (Ions2) (counts/sec)  
Size: 80 × 48 time-varying  
particle_flux>differential_directional_number_rate  
Ion Composition mode. Corrected for deadtime.  
Look_Direction_80 0 – 79 (80 bins)  
N_ChanD_Energy

4.1.2.53  **N_Counts_ChanD**  N counts channel D (Ions2) (counts)  
Size: 80 × 48 time-varying  
particle_flux>differential_directional_number_rate  
Ion Composition mode. Raw counts per integration.  
Look_Direction_80 0 – 79 (80 bins)  
N_ChanD_Energy

4.1.2.54  **Ne_CountRate_ChanD**  Ne count rate channel D (Ions2) (counts/sec)  
Size: 80 × 48 time-varying  
particle_flux>differential_directional_number_rate  
Ion Composition mode. Corrected for deadtime.  
Look_Direction_80 0 – 79 (80 bins)  
Ne_ChanD_Energy

4.1.2.55  **Ne_Counts_ChanD**  Ne counts channel D (Ions2) (counts)  
Size: 80 × 48 time-varying
particle_flux>differential_directional_number_rate
Ion Composition mode. Raw counts per integration.
Look_Direction_80 0 – 79 (80 bins)
Ne_ChanD_Energy

4.1.2.56  O_CountRate_ChanC  O count rate channel C (Ions1) (counts/sec)
Size: 80 × 48 time-varying
particle_flux>differential_directional_number_rate
Ion Composition mode. Corrected for deadtime.
Look_Direction_80 0 – 79 (80 bins)
O_ChanC_Energy 202 – 19262 keV (40 bins)

4.1.2.57  O_Counts_ChanC  O counts channel C (Ions1) (counts)
Size: 80 × 48 time-varying
particle_flux>differential_directional_number_rate
Ion Composition mode. Raw counts per integration.
Look_Direction_80 0 – 79 (80 bins)
O_ChanC_Energy 202 – 19262 keV (40 bins)

4.1.2.58  PA_ChanC  Pitch angle ChanC (degree)
Size: 80 time-varying
position>angle
Look_Direction_80 0 – 79 (80 bins)

4.1.2.59  PA_ChanD  Pitch angle ChanD (degree)
Size: 80 time-varying
position>angle
Look_Direction_80 0 – 79 (80 bins)

4.1.2.60  PA_ChanP  Pitch angle ChanP (degree)
Size: 80 time-varying
position>angle
Look_Direction_80 0 – 79 (80 bins)

4.1.2.61  PA_ChanR  Pitch angle ChanR (degree)
Size: 80 time-varying
position>angle
Look_Direction_80 0 – 79 (80 bins)

4.1.2.62  **PA_Chant**  Pitch angle ChanT (degree)
Size: 80 time-varying
position>angle
Look_Direction_80 0 – 79 (80 bins)

4.1.2.63  **RTN_ChanC**  RTN flow direction ChanC
Size: 80 × 3 time-varying
position>direction
Look_Direction_80 0 – 79 (80 bins)

4.1.2.64  **RTN_ChanD**  RTN flow direction ChanD
Size: 80 × 3 time-varying
position>direction
Look_Direction_80 0 – 79 (80 bins)

4.1.2.65  **RTN_ChanP**  RTN flow direction ChanP
Size: 80 × 3 time-varying
position>direction
Look_Direction_80 0 – 79 (80 bins)

4.1.2.66  **RTN_ChanR**  RTN flow direction ChanR
Size: 80 × 3 time-varying
position>direction
Look_Direction_80 0 – 79 (80 bins)

4.1.2.67  **RTN_ChanT**  RTN flow direction ChanT
Size: 80 × 3 time-varying
position>direction
Look_Direction_80 0 – 79 (80 bins)

4.1.2.68  **SA_ChanC**  Nominal Parker Spiral angle ChanC (degree)
Size: 80 time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.
Look_Direction_80 0 – 79 (80 bins)

4.1.2.69  **SA_ChanD**  Nominal Parker Spiral angle ChanD (degree)
Size: 80 time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.
Look_Direction_80 0 – 79 (80 bins)

4.1.2.70  **SA_ChanP**  Nominal Parker Spiral angle ChanP (degree)
Size: 80 time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.
Look_Direction_80 0 – 79 (80 bins)

4.1.2.71  **SA_ChanR**  Nominal Parker Spiral angle ChanR (degree)
Size: 80 time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.
Look_Direction_80 0 – 79 (80 bins)

4.1.2.72  **SA_ChanT**  Nominal Parker Spiral angle ChanT (degree)
Size: 80 time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.
Look_Direction_80 0 – 79 (80 bins)
4.1.2.73 **Si_CountRate_ChanD**  Si count rate channel D (Ions2) (counts/sec)  
Size: 80 × 48 time-varying  
particle_flux>differential_directional_number_rate  
Ion Composition mode. Corrected for deadtime.  
Look_Direction_80 0 – 79 (80 bins)  
Si_ChanD_Energy 549 – 19567 keV (15 bins)

4.1.2.74 **Si_Counts_ChanD**  Si counts channel D (Ions2) (counts)  
Size: 80 × 48 time-varying  
particle_flux>differential_directional_number_rate  
Ion Composition mode. Raw counts per integration.  
Look_Direction_80 0 – 79 (80 bins)  
Si_ChanD_Energy 549 – 19567 keV (15 bins)

4.1.3 **OTHER SUPPORT**

4.1.3.1 **Look_Direction_80_DELTAMINUS**  Size: 80 constant number

4.1.3.2 **Look_Direction_80_DELTAPLUS**  Size: 80 constant number

4.2 **PSP_ISOIS-EPILO_L2-PE**

ISOIS-EPILO>Integrated Science Investigation of the Sun, Energetic Particle Instrument Lo  
L2-pe>Level 2 pe  
EPI-Lo, Particle Energy mode.  
Instrument paper: Integrated Science Investigation of the Sun (ISIS): Design of the Energetic  
0059-1  
1 minute to 1 hour  
Cite McComas et al (2016), doi:10.1007/s11214-014-0059-1

4.2.1 **PRIMARY VARIABLES**

4.2.2 **OTHER DATA**

4.2.2.1 **Electron_CountRate_ChanE**  Electron count rate channel E (HiResElectrons)  
(counts/sec)  
Size: 8 × 48 time-varying  
particle_flux>differential_directional_number_rate

99
Particle Energy mode. Corrected for deadtime.
Look_Direction_08 0 – 7 (8 bins)
Electron_ChanE_Energy 46 – 9164 keV (32 bins)

4.2.2.2 Electron_CountRate_ChanF  Electron count rate channel F (HiTimeResElectrons) (counts/sec)
Size: 8 \times 48 time-varying
Particle Energy mode. Corrected for deadtime.
Look_Direction_08 0 – 7 (8 bins)
Electron_ChanF_Energy 54 – 6659 keV (12 bins)

4.2.2.3 Electron_CountRate_ChanG  Electron count rate channel G (HiLookResElectrons) (counts/sec)
Size: 80 \times 48 time-varying
Particle Energy mode. Corrected for deadtime.
Look_Direction_80 0 – 79 (80 bins)
Electron_ChanG_Energy 46 – 9164 keV (32 bins)

4.2.2.4 Electron_Counts_ChanE  Electron counts channel E (HiResElectrons) (counts)
Size: 8 \times 48 time-varying
Particle Energy mode. Raw counts per integration.
Look_Direction_08 0 – 7 (8 bins)
Electron_ChanE_Energy 46 – 9164 keV (32 bins)

4.2.2.5 Electron_Counts_ChanF  Electron counts channel F (HiTimeResElectrons) (counts)
Size: 8 \times 48 time-varying
Particle Energy mode. Raw counts per integration.
Look_Direction_08 0 – 7 (8 bins)
Electron_ChanF_Energy 54 – 6659 keV (12 bins)

4.2.2.6 Electron_Counts_ChanG  Electron counts channel G (HiLookResElectrons) (counts)
Size: 80 \times 48 time-varying
Particle Energy mode.
Particle Energy mode. Raw counts per integration.
Look_Direction_80 0 – 79 (80 bins)
Electron_ChanG_Energy 46 – 9164 keV (32 bins)

4.2.2.7  HCI_ChanE  HCI flow direction ChanE
Size: 8 × 3 time-varying
position>direction
Look_Direction_08 0 – 7 (8 bins)

4.2.2.8  HCI_ChanF  HCI flow direction ChanF
Size: 8 × 3 time-varying
position>direction
Look_Direction_08 0 – 7 (8 bins)

4.2.2.9  HCI_ChanG  HCI flow direction ChanG
Size: 80 × 3 time-varying
position>direction
Look_Direction_80 0 – 79 (80 bins)

4.2.2.10  HCI_Lat_ChanE  HCI latitude ChanE (degrees)
time-varying
position>latitude

4.2.2.11  HCI_Lat_ChanF  HCI latitude ChanF (degrees)
time-varying
position>latitude

4.2.2.12  HCI_Lat_ChanG  HCI latitude ChanG (degrees)
time-varying
position>latitude

4.2.2.13 **HCI_Lon_ChanE**  
HCl longitude ChanE (degrees)  
time-varying  
position>longitude  

4.2.2.14 **HCI_Lon_ChanF**  
HCl longitude ChanF (degrees)  
time-varying  
position>longitude  

4.2.2.15 **HCI_Lon_ChanG**  
HCl longitude ChanG (degrees)  
time-varying  
position>longitude  

4.2.2.16 **HCI_R_ChanE**  
Heliocentric distance ChanE (AU)  
time-varying  
position>radial  

4.2.2.17 **HCI_R_ChanF**  
Heliocentric distance ChanF (AU)  
time-varying  
position>radial  

4.2.2.18 **HCI_R_ChanG**  
Heliocentric distance ChanG (AU)  
time-varying  
position>radial  

4.2.2.19 **HGC_Lat_ChanE**  
HGC latitude ChanE (degrees)  
time-varying
position>latitude

4.2.2.20  HGC_Lat_ChanF  HGC latitude ChanF (degrees)
time-varying
position>latitude

4.2.2.21  HGC_Lat_ChanG  HGC latitude ChanG (degrees)
time-varying
position>latitude

4.2.2.22  HGC_Lon_ChanE  HGC longitude ChanE (degrees)
time-varying
position>longitude

4.2.2.23  HGC_Lon_ChanF  HGC longitude ChanF (degrees)
time-varying
position>longitude

4.2.2.24  HGC_Lon_ChanG  HGC longitude ChanG (degrees)
time-varying
position>longitude

4.2.2.25  HGC_R_ChanE  Heliocentric distance ChanE (AU)
time-varying
position>radial
4.2.2.26 **HGC_R_ChanF**  Heliocentric distance ChanF (AU)
time-varying
position>radial

4.2.2.27 **HGC_R_ChanG**  Heliocentric distance ChanG (AU)
time-varying
position>radial

4.2.2.28 **H_CountRate_ChanE**  H count rate channel E (HiResElectrons) (counts/sec)
Size: 8 × 48 time-varying
particle_flux>differential_directional_number_rate
Particle Energy mode. Corrected for deadtime.
Look_Direction_08 0 – 7 (8 bins)
H_Chane_Energy

4.2.2.29 **H_CountRate_ChanF**  H count rate channel F (HiTimeResElectrons) (counts/sec)
Size: 8 × 48 time-varying
particle_flux>differential_directional_number_rate
Particle Energy mode. Corrected for deadtime.
Look_Direction_08 0 – 7 (8 bins)
H_ChanF_Energy

4.2.2.30 **H_CountRate_ChanG**  H count rate channel G (HiLookResElectrons) (counts/sec)
Size: 80 × 48 time-varying
particle_flux>differential_directional_number_rate
Particle Energy mode. Corrected for deadtime.
Look_Direction_80 0 – 79 (80 bins)
H_ChanG_Energy

4.2.2.31 **H_Counts_ChanE**  H counts channel E (HiResElectrons) (counts)
Size: 8 × 48 time-varying
particle_flux>differential_directional_number_rate
Particle Energy mode. Raw counts per integration.
Look_Direction_08 0 – 7 (8 bins)
4.2.2.32  **H_Counts_ChanF**  H counts channel F (HiTimeResElectrons) (counts)
Size: $8 \times 48$ time-varying
particle_flux>differential_directional_number_rate
Particle Energy mode. Raw counts per integration.
Look(Direction)_08 0 – 7 (8 bins)
H_Counts_ChanF

4.2.2.33  **H_Counts_ChanG**  H counts channel G (HiLookResElectrons) (counts)
Size: $80 \times 48$ time-varying
particle_flux>differential_directional_number_rate
Particle Energy mode. Raw counts per integration.
Look(Direction)_80 0 – 79 (80 bins)
H_Counts_ChanG

4.2.2.34  **PA_ChanE**  Pitch angle ChanE (degree)
Size: 8 time-varying
position>angle
Look(Direction)_08 0 – 7 (8 bins)

4.2.2.35  **PA_ChanF**  Pitch angle ChanF (degree)
Size: 8 time-varying
position>angle
Look(Direction)_08 0 – 7 (8 bins)

4.2.2.36  **PA_ChanG**  Pitch angle ChanG (degree)
Size: 80 time-varying
position>angle
Look(Direction)_80 0 – 79 (80 bins)

4.2.2.37  **RTN_ChanE**  RTN flow direction ChanE
Size: $8 \times 3$ time-varying
position>direction
Look_Direction_080–7 (8 bins)

4.2.2.38 RTN_ChanF  RTN flow direction ChanF
Size: 8 × 3 time-varying
position>direction
Look_Direction_080–7 (8 bins)

4.2.2.39 RTN_ChanG  RTN flow direction ChanG
Size: 80 × 3 time-varying
position>direction
Look_Direction_800–79 (80 bins)

4.2.2.40 SA_ChanE  Nominal Parker Spiral angle ChanE (degree)
Size: 8 time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.
Look_Direction_080–7 (8 bins)

4.2.2.41 SA_ChanF  Nominal Parker Spiral angle ChanF (degree)
Size: 8 time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.
Look_Direction_080–7 (8 bins)

4.2.2.42 SA_ChanG  Nominal Parker Spiral angle ChanG (degree)
Size: 80 time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.
Look_Direction_800–79 (80 bins)
4.2.3 OTHER SUPPORT

4.2.3.1 Look_Direction_08_DELTAMINUS  Size: 8 constant number

4.2.3.2 Look_Direction_08_DELTAPLUS  Size: 8 constant number

4.2.3.3 Look_Direction_80_DELTAMINUS  Size: 80 constant number

4.2.3.4 Look_Direction_80_DELTAPLUS  Size: 80 constant number

4.3 PSP_ISOIS-EPIHI_L2-HET-RATES10

ISOIS-EPIHI>Integrated Science Investigation of the Sun, Energetic Particle Instrument Hi L2-HET-rates10>Level 2 HET 10-second rates
EPI-Hi 10 second rates cdf. Time tags indicate midpoint of integration.
1 minute to 1 hour
Cite McComas et al (2016), doi:10.1007/s11214-014-0059-1

4.3.1 PRIMARY VARIABLES

4.3.1.1 A_H_Flux  H flux side A (cm$^{-2}$sr$^{-1}$sec$^{-1}$MeV$^{-1}$)
Size: 13 time-varying
particle_flux>differential_directional_number
Energy Bins for H 9 – 70 MeV (13 bins)

4.3.1.2 A_He_Flux  He flux side A (cm$^{-2}$sr$^{-1}$sec$^{-1}$(MeV/nuc)$^{-1}$)
Size: 14 time-varying
particle_flux>differential_directional_number
Energy Bins for He 9 – 83 MeV/nuc (14 bins)
4.3.1.3 **B_H_Flux**  H flux side B (cm$^{-2}$sr$^{-1}$sec$^{-1}$MeV$^{-1}$)  
Size: 13 time-varying  
particle_flux>differential_directional_number  
Energy Bins for H 9 – 70 MeV (13 bins)

4.3.1.4 **B_He_Flux**  He flux side B (cm$^{-2}$sr$^{-1}$sec$^{-1}$MeV$^{-1}$)  
Size: 14 time-varying  
particle_flux>differential_directional_number  
Energy Bins for He 9 – 83 MeV/nuc (14 bins)

4.3.2 **OTHER DATA**

4.3.2.1 **A_Electrons**  Electrons counts side A (counts)  
Size: 18 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for Electrons 1 – 10 MeV (18 bins)

4.3.2.2 **A_Electrons_Rate**  Electrons count rate side A (counts s$^{-1}$)  
Size: 18 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for Electrons 1 – 10 MeV (18 bins)

4.3.2.3 **A_H**  H counts side A (counts)  
Size: 13 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for H 9 – 70 MeV (13 bins)

4.3.2.4 **A_H_Rate**  H count rate side A (counts s$^{-1}$)  
Size: 13 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for H 9 – 70 MeV (13 bins)

4.3.2.5 **A_He**  He counts side A (counts)  
Size: 14 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for He 9 – 83 MeV/nuc (14 bins)
4.3.2.6  **A_He_Rate**  He count rate side A (counts s⁻¹)
Size: 14 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for He 9 – 83 MeV/nuc (14 bins)

4.3.2.7  **B_Electrons**  Electrons counts side B (counts)
Size: 18 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Electrons 1 – 10 MeV (18 bins)

4.3.2.8  **B_Electrons_Rate**  Electrons count rate side B (counts s⁻¹)
Size: 18 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Electrons 1 – 10 MeV (18 bins)

4.3.2.9  **B_H**  H counts side B (counts)
Size: 13 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for H 9 – 70 MeV (13 bins)

4.3.2.10  **B_H_Rate**  H count rate side B (counts s⁻¹)
Size: 13 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for H 9 – 70 MeV (13 bins)

4.3.2.11  **B_He**  He counts side B (counts)
Size: 14 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for He 9 – 83 MeV/nuc (14 bins)

4.3.2.12  **B_He_Rate**  He count rate side B (counts s⁻¹)
Size: 14 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for He 9 – 83 MeV/nuc (14 bins)
4.3.2.13 **HCI_Lat**  
HCI latitude (degrees)  
time-varying  
position>latitude  

4.3.2.14 **HCI_Lon**  
HCI longitude (degrees)  
time-varying  
position>longitude  

4.3.2.15 **HCI_R**  
Heliocentric distance (AU)  
time-varying  
position>radial  

4.3.2.16 **HET_A_HCI**  
HCI flow direction HETA  
Size: 3 time-varying  
position>direction  
Unit vector, after Fraenz and Harper, PSS, 2002.

4.3.2.17 **HET_A_PA**  
Pitch angle HETA (degree)  
time-varying  
position>angle

4.3.2.18 **HET_A_RTN**  
RTN flow direction HETA  
Size: 3 time-varying  
position>direction  
Unit vector, after Fraenz and Harper, PSS, 2002.

4.3.2.19 **HET_A_SA**  
Nominal Parker Spiral angle HETA (degree)  
time-varying  
position>angle  
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.
4.3.2.20  HET_B_HCI  HCI flow direction HETB
Size: 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.3.2.21  HET_B_PA  Pitch angle HETB (degree)
time-varying
position>angle

4.3.2.22  HET_B_RTN  RTN flow direction HETB
Size: 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.3.2.23  HET_B_SA  Nominal Parker Spiral angle HETB (degree)
time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.

4.3.2.24  HGC_Lat  HGC latitude (degrees)
time-varying
position>latitude

4.3.2.25  HGC_Lon  HGC longitude (degrees)
time-varying
position>longitude

4.3.2.26  HGC_R  Heliocentric distance (AU)
time-varying
position>radial
4.3.3 OTHER SUPPORT

4.4 PSP_ISOIS-EPIHI_L2-HET-RATES300

ISOIS-EPIHI>Integrated Science Investigation of the Sun, Energetic Particle Instrument Hi
L2-HET-rates300>Level 2 HET 5-minute rates
EPI-Hi HET 300 second rates cdf. Time tags indicate midpoint of integration.
Instrument paper: Integrated Science Investigation of the Sun (ISIS): Design of the Energetic
0059-1
1 minute to 1 hour
Cite McComas et al (2016), doi:10.1007/s11214-014-0059-1

4.4.1 PRIMARY VARIABLES

4.4.2 OTHER DATA

4.4.2.1 _A_CNO_SECT_Rate_ CNO sectored count rate side A (counts s\(^{-1}\))
Size: 2 × 25 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for CNO SECT 35 – 64 MeV/nuc (2 bins)
HET_R17_SECTORS 0 – 24 (25 bins)

4.4.2.2 _A_FeGroup_SECT_Rate_ FeGroup sectored count rate side A (counts s\(^{-1}\))
Size: 1 × 25 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for FeGroup SECT 76 – 76 MeV/nuc (1 bins)
HET_R17_SECTORS 0 – 24 (25 bins)

4.4.2.3 _A_NetoSi_SECT_Rate_ NetoSi sectored count rate side A (counts s\(^{-1}\))
Size: 1 × 25 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for NetoSi SECT 54 – 54 MeV/nuc (1 bins)
HET_R17_SECTORS 0 – 24 (25 bins)

4.4.2.4 _B_CNO_SECT_Rate_ CNO sectored count rate side B (counts s\(^{-1}\))
Size: 2 × 25 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for CNO SECT 35 – 64 MeV/nuc (2 bins)
HET_R17_SECTORS 0 – 24 (25 bins)
### 4.4.2.5 B_FeGroup_SECT_Rate
FeGroup sectored count rate side B (counts s\(^{-1}\))

Size: 1 × 25 time-varying

- particle\_flux > differential\_directional\_number\_rate
- Energy Bins for FeGroup SECT 76 – 76 MeV/nuc (1 bins)
- HET_R17_SECTORS 0 – 24 (25 bins)

### 4.4.2.6 B_NetoSi_SECT_Rate
NetoSi sectored count rate side B (counts s\(^{-1}\))

Size: 1 × 25 time-varying

- particle\_flux > differential\_directional\_number\_rate
- Energy Bins for NetoSi SECT 54 – 54 MeV/nuc (1 bins)
- HET_R17_SECTORS 0 – 24 (25 bins)

### 4.4.2.7 HCI_Lat
HCl latitude (degrees)

time-varying

- position > latitude

### 4.4.2.8 HCI_Lon
HCl longitude (degrees)

time-varying

- position > longitude

### 4.4.2.9 HCI_R
Heliocentric distance (AU)

time-varying

- position > radial

### 4.4.2.10 HET_A_HCI
HCl flow direction HETA

Size: 3 time-varying

- position > direction
- Unit vector, after Fraenz and Harper, PSS, 2002.

### 4.4.2.11 HET_A_PA
Pitch angle HETA (degree)

time-varying

- position > angle
4.4.2.12  **HET_A_R17_SECT_HCI**  HCI flow direction HETAR17SECT
Size: 25 × 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
HET_R17_SECTORS 0 – 24 (25 bins)

4.4.2.13  **HET_A_R17_SECT_PA**  Pitch angle HETAR17SECT (degree)
Size: 25 time-varying
position>angle
HET_R17_SECTORS 0 – 24 (25 bins)

4.4.2.14  **HET_A_R17_SECT_RTN**  RTN flow direction HETAR17SECT
Size: 25 × 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
HET_R17_SECTORS 0 – 24 (25 bins)

4.4.2.15  **HET_A_R17_SECT_SA**  Nominal Parker Spiral angle HETAR17SECT (degree)
Size: 25 time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.
HET_R17_SECTORS 0 – 24 (25 bins)

4.4.2.16  **HET_A_RTN**  RTN flow direction HETA
Size: 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.4.2.17  **HET_A_SA**  Nominal Parker Spiral angle HETA (degree)
time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.
4.4.2.18  **HET_B_HCI**  HCI flow direction HETB
Size: 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.4.2.19  **HET_B_PA**  Pitch angle HETB (degree)
time-varying
position>angle

4.4.2.20  **HET_B_R17_SECT_HCI**  HCI flow direction HETBR17SECT
Size: $25 \times 3$ time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
HET_R17_SECTORS 0 – 24 (25 bins)

4.4.2.21  **HET_B_R17_SECT_PA**  Pitch angle HETBR17SECT (degree)
Size: 25 time-varying
position>angle
HET_R17_SECTORS 0 – 24 (25 bins)

4.4.2.22  **HET_B_R17_SECT_RTN**  RTN flow direction HETBR17SECT
Size: $25 \times 3$ time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
HET_R17_SECTORS 0 – 24 (25 bins)

4.4.2.23  **HET_B_R17_SECT_SA**  Nominal Parker Spiral angle HETBR17SECT (degree)
Size: 25 time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind
and corotation breakdown at 10Rs.
HET_R17_SECTORS 0 – 24 (25 bins)

4.4.2.24  **HET_B_RTN**  RTN flow direction HETB
Size: 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.4.2.25 HET_B_SA  Nominal Parker Spiral angle HETB (degree)
time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.

4.4.2.26 HGC_Lat  HGC latitude (degrees)
time-varying
position>latitude

4.4.2.27 HGC_Lon  HGC longitude (degrees)
time-varying
position>longitude

4.4.2.28 HGC_R  Heliocentric distance (AU)
time-varying
position>radial

4.4.3 OTHER SUPPORT

4.5 PSP_ISOIS-EPIHI_L2-HET-RATES3600
1 minute to 1 hour
Cite McComas et al (2016), doi:10.1007/s11214-014-0059-1

4.5.1 PRIMARY VARIABLES
4.5.1.1 A_H_Flux  H flux side A (cm\(^{-2}\)sr\(^{-1}\)sec\(^{-1}\)MeV\(^{-1}\))
Size: 15 time-varying
particle_flux>differential_directional_number
Energy Bins for H 7 – 83 MeV (15 bins)

4.5.1.2 A_H_SECT_Flux  H sectored flux side A (cm\(^{-2}\)sr\(^{-1}\)sec\(^{-1}\)MeV\(^{-1}\))
Size: 2 \times 25 time-varying
particle_flux>differential_directional_number
Energy Bins for H SECT 17 – 32 MeV (2 bins)
HET_R17_SECTORS 0 – 24 (25 bins)

4.5.1.3 A_He_Flux  He flux side A (cm\(^{-2}\)sr\(^{-1}\)sec\(^{-1}\)(MeV/nuc)\(^{-1}\))
Size: 16 time-varying
particle_flux>differential_directional_number
Energy Bins for He 7 – 99 MeV/nuc (16 bins)

4.5.1.4 A_He_SECT_Flux  He sectored flux side A (cm\(^{-2}\)sr\(^{-1}\)sec\(^{-1}\)(MeV/nuc)\(^{-1}\))
Size: 2 \times 25 time-varying
particle_flux>differential_directional_number
Energy Bins for He SECT 17 – 32 MeV/nuc (2 bins)
HET_R17_SECTORS 0 – 24 (25 bins)

4.5.1.5 B_H_Flux  H flux side B (cm\(^{-2}\)sr\(^{-1}\)sec\(^{-1}\)MeV\(^{-1}\))
Size: 15 time-varying
particle_flux>differential_directional_number
Energy Bins for H 7 – 83 MeV (15 bins)

4.5.1.6 B_H_SECT_Flux  H sectored flux side B (cm\(^{-2}\)sr\(^{-1}\)sec\(^{-1}\)MeV\(^{-1}\))
Size: 2 \times 25 time-varying
particle_flux>differential_directional_number
Energy Bins for H SECT 17 – 32 MeV (2 bins)
HET_R17_SECTORS 0 – 24 (25 bins)

4.5.1.7 B_He_Flux  He flux side B (cm\(^{-2}\)sr\(^{-1}\)sec\(^{-1}\)(MeV/nuc)\(^{-1}\))
Size: 16 time-varying
particle_flux>differential_directional_number
Energy Bins for He 7 – 99 MeV/nuc (16 bins)

4.5.1.8  **B_He_SECT_Flux**  
He sectored flux side B (cm$^{-2}$sr$^{-1}$sec$^{-1}$MeV/nuc$^{-1}$)
Size: 2 × 25 time-varying

Energy Bins for He SECT 17 – 32 MeV/nuc (2 bins)
HET_R17_SECTORS 0 – 24 (25 bins)

4.5.2  **OTHER DATA**

4.5.2.1  **A_Al**  
Al counts side A (counts)
Size: 15 time-varying

Energy Bins for Al 21 – 235 MeV/nuc (15 bins)

4.5.2.2  **A_Al_Rate**  
Al count rate side A (counts s$^{-1}$)
Size: 15 time-varying

Energy Bins for Al 21 – 235 MeV/nuc (15 bins)

4.5.2.3  **A_Ar**  
Ar counts side A (counts)
Size: 15 time-varying

Energy Bins for Ar 25 – 279 MeV/nuc (15 bins)

4.5.2.4  **A_Ar_Rate**  
Ar count rate side A (counts s$^{-1}$)
Size: 15 time-varying

Energy Bins for Ar 25 – 279 MeV/nuc (15 bins)

4.5.2.5  **A_C**  
C counts side A (counts)
Size: 15 time-varying

Energy Bins for C 12 – 140 MeV/nuc (15 bins)
4.5.2.6  **A_CNO_SECT_Rate**  CNO sectored count rate side A (counts s⁻¹)
Size: 2 x 25 time-varying

*particle_flux > differential_directional_number_rate*
Energy Bins for CNO SECT 35 – 64 MeV/nuc (2 bins)
HET_R17_SECTORS 0 – 24 (25 bins)

4.5.2.7  **A_C_Rate**  C count rate side A (counts s⁻¹)
Size: 15 time-varying

*particle_flux > differential_directional_number_rate*
Energy Bins for C 12 – 140 MeV/nuc (15 bins)

4.5.2.8  **A_Ca**  Ca counts side A (counts)
Size: 15 time-varying

*particle_flux > differential_directional_number_rate*
Energy Bins for Ca 25 – 279 MeV/nuc (15 bins)

4.5.2.9  **A_Ca_Rate**  Ca count rate side A (counts s⁻¹)
Size: 15 time-varying

*particle_flux > differential_directional_number_rate*
Energy Bins for Ca 25 – 279 MeV/nuc (15 bins)

4.5.2.10  **A_Cr**  Cr counts side A (counts)
Size: 16 time-varying

*particle_flux > differential_directional_number_rate*
Energy Bins for Cr 25 – 332 MeV/nuc (16 bins)

4.5.2.11  **A_Cr_Rate**  Cr count rate side A (counts s⁻¹)
Size: 16 time-varying

*particle_flux > differential_directional_number_rate*
Energy Bins for Cr 25 – 332 MeV/nuc (16 bins)

4.5.2.12  **A_Electrons**  Electrons counts side A (counts)
Size: 19 time-varying

*particle_flux > differential_directional_number_rate*
Energy Bins for Electrons 0 – 10 MeV (19 bins)
4.5.2.13 A_Electrons_Rate  Electrons count rate side A (counts s\(^{-1}\))
Size: 19 time-varying
\text{particle\_flux}\text{\textgreater}\text{differential\_directional\_number\_rate}
Energy Bins for Electrons 0 – 10 MeV (19 bins)

4.5.2.14 A_Electrons_SECT_Rate  Electrons sectored count rate side A (counts s\(^{-1}\))
Size: 2 \times 25 time-varying
\text{particle\_flux}\text{\textgreater}\text{differential\_directional\_number\_rate}
Energy Bins for Electrons SECT 1 – 3 MeV (2 bins)
HET_R17_SECTORS 0 – 24 (25 bins)

4.5.2.15 A_Fe  Fe counts side A (counts)
Size: 15 time-varying
\text{particle\_flux}\text{\textgreater}\text{differential\_directional\_number\_rate}
Energy Bins for Fe 29 – 332 MeV/nuc (15 bins)

4.5.2.16 A_FeGroup_SECT_Rate  FeGroup sectored count rate side A (counts s\(^{-1}\))
Size: 1 \times 25 time-varying
\text{particle\_flux}\text{\textgreater}\text{differential\_directional\_number\_rate}
Energy Bins for FeGroup SECT 76 – 76 MeV/nuc (1 bins)
HET_R17_SECTORS 0 – 24 (25 bins)

4.5.2.17 A_Fe_Rate  Fe count rate side A (counts s\(^{-1}\))
Size: 15 time-varying
\text{particle\_flux}\text{\textgreater}\text{differential\_directional\_number\_rate}
Energy Bins for Fe 29 – 332 MeV/nuc (15 bins)

4.5.2.18 A_H  H counts side A (counts)
Size: 15 time-varying
\text{particle\_flux}\text{\textgreater}\text{differential\_directional\_number\_rate}
Energy Bins for H 7 – 83 MeV (15 bins)

4.5.2.19 A_H_Rate  H count rate side A (counts s\(^{-1}\))
Size: 15 time-varying
\text{particle\_flux}\text{\textgreater}\text{differential\_directional\_number\_rate}
Energy Bins for H 7 – 83 MeV (15 bins)

4.5.2.20  **A_H_SECT_Rate**  H sectored count rate side A (counts s\(^{-1}\))
Size: 2 × 25 time-varying
particle\_flux>differential\_directional\_number\_rate
Energy Bins for H SECT 17 – 32 MeV (2 bins)
HET_R17_SECTORS 0 – 24 (25 bins)

4.5.2.21  **A_He**  He counts side A (counts)
Size: 16 time-varying
particle\_flux>differential\_directional\_number\_rate
Energy Bins for He 7 – 99 MeV/nuc (16 bins)

4.5.2.22  **A_He_Rate**  He count rate side A (counts s\(^{-1}\))
Size: 16 time-varying
particle\_flux>differential\_directional\_number\_rate
Energy Bins for He 7 – 99 MeV/nuc (16 bins)

4.5.2.23  **A_He_SECT_Rate**  He sectored count rate side A (counts s\(^{-1}\))
Size: 2 × 25 time-varying
particle\_flux>differential\_directional\_number\_rate
Energy Bins for He SECT 17 – 32 MeV/nuc (2 bins)
HET_R17_SECTORS 0 – 24 (25 bins)

4.5.2.24  **A_Mg**  Mg counts side A (counts)
Size: 15 time-varying
particle\_flux>differential\_directional\_number\_rate
Energy Bins for Mg 21 – 235 MeV/nuc (15 bins)

4.5.2.25  **A_Mg_Rate**  Mg count rate side A (counts s\(^{-1}\))
Size: 15 time-varying
particle\_flux>differential\_directional\_number\_rate
Energy Bins for Mg 21 – 235 MeV/nuc (15 bins)
4.5.2.26  A_N  N counts side A (counts)
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for N 12 – 140 MeV/nuc (15 bins)

4.5.2.27  A_N_Rate  N count rate side A (counts s⁻¹)
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for N 12 – 140 MeV/nuc (15 bins)

4.5.2.28  A_Na  Na counts side A (counts)
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Na 17 – 197 MeV/nuc (15 bins)

4.5.2.29  A_Na_Rate  Na count rate side A (counts s⁻¹)
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Na 17 – 197 MeV/nuc (15 bins)

4.5.2.30  A_Ne  Ne counts side A (counts)
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Ne 17 – 197 MeV/nuc (15 bins)

4.5.2.31  A_Ne_Rate  Ne count rate side A (counts s⁻¹)
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Ne 17 – 197 MeV/nuc (15 bins)

4.5.2.32  A_NetoSi_SECT_Rate  NetoSi sectored count rate side A (counts s⁻¹)
Size: 1 × 25 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for NetoSi SECT 54 – 54 MeV/nuc (1 bins)
HET_R17_SECTORS 0 – 24 (25 bins)
4.5.2.33  A_Ni  Ni counts side A (counts)
Size: 15 time-varying
particle_flux > differential_directional_number_rate
Energy Bins for Ni 29 – 332 MeV/nuc (15 bins)

4.5.2.34  A_Ni_Rate  Ni count rate side A (counts s\(^{-1}\))
Size: 15 time-varying
particle_flux > differential_directional_number_rate
Energy Bins for Ni 29 – 332 MeV/nuc (15 bins)

4.5.2.35  A_O  O counts side A (counts)
Size: 15 time-varying
particle_flux > differential_directional_number_rate
Energy Bins for O 15 – 166 MeV/nuc (15 bins)

4.5.2.36  A_O_Rate  O count rate side A (counts s\(^{-1}\))
Size: 15 time-varying
particle_flux > differential_directional_number_rate
Energy Bins for O 15 – 166 MeV/nuc (15 bins)

4.5.2.37  A_S  S counts side A (counts)
Size: 16 time-varying
particle_flux > differential_directional_number_rate
Energy Bins for S 21 – 279 MeV/nuc (16 bins)

4.5.2.38  A_S_Rate  S count rate side A (counts s\(^{-1}\))
Size: 16 time-varying
particle_flux > differential_directional_number_rate
Energy Bins for S 21 – 279 MeV/nuc (16 bins)

4.5.2.39  A_Si  Si counts side A (counts)
Size: 15 time-varying
particle_flux > differential_directional_number_rate
Energy Bins for Si 21 – 235 MeV/nuc (15 bins)
4.5.2.40  **A_Si_Rate**  Si count rate side A (counts s\(^{-1}\))
Size: 15 time-varying
\texttt{particle_flux>\textit{differential_directional_number_rate}}
Energy Bins for Si 21 – 235 MeV/nuc (15 bins)

4.5.2.41  **B_Al**  Al counts side B (counts)
Size: 15 time-varying
\texttt{particle_flux>\textit{differential_directional_number_rate}}
Energy Bins for Al 21 – 235 MeV/nuc (15 bins)

4.5.2.42  **B_Ar_Rate**  Al count rate side B (counts s\(^{-1}\))
Size: 15 time-varying
\texttt{particle_flux>\textit{differential_directional_number_rate}}
Energy Bins for Al 21 – 235 MeV/nuc (15 bins)

4.5.2.43  **B_Ar**  Ar counts side B (counts)
Size: 15 time-varying
\texttt{particle_flux>\textit{differential_directional_number_rate}}
Energy Bins for Ar 25 – 279 MeV/nuc (15 bins)

4.5.2.44  **B_Ar_Rate**  Ar count rate side B (counts s\(^{-1}\))
Size: 15 time-varying
\texttt{particle_flux>\textit{differential_directional_number_rate}}
Energy Bins for Ar 25 – 279 MeV/nuc (15 bins)

4.5.2.45  **B_C**  C counts side B (counts)
Size: 15 time-varying
\texttt{particle_flux>\textit{differential_directional_number_rate}}
Energy Bins for C 12 – 140 MeV/nuc (15 bins)

4.5.2.46  **B_CNO_SECT_Rate**  CNO sectored count rate side B (counts s\(^{-1}\))
Size: 2 × 25 time-varying
\texttt{particle_flux>\textit{differential_directional_number_rate}}
Energy Bins for CNO SECT 35 – 64 MeV/nuc (2 bins)
HET\_R17\_SECTORS 0 – 24 (25 bins)
4.5.2.47  **B_C_Rate**  C count rate side B (counts s⁻¹)
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for C 12 – 140 MeV/nuc (15 bins)

4.5.2.48  **B_Ca**  Ca counts side B (counts)
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Ca 25 – 279 MeV/nuc (15 bins)

4.5.2.49  **B_Ca_Rate**  Ca count rate side B (counts s⁻¹)
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Ca 25 – 279 MeV/nuc (15 bins)

4.5.2.50  **B_Cr**  Cr counts side B (counts)
Size: 16 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Cr 25 – 332 MeV/nuc (16 bins)

4.5.2.51  **B_Cr_Rate**  Cr count rate side B (counts s⁻¹)
Size: 16 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Cr 25 – 332 MeV/nuc (16 bins)

4.5.2.52  **B_Electrons**  Electrons counts side B (counts)
Size: 19 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Electrons 0 – 10 MeV (19 bins)

4.5.2.53  **B_Electrons_Rate**  Electrons count rate side B (counts s⁻¹)
Size: 19 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Electrons 0 – 10 MeV (19 bins)
4.5.2.54  **B_Electrons_SECT_Rate**  Electrons sectored count rate side B (counts s⁻¹)
Size: 2 × 25 time-varying
particle_flux×differential_directional_number_rate
Energy Bins for Electrons SECT 1 – 3 MeV (2 bins)
HET_R17_SECTORS 0 – 24 (25 bins)

4.5.2.55  **B_Fe**  Fe counts side B (counts)
Size: 15 time-varying
particle_flux×differential_directional_number_rate
Energy Bins for Fe 29 – 332 MeV/nuc (15 bins)

4.5.2.56  **B_FeGroup_SECT_Rate**  FeGroup sectored count rate side B (counts s⁻¹)
Size: 1 × 25 time-varying
particle_flux×differential_directional_number_rate
Energy Bins for FeGroup SECT 76 – 76 MeV/nuc (1 bins)
HET_R17_SECTORS 0 – 24 (25 bins)

4.5.2.57  **B_Fe_Rate**  Fe count rate side B (counts s⁻¹)
Size: 15 time-varying
particle_flux×differential_directional_number_rate
Energy Bins for Fe 29 – 332 MeV/nuc (15 bins)

4.5.2.58  **B_H**  H counts side B (counts)
Size: 15 time-varying
particle_flux×differential_directional_number_rate
Energy Bins for H 7 – 83 MeV (15 bins)

4.5.2.59  **B_H_Rate**  H count rate side B (counts s⁻¹)
Size: 15 time-varying
particle_flux×differential_directional_number_rate
Energy Bins for H 7 – 83 MeV (15 bins)

4.5.2.60  **B_H_SECT_Rate**  H sectored count rate side B (counts s⁻¹)
Size: 2 × 25 time-varying
particle_flux×differential_directional_number_rate
Energy Bins for H SECT 17 – 32 MeV (2 bins)
HET_R17_SECTORS 0 – 24 (25 bins)

4.5.2.61 B_He  He counts side B (counts)  
Size: 16 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for He 7 – 99 MeV/nuc (16 bins)

4.5.2.62 B_He_Rate  He count rate side B (counts s\(^{-1}\))  
Size: 16 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for He 7 – 99 MeV/nuc (16 bins)

4.5.2.63 B_He_SECT_Rate  He sectored count rate side B (counts s\(^{-1}\))  
Size: 2 × 25 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for He SECT 17 – 32 MeV/nuc (2 bins)  
HET_R17_SECTORS 0 – 24 (25 bins)

4.5.2.64 B_Mg  Mg counts side B (counts)  
Size: 15 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for Mg 21 – 235 MeV/nuc (15 bins)

4.5.2.65 B_Mg_Rate  Mg count rate side B (counts s\(^{-1}\))  
Size: 15 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for Mg 21 – 235 MeV/nuc (15 bins)

4.5.2.66 B_N  N counts side B (counts)  
Size: 15 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for N 12 – 140 MeV/nuc (15 bins)
4.5.2.67  **B_N_Rate**  N count rate side B (counts s\(^{-1}\))  
Size: 15 time-varying  
particle\_flux > differential\_directional\_number\_rate  
Energy Bins for N 12 – 140 MeV/nuc (15 bins)

4.5.2.68  **B_Na**  Na counts side B (counts)  
Size: 15 time-varying  
particle\_flux > differential\_directional\_number\_rate  
Energy Bins for Na 17 – 197 MeV/nuc (15 bins)

4.5.2.69  **B_Na_Rate**  Na count rate side B (counts s\(^{-1}\))  
Size: 15 time-varying  
particle\_flux > differential\_directional\_number\_rate  
Energy Bins for Na 17 – 197 MeV/nuc (15 bins)

4.5.2.70  **B_Ne**  Ne counts side B (counts)  
Size: 15 time-varying  
particle\_flux > differential\_directional\_number\_rate  
Energy Bins for Ne 17 – 197 MeV/nuc (15 bins)

4.5.2.71  **B_Ne_Rate**  Ne count rate side B (counts s\(^{-1}\))  
Size: 15 time-varying  
particle\_flux > differential\_directional\_number\_rate  
Energy Bins for Ne 17 – 197 MeV/nuc (15 bins)

4.5.2.72  **B_NetoSi\_SECT\_Rate**  NetoSi sectored count rate side B (counts s\(^{-1}\))  
Size: 1 × 25 time-varying  
particle\_flux > differential\_directional\_number\_rate  
Energy Bins for NetoSi SECT 54 – 54 MeV/nuc (1 bins)  
HET\_R17\_SECTORS 0 – 24 (25 bins)

4.5.2.73  **B_Ni**  Ni counts side B (counts)  
Size: 15 time-varying  
particle\_flux > differential\_directional\_number\_rate  
Energy Bins for Ni 29 – 332 MeV/nuc (15 bins)
4.5.2.74 B_Ni_Rate  Ni count rate side B (counts s$^{-1}$)
Size: 15 time-varying
particle_flux > differential_directional_number_rate
Energy Bins for Ni 29 – 332 MeV/nuc (15 bins)

4.5.2.75 B_O  O counts side B (counts)
Size: 15 time-varying
particle_flux > differential_directional_number_rate
Energy Bins for O 15 – 166 MeV/nuc (15 bins)

4.5.2.76 B_O_Rate  O count rate side B (counts s$^{-1}$)
Size: 15 time-varying
particle_flux > differential_directional_number_rate
Energy Bins for O 15 – 166 MeV/nuc (15 bins)

4.5.2.77 B_S  S counts side B (counts)
Size: 16 time-varying
particle_flux > differential_directional_number_rate
Energy Bins for S 21 – 279 MeV/nuc (16 bins)

4.5.2.78 B_S_Rate  S count rate side B (counts s$^{-1}$)
Size: 16 time-varying
particle_flux > differential_directional_number_rate
Energy Bins for S 21 – 279 MeV/nuc (16 bins)

4.5.2.79 B_Si  Si counts side B (counts)
Size: 15 time-varying
particle_flux > differential_directional_number_rate
Energy Bins for Si 21 – 235 MeV/nuc (15 bins)

4.5.2.80 B_Si_Rate  Si count rate side B (counts s$^{-1}$)
Size: 15 time-varying
particle_flux > differential_directional_number_rate
Energy Bins for Si 21 – 235 MeV/nuc (15 bins)
4.5.2.81  HCI_Lat  HCI latitude (degrees)  
time-varying  
position>latitude  

4.5.2.82  HCI_Lon  HCI longitude (degrees)  
time-varying  
position>longitude  

4.5.2.83  HCI_R  Heliocentric distance (AU)  
time-varying  
position>radial  

4.5.2.84  HET_A_HCI  HCI flow direction HETA  
Size: 3 time-varying  
position>direction  
Unit vector, after Fraenz and Harper, PSS, 2002.

4.5.2.85  HET_A_PA  Pitch angle HETA (degree)  
time-varying  
position>angle

4.5.2.86  HET_A_R17_SECT_HCI  HCI flow direction HETAR17SECT  
Size: 25 × 3 time-varying  
position>direction  
Unit vector, after Fraenz and Harper, PSS, 2002.  
HET_R17_SECTORS 0 – 24 (25 bins)

4.5.2.87  HET_A_R17_SECT_PA  Pitch angle HETAR17SECT (degree)  
Size: 25 time-varying  
position>angle  
HET_R17_SECTORS 0 – 24 (25 bins)
4.5.2.88  **HET_A_R17_SECT_RTN**  RTN flow direction HETAR17SECT  
Size: 25 × 3 time-varying  
position>direction  
Unit vector, after Fraenz and Harper, PSS, 2002.  
HET_R17_SECTORS 0 – 24 (25 bins)

4.5.2.89  **HET_A_R17_SECT_SA**  Nominal Parker Spiral angle HETAR17SECT (degree)  
Size: 25 time-varying  
position>angle  
Angle between particle direction and nominal outward Parker Spiral, based on 400 km/s solar wind and corotation breakdown at 10Rs.  
HET_R17_SECTORS 0 – 24 (25 bins)

4.5.2.90  **HET_A_RTN**  RTN flow direction HETA  
Size: 3 time-varying  
position>direction  
Unit vector, after Fraenz and Harper, PSS, 2002.

4.5.2.91  **HET_A_SA**  Nominal Parker Spiral angle HETA (degree)  
time-varying  
position>angle  
Angle between particle direction and nominal outward Parker Spiral, based on 400 km/s solar wind and corotation breakdown at 10Rs.

4.5.2.92  **HET_B_HCI**  HCI flow direction HETB  
Size: 3 time-varying  
position>direction  
Unit vector, after Fraenz and Harper, PSS, 2002.

4.5.2.93  **HET_B_PA**  Pitch angle HETB (degree)  
time-varying  
position>angle

4.5.2.94  **HET_B_R17_SECT_HCI**  HCI flow direction HETBR17SECT  
Size: 25 × 3 time-varying  
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
HET_R17_SECTORS 0 – 24 (25 bins)

4.5.2.95 HET_B_R17_SECT_PA  Pitch angle HETBR17SECT (degree)
Size: 25 time-varying
position>angle
HET_R17_SECTORS 0 – 24 (25 bins)

4.5.2.96 HET_B_R17_SECT_RTN  RTN flow direction HETBR17SECT
Size: 25 × 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
HET_R17_SECTORS 0 – 24 (25 bins)

4.5.2.97 HET_B_R17_SECT_SA  Nominal Parker Spiral angle HETBR17SECT (degree)
Size: 25 time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.
HET_R17_SECTORS 0 – 24 (25 bins)

4.5.2.98 HET_B_RTN  RTN flow direction HETB
Size: 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.5.2.99 HET_B_SA  Nominal Parker Spiral angle HETB (degree)
time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.

4.5.2.100 HGC_Lat  HGC latitude (degrees)
time-varying
position>latitude

4.5.2.101 HGC_Lon  HGC longitude (degrees)
  time-varying
  position>longitude

4.5.2.102 HGC_R  Heliocentric distance (AU)
  time-varying
  position>radial

4.5.2.103 R1A_He_BIN  R1A He Rates (counts)
  Size: 5 × 16 time-varying
  particle_flux>differential_directional_number_rate
  Energy Bins for R1 He BIN 9 – 32 MeV/nuc (5 bins)
  R1A_He_BIN_MASS_BIN 0 – 15 segment (16 bins)

4.5.2.104 R1A_Ne_BIN  R1A Ne Rates (counts)
  Size: 4 × 8 time-varying
  particle_flux>differential_directional_number_rate
  Energy Bins for R1 Ne BIN 23 – 64 MeV/nuc (4 bins)
  R1A_Ne_BIN_MASS_BIN 0 – 7 segment (8 bins)

4.5.2.105 R1B_He_BIN  R1B He Rates (counts)
  Size: 5 × 16 time-varying
  particle_flux>differential_directional_number_rate
  Energy Bins for R1 He BIN 9 – 32 MeV/nuc (5 bins)
  R1B_He_BIN_MASS_BIN 0 – 15 segment (16 bins)

4.5.2.106 R1B_Ne_BIN  R1B Ne Rates (counts)
  Size: 4 × 8 time-varying
  particle_flux>differential_directional_number_rate
  Energy Bins for R1 Ne BIN 23 – 64 MeV/nuc (4 bins)
  R1B_Ne_BIN_MASS_BIN 0 – 7 segment (8 bins)
4.5.2.107 **R2A_He_BIN**  
R2A He Rates (counts)  
Size: 4 × 16 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for R2 He BIN 16 – 45 MeV/nuc (4 bins)  
R2A_He_BIN_MASS_BIN 0 – 15 segment (16 bins)

4.5.2.108 **R2A_Ne_BIN**  
R2A Ne Rates (counts)  
Size: 4 × 8 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for R2 Ne BIN 32 – 91 MeV/nuc (4 bins)  
R2A_Ne_BIN_MASS_BIN 0 – 7 segment (8 bins)

4.5.2.109 **R2B_He_BIN**  
R2B He Rates (counts)  
Size: 4 × 16 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for R2 He BIN 16 – 45 MeV/nuc (4 bins)  
R2B_He_BIN_MASS_BIN 0 – 15 segment (16 bins)

4.5.2.110 **R2B_Ne_BIN**  
R2B Ne Rates (counts)  
Size: 4 × 8 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for R2 Ne BIN 32 – 91 MeV/nuc (4 bins)  
R2B_Ne_BIN_MASS_BIN 0 – 7 segment (8 bins)

4.5.2.111 **R3A_He_BIN**  
R3A He Rates (counts)  
Size: 4 × 16 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for R3 He BIN 23 – 64 MeV/nuc (4 bins)  
R3A_He_BIN_MASS_BIN 0 – 15 segment (16 bins)

4.5.2.112 **R3A_Ne_BIN**  
R3A Ne Rates (counts)  
Size: 4 × 8 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for R3 Ne BIN 45 – 128 MeV/nuc (4 bins)  
R3A_Ne_BIN_MASS_BIN 0 – 7 segment (8 bins)
4.5.2.113 **R3B He BIN**  R3B He Rates (counts)
Size: 4 × 16 time-varying
\[\text{particle}\_\text{flux} > \text{differential\_directional\_number\_rate}\]
Energy Bins for R3 He BIN 23 – 64 MeV/nuc (4 bins)
R3B_He_BIN_MASS_BIN 0 – 15 segment (16 bins)

4.5.2.114 **R3B Ne BIN**  R3B Ne Rates (counts)
Size: 4 × 8 time-varying
\[\text{particle}\_\text{flux} > \text{differential\_directional\_number\_rate}\]
Energy Bins for R3 Ne BIN 45 – 128 MeV/nuc (4 bins)
R3B_Ne_BIN_MASS_BIN 0 – 7 segment (8 bins)

4.5.2.115 **R4A He BIN**  R4A He Rates (counts)
Size: 3 × 16 time-varying
\[\text{particle}\_\text{flux} > \text{differential\_directional\_number\_rate}\]
Energy Bins for R4 He BIN 32 – 64 MeV/nuc (3 bins)
R4A_He_BIN_MASS_BIN 0 – 15 segment (16 bins)

4.5.2.116 **R4A Ne BIN**  R4A Ne Rates (counts)
Size: 3 × 8 time-varying
\[\text{particle}\_\text{flux} > \text{differential\_directional\_number\_rate}\]
Energy Bins for R4 Ne BIN 64 – 128 MeV/nuc (3 bins)
R4A_Ne_BIN_MASS_BIN 0 – 7 segment (8 bins)

4.5.2.117 **R4B He BIN**  R4B He Rates (counts)
Size: 3 × 16 time-varying
\[\text{particle}\_\text{flux} > \text{differential\_directional\_number\_rate}\]
Energy Bins for R4 He BIN 32 – 64 MeV/nuc (3 bins)
R4B_He_BIN_MASS_BIN 0 – 15 segment (16 bins)

4.5.2.118 **R4B Ne BIN**  R4B Ne Rates (counts)
Size: 3 × 8 time-varying
\[\text{particle}\_\text{flux} > \text{differential\_directional\_number\_rate}\]
Energy Bins for R4 Ne BIN 64 – 128 MeV/nuc (3 bins)
R4B_Ne_BIN_MASS_BIN 0 – 7 segment (8 bins)
4.5.2.119 **R5A He BIN**  R5A He Rates (counts)
Size: 3 × 16 time-varying
\[\text{particle flux} \times \text{differential directional number rate}\]
Energy Bins for R5 He BIN 32 – 64 MeV/nuc (3 bins)
R5A_He_BIN_MASS_BIN 0 – 15 segment (16 bins)

4.5.2.120 **R5A Ne BIN**  R5A Ne Rates (counts)
Size: 2 × 8 time-varying
\[\text{particle flux} \times \text{differential directional number rate}\]
Energy Bins for R5 Ne BIN 91 – 128 MeV/nuc (2 bins)
R5A_Ne_BIN_MASS_BIN 0 – 7 segment (8 bins)

4.5.2.121 **R5B He BIN**  R5B He Rates (counts)
Size: 3 × 16 time-varying
\[\text{particle flux} \times \text{differential directional number rate}\]
Energy Bins for R5 He BIN 32 – 64 MeV/nuc (3 bins)
R5B_He_BIN_MASS_BIN 0 – 15 segment (16 bins)

4.5.2.122 **R5B Ne BIN**  R5B Ne Rates (counts)
Size: 2 × 8 time-varying
\[\text{particle flux} \times \text{differential directional number rate}\]
Energy Bins for R5 Ne BIN 91 – 128 MeV/nuc (2 bins)
R5B_Ne_BIN_MASS_BIN 0 – 7 segment (8 bins)

4.5.2.123 **R6A He BIN**  R6A He Rates (counts)
Size: 3 × 16 time-varying
\[\text{particle flux} \times \text{differential directional number rate}\]
Energy Bins for R6 He BIN 32 – 64 MeV/nuc (3 bins)
R6A_He_BIN_MASS_BIN 0 – 15 segment (16 bins)

4.5.2.124 **R6A Ne BIN**  R6A Ne Rates (counts)
Size: 3 × 8 time-varying
\[\text{particle flux} \times \text{differential directional number rate}\]
Energy Bins for R6 Ne BIN 91 – 181 MeV/nuc (3 bins)
R6A_Ne_BIN_MASS_BIN 0 – 7 segment (8 bins)
4.5.2.125 R6B_He_BIN  R6B He Rates (counts)
Size: 3 × 16 time-varying
\(\text{particle_flux} \times \text{differential_directional_number_rate}\)
Energy Bins for R6 He BIN 32 – 64 MeV/nuc (3 bins)
R6B_He_BIN_MASS_BIN 0 – 15 segment (16 bins)

4.5.2.126 R6B_Ne_BIN  R6B Ne Rates (counts)
Size: 3 × 8 time-varying
\(\text{particle_flux} \times \text{differential_directional_number_rate}\)
Energy Bins for R6 Ne BIN 91 – 181 MeV/nuc (3 bins)
R6B_Ne_BIN_MASS_BIN 0 – 7 segment (8 bins)

4.5.2.127 R7A_He_BIN  R7A He Rates (counts)
Size: 2 × 16 time-varying
\(\text{particle_flux} \times \text{differential_directional_number_rate}\)
Energy Bins for R7 He BIN 45 – 64 MeV/nuc (2 bins)
R7A_He_BIN_MASS_BIN 0 – 15 segment (16 bins)

4.5.2.128 R7A_Ne_BIN  R7A Ne Rates (counts)
Size: 3 × 8 time-varying
\(\text{particle_flux} \times \text{differential_directional_number_rate}\)
Energy Bins for R7 Ne BIN 91 – 181 MeV/nuc (3 bins)
R7A_Ne_BIN_MASS_BIN 0 – 7 segment (8 bins)

4.5.2.129 R7B_He_BIN  R7B He Rates (counts)
Size: 2 × 16 time-varying
\(\text{particle_flux} \times \text{differential_directional_number_rate}\)
Energy Bins for R7 He BIN 45 – 64 MeV/nuc (2 bins)
R7B_He_BIN_MASS_BIN 0 – 15 segment (16 bins)

4.5.2.130 R7B_Ne_BIN  R7B Ne Rates (counts)
Size: 3 × 8 time-varying
\(\text{particle_flux} \times \text{differential_directional_number_rate}\)
Energy Bins for R7 Ne BIN 91 – 181 MeV/nuc (3 bins)
R7B_Ne_BIN_MASS_BIN 0 – 7 segment (8 bins)
4.5.3 OTHER SUPPORT

4.6 PSP_ISOIS-EPIHI_L2-HET-RATES60

ISOIS-EPIHI>Integrated Science Investigation of the Sun, Energetic Particle Instrument Hi
L2-HET-rates60>Level 2 HET 1-minute rates
EPI-Hi HET 60 second rates cdf. Time tags indicate midpoint of integration.
Instrument paper: Integrated Science Investigation of the Sun (ISIS): Design of the Energetic
0059-1
1 minute to 1 hour
Cite McComas et al (2016), doi:10.1007/s11214-014-0059-1

4.6.1 PRIMARY VARIABLES

4.6.1.1 A_H_Flux  H flux side A (cm\(^{-2}\)sr\(^{-1}\)sec\(^{-1}\)MeV\(^{-1}\))
Size: 15 time-varying
particle_flux>differential_directional_number
Energy Bins for H 7 – 83 MeV (15 bins)

4.6.1.2 A_H_SECT_Flux  H sectored flux side A (cm\(^{-2}\)sr\(^{-1}\)sec\(^{-1}\)MeV\(^{-1}\))
Size: 2 × 25 time-varying
particle_flux>differential_directional_number
Energy Bins for H SECT 17 – 32 MeV (2 bins)
HET_R17_SECTORS 0 – 24 (25 bins)

4.6.1.3 A_He_Flux  He flux side A (cm\(^{-2}\)sr\(^{-1}\)sec\(^{-1}\)(MeV/nuc)\(^{-1}\))
Size: 16 time-varying
particle_flux>differential_directional_number
Energy Bins for He 7 – 99 MeV/nuc (16 bins)

4.6.1.4 A_He_SECT_Flux  He sectored flux side A (cm\(^{-2}\)sr\(^{-1}\)sec\(^{-1}\)(MeV/nuc)\(^{-1}\))
Size: 2 × 25 time-varying
particle_flux>differential_directional_number
Energy Bins for He SECT 17 – 32 MeV/nuc (2 bins)
HET_R17_SECTORS 0 – 24 (25 bins)

4.6.1.5 B_H_Flux  H flux side B (cm\(^{-2}\)sr\(^{-1}\)sec\(^{-1}\)MeV\(^{-1}\))
Size: 15 time-varying
4.6.1.6 **B_H_SECT_Flux**  H sectored flux side B (cm$^{-2}$sr$^{-1}$sec$^{-1}$MeV$^{-1}$)
Size: 2 × 25 time-varying

Energy Bins for H SECT 17–32 MeV (2 bins)
HET_R17_SECTORS 0–24 (25 bins)

4.6.1.7 **B_He_Flux**  He flux side B (cm$^{-2}$sr$^{-1}$sec$^{-1}$(MeV/nuc)$^{-1}$)
Size: 16 time-varying

Energy Bins for He 7–99 MeV/nuc (16 bins)

4.6.1.8 **B_He_SECT_Flux**  He sectored flux side B (cm$^{-2}$sr$^{-1}$sec$^{-1}$(MeV/nuc)$^{-1}$)
Size: 2 × 25 time-varying

Energy Bins for He SECT 17–32 MeV/nuc (2 bins)
HET_R17_SECTORS 0–24 (25 bins)

4.6.2 **OTHER DATA**

4.6.2.1 **A_Al**  Al counts side A (counts)
Size: 15 time-varying

Energy Bins for Al 21–235 MeV/nuc (15 bins)

4.6.2.2 **A_Al_Rate**  Al count rate side A (counts s$^{-1}$)
Size: 15 time-varying

Energy Bins for Al 21–235 MeV/nuc (15 bins)

4.6.2.3 **A_Ar**  Ar counts side A (counts)
Size: 15 time-varying

Energy Bins for Ar 25–279 MeV/nuc (15 bins)
4.6.2.4 A_Ar_Rate Ar count rate side A (counts s\(^{-1}\))
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Ar 25 – 279 MeV/nuc (15 bins)

4.6.2.5 A_C C counts side A (counts)
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for C 12 – 140 MeV/nuc (15 bins)

4.6.2.6 A_C_Rate C count rate side A (counts s\(^{-1}\))
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for C 12 – 140 MeV/nuc (15 bins)

4.6.2.7 A_Ca Ca counts side A (counts)
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Ca 25 – 279 MeV/nuc (15 bins)

4.6.2.8 A_Ca_Rate Ca count rate side A (counts s\(^{-1}\))
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Ca 25 – 279 MeV/nuc (15 bins)

4.6.2.9 A_Cr Cr counts side A (counts)
Size: 16 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Cr 25 – 332 MeV/nuc (16 bins)

4.6.2.10 A_Cr_Rate Cr count rate side A (counts s\(^{-1}\))
Size: 16 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Cr 25 – 332 MeV/nuc (16 bins)
4.6.2.11 **A_Electrons**  Electrons counts side A (counts)
Size: 19 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Electrons 0 – 10 MeV (19 bins)

4.6.2.12 **A_Electrons_Rate**  Electrons count rate side A (counts s⁻¹)
Size: 19 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Electrons 0 – 10 MeV (19 bins)

4.6.2.13 **A_Electrons_SECT_Rate**  Electrons sectored count rate side A (counts s⁻¹)
Size: 2 × 25 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Electrons SECT 1 – 3 MeV (2 bins)
HET_R17_SECTORS 0 – 24 (25 bins)

4.6.2.14 **A_Fe**  Fe counts side A (counts)
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Fe 29 – 332 MeV/nuc (15 bins)

4.6.2.15 **A_Fe_Rate**  Fe count rate side A (counts s⁻¹)
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Fe 29 – 332 MeV/nuc (15 bins)

4.6.2.16 **A_H**  H counts side A (counts)
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for H 7 – 83 MeV (15 bins)

4.6.2.17 **A_H_Rate**  H count rate side A (counts s⁻¹)
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for H 7 – 83 MeV (15 bins)
4.6.2.18  **A_H_SECT_Rate**  H sectored count rate side A (counts s\(^{-1}\))
Size: 2 \(\times\) 25 time-varying
\textit{particle_flux}>\textit{differential_directional_number_rate}
Energy Bins for H SECT 17 – 32 MeV (2 bins)
HET\textunderscore R17\textunderscore SECTORS 0 – 24 (25 bins)

4.6.2.19  **A_He**  He counts side A (counts)
Size: 16 time-varying
\textit{particle_flux}>\textit{differential_directional_number_rate}
Energy Bins for He 7 – 99 MeV/nuc (16 bins)

4.6.2.20  **A_He_Rate**  He count rate side A (counts s\(^{-1}\))
Size: 16 time-varying
\textit{particle_flux}>\textit{differential_directional_number_rate}
Energy Bins for He 7 – 99 MeV/nuc (16 bins)

4.6.2.21  **A_He_SECT_Rate**  He sectored count rate side A (counts s\(^{-1}\))
Size: 2 \(\times\) 25 time-varying
\textit{particle_flux}>\textit{differential_directional_number_rate}
Energy Bins for He SECT 17 – 32 MeV/nuc (2 bins)
HET\textunderscore R17\textunderscore SECTORS 0 – 24 (25 bins)

4.6.2.22  **A_Mg**  Mg counts side A (counts)
Size: 15 time-varying
\textit{particle_flux}>\textit{differential_directional_number_rate}
Energy Bins for Mg 21 – 235 MeV/nuc (15 bins)

4.6.2.23  **A_Mg_Rate**  Mg count rate side A (counts s\(^{-1}\))
Size: 15 time-varying
\textit{particle_flux}>\textit{differential_directional_number_rate}
Energy Bins for Mg 21 – 235 MeV/nuc (15 bins)

4.6.2.24  **A_N**  N counts side A (counts)
Size: 15 time-varying
\textit{particle_flux}>\textit{differential_directional_number_rate}
Energy Bins for N 12 – 140 MeV/nuc (15 bins)

**4.6.2.25 A_N_Rate**  N count rate side A (counts s\(^{-1}\))
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for N 12 – 140 MeV/nuc (15 bins)

**4.6.2.26 A_Na**  Na counts side A (counts)
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Na 17 – 197 MeV/nuc (15 bins)

**4.6.2.27 A_Na_Rate**  Na count rate side A (counts s\(^{-1}\))
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Na 17 – 197 MeV/nuc (15 bins)

**4.6.2.28 A_Ne**  Ne counts side A (counts)
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Ne 17 – 197 MeV/nuc (15 bins)

**4.6.2.29 A_Ne_Rate**  Ne count rate side A (counts s\(^{-1}\))
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Ne 17 – 197 MeV/nuc (15 bins)

**4.6.2.30 A_Ni**  Ni counts side A (counts)
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Ni 29 – 332 MeV/nuc (15 bins)

**4.6.2.31 A_Ni_Rate**  Ni count rate side A (counts s\(^{-1}\))
Size: 15 time-varying
particle_flux\textgreater differential\_directional\_number\_rate
Energy Bins for Ni 29 – 332 MeV/nuc (15 bins)

4.6.2.32 \textbf{A\_O} O counts side A (counts)
Size: 15 time-varying
particle_flux\textgreater differential\_directional\_number\_rate
Energy Bins for O 15 – 166 MeV/nuc (15 bins)

4.6.2.33 \textbf{A\_O\_Rate} O count rate side A (counts s\(^{-1}\))
Size: 15 time-varying
particle_flux\textgreater differential\_directional\_number\_rate
Energy Bins for O 15 – 166 MeV/nuc (15 bins)

4.6.2.34 \textbf{A\_S} S counts side A (counts)
Size: 16 time-varying
particle_flux\textgreater differential\_directional\_number\_rate
Energy Bins for S 21 – 279 MeV/nuc (16 bins)

4.6.2.35 \textbf{A\_S\_Rate} S count rate side A (counts s\(^{-1}\))
Size: 16 time-varying
particle_flux\textgreater differential\_directional\_number\_rate
Energy Bins for S 21 – 279 MeV/nuc (16 bins)

4.6.2.36 \textbf{A\_Si} Si counts side A (counts)
Size: 15 time-varying
particle_flux\textgreater differential\_directional\_number\_rate
Energy Bins for Si 21 – 235 MeV/nuc (15 bins)

4.6.2.37 \textbf{A\_Si\_Rate} Si count rate side A (counts s\(^{-1}\))
Size: 15 time-varying
particle_flux\textgreater differential\_directional\_number\_rate
Energy Bins for Si 21 – 235 MeV/nuc (15 bins)
4.6.2.38  **B_Al**  Al counts side B (counts)
Size: 15 time-varying
\textit{particle flux> differential directional number rate}
Energy Bins for Al 21 – 235 MeV/nuc (15 bins)

4.6.2.39  **B_Al_Rate**  Al count rate side B (counts s$^{-1}$)
Size: 15 time-varying
\textit{particle flux> differential directional number rate}
Energy Bins for Al 21 – 235 MeV/nuc (15 bins)

4.6.2.40  **B_Ar**  Ar counts side B (counts)
Size: 15 time-varying
\textit{particle flux> differential directional number rate}
Energy Bins for Ar 25 – 279 MeV/nuc (15 bins)

4.6.2.41  **B_Ar_Rate**  Ar count rate side B (counts s$^{-1}$)
Size: 15 time-varying
\textit{particle flux> differential directional number rate}
Energy Bins for Ar 25 – 279 MeV/nuc (15 bins)

4.6.2.42  **B_C**  C counts side B (counts)
Size: 15 time-varying
\textit{particle flux> differential directional number rate}
Energy Bins for C 12 – 140 MeV/nuc (15 bins)

4.6.2.43  **B_C_Rate**  C count rate side B (counts s$^{-1}$)
Size: 15 time-varying
\textit{particle flux> differential directional number rate}
Energy Bins for C 12 – 140 MeV/nuc (15 bins)

4.6.2.44  **B_Ca**  Ca counts side B (counts)
Size: 15 time-varying
\textit{particle flux> differential directional number rate}
Energy Bins for Ca 25 – 279 MeV/nuc (15 bins)
4.6.2.45 **B_Ca_Rate**  Ca count rate side B (counts s\(^{-1}\))
Size: 15 time-varying
\textit{particle\_flux>differential\_directional\_number\_rate}
Energy Bins for Ca 25 – 279 MeV/nuc (15 bins)

4.6.2.46 **B_Cr**  Cr counts side B (counts)
Size: 16 time-varying
\textit{particle\_flux>differential\_directional\_number\_rate}
Energy Bins for Cr 25 – 332 MeV/nuc (16 bins)

4.6.2.47 **B_Cr_Rate**  Cr count rate side B (counts s\(^{-1}\))
Size: 16 time-varying
\textit{particle\_flux>differential\_directional\_number\_rate}
Energy Bins for Cr 25 – 332 MeV/nuc (16 bins)

4.6.2.48 **B_Electrons**  Electrons counts side B (counts)
Size: 19 time-varying
\textit{particle\_flux>differential\_directional\_number\_rate}
Energy Bins for Electrons 0 – 10 MeV (19 bins)

4.6.2.49 **B_Electrons_Rate**  Electrons count rate side B (counts s\(^{-1}\))
Size: 19 time-varying
\textit{particle\_flux>differential\_directional\_number\_rate}
Energy Bins for Electrons 0 – 10 MeV (19 bins)

4.6.2.50 **B_Electrons_SECT_Rate**  Electrons sectored count rate side B (counts s\(^{-1}\))
Size: \(2 \times 25\) time-varying
\textit{particle\_flux>differential\_directional\_number\_rate}
Energy Bins for Electrons SECT 1 – 3 MeV (2 bins)
HET_R17_SECTORS 0 – 24 (25 bins)

4.6.2.51 **B_Fe**  Fe counts side B (counts)
Size: 15 time-varying
\textit{particle\_flux>differential\_directional\_number\_rate}
Energy Bins for Fe 29 – 332 MeV/nuc (15 bins)
4.6.2.52  **B_Fe_Rate**  Fe count rate side B (counts s⁻¹)
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Fe 29 – 332 MeV/nuc (15 bins)

4.6.2.53  **B_H**  H counts side B (counts)
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for H 7 – 83 MeV (15 bins)

4.6.2.54  **B_H_Rate**  H count rate side B (counts s⁻¹)
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for H 7 – 83 MeV (15 bins)

4.6.2.55  **B_H_SECT_Rate**  H sectored count rate side B (counts s⁻¹)
Size: 2 × 25 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for H SECT 17 – 32 MeV (2 bins)
HET_R17_SECTORS 0 – 24 (25 bins)

4.6.2.56  **B_He**  He counts side B (counts)
Size: 16 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for He 7 – 99 MeV/nuc (16 bins)

4.6.2.57  **B_He_Rate**  He count rate side B (counts s⁻¹)
Size: 16 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for He 7 – 99 MeV/nuc (16 bins)

4.6.2.58  **B_He_SECT_Rate**  He sectored count rate side B (counts s⁻¹)
Size: 2 × 25 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for He SECT 17 – 32 MeV/nuc (2 bins)
PSP/IS⊙IS User Guide

HET_R17_SECTORS 0 – 24 (25 bins)

4.6.2.59 B_Mg  Mg counts side B (counts)  
Size: 15 time-varying  
particle_flux>\text{differential}\_\text{directional}\_\text{number}\_\text{rate}  
Energy Bins for Mg 21 – 235 MeV/nuc (15 bins)

4.6.2.60 B_Mg_Rate  Mg count rate side B (counts s⁻¹)  
Size: 15 time-varying  
particle_flux>\text{differential}\_\text{directional}\_\text{number}\_\text{rate}  
Energy Bins for Mg 21 – 235 MeV/nuc (15 bins)

4.6.2.61 B_N  N counts side B (counts)  
Size: 15 time-varying  
particle_flux>\text{differential}\_\text{directional}\_\text{number}\_\text{rate}  
Energy Bins for N 12 – 140 MeV/nuc (15 bins)

4.6.2.62 B_N_Rate  N count rate side B (counts s⁻¹)  
Size: 15 time-varying  
particle_flux>\text{differential}\_\text{directional}\_\text{number}\_\text{rate}  
Energy Bins for N 12 – 140 MeV/nuc (15 bins)

4.6.2.63 B_Na  Na counts side B (counts)  
Size: 15 time-varying  
particle_flux>\text{differential}\_\text{directional}\_\text{number}\_\text{rate}  
Energy Bins for Na 17 – 197 MeV/nuc (15 bins)

4.6.2.64 B_Na_Rate  Na count rate side B (counts s⁻¹)  
Size: 15 time-varying  
particle_flux>\text{differential}\_\text{directional}\_\text{number}\_\text{rate}  
Energy Bins for Na 17 – 197 MeV/nuc (15 bins)

4.6.2.65 B_Ne  Ne counts side B (counts)  
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Ne 17 – 197 MeV/nuc (15 bins)

4.6.2.66 B_Ne_Rate  Ne count rate side B (counts s$^{-1}$)
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Ne 17 – 197 MeV/nuc (15 bins)

4.6.2.67 B_Ni   Ni counts side B (counts)
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Ni 29 – 332 MeV/nuc (15 bins)

4.6.2.68 B_Ni_Rate  Ni count rate side B (counts s$^{-1}$)
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Ni 29 – 332 MeV/nuc (15 bins)

4.6.2.69 B_O   O counts side B (counts)
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for O 15 – 166 MeV/nuc (15 bins)

4.6.2.70 B_O_Rate  O count rate side B (counts s$^{-1}$)
Size: 15 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for O 15 – 166 MeV/nuc (15 bins)

4.6.2.71 B_S   S counts side B (counts)
Size: 16 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for S 21 – 279 MeV/nuc (16 bins)
4.6.2.72  **B_S_Rate**  S count rate side B (counts s\(^{-1}\))
Size: 16 time-varying
particle flux → differential_directional_number_rate
Energy Bins for S 21 – 279 MeV/nuc (16 bins)

4.6.2.73  **B_Si**  Si counts side B (counts)
Size: 15 time-varying
particle flux → differential_directional_number_rate
Energy Bins for Si 21 – 235 MeV/nuc (15 bins)

4.6.2.74  **B_Si_Rate**  Si count rate side B (counts s\(^{-1}\))
Size: 15 time-varying
particle flux → differential_directional_number_rate
Energy Bins for Si 21 – 235 MeV/nuc (15 bins)

4.6.2.75  **HCI_Lat**  HCI latitude (degrees)
time-varying
position → latitude

4.6.2.76  **HCI_Lon**  HCI longitude (degrees)
time-varying
position → longitude

4.6.2.77  **HCI_R**  Heliocentric distance (AU)
time-varying
position → radial

4.6.2.78  **HET_A_HCI**  HCI flow direction HETA
Size: 3 time-varying
position → direction
Unit vector, after Fraenz and Harper, PSS, 2002.
4.6.2.79  **HET_A_PA**  Pitch angle HETA (degree)
  time-varying
  position>angle

4.6.2.80  **HET_A_R17_SECT_HCI**  HCI flow direction HETAR17SECT
  Size: 25 × 3 time-varying
  position>direction
  Unit vector, after Fraenz and Harper, PSS, 2002.
  HET_R17_SECTORS 0 – 24 (25 bins)

4.6.2.81  **HET_A_R17_SECT_PA**  Pitch angle HETAR17SECT (degree)
  Size: 25 time-varying
  position>angle
  HET_R17_SECTORS 0 – 24 (25 bins)

4.6.2.82  **HET_A_R17_SECT_RTN**  RTN flow direction HETAR17SECT
  Size: 25 × 3 time-varying
  position>direction
  Unit vector, after Fraenz and Harper, PSS, 2002.
  HET_R17_SECTORS 0 – 24 (25 bins)

4.6.2.83  **HET_A_R17_SECT_SA**  Nominal Parker Spiral angle HETAR17SECT (degree)
  Size: 25 time-varying
  position>angle
  Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind
  and corotation breakdown at 10Rs.
  HET_R17_SECTORS 0 – 24 (25 bins)

4.6.2.84  **HET_A_RTN**  RTN flow direction HETA
  Size: 3 time-varying
  position>direction
  Unit vector, after Fraenz and Harper, PSS, 2002.

4.6.2.85  **HET_A_SA**  Nominal Parker Spiral angle HETA (degree)
  time-varying
  position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.

4.6.2.86 HET_B_HCI  HCI flow direction HETB  
Size: 3 time-varying  
position>direction  
Unit vector, after Fraenz and Harper, PSS, 2002.

4.6.2.87 HET_B_PA  Pitch angle HETB (degree)  
time-varying  
position>angle

4.6.2.88 HET_B_R17_SECT_HCI  HCI flow direction HETBR17SECT  
Size: 25 × 3 time-varying  
position>direction  
Unit vector, after Fraenz and Harper, PSS, 2002.  
HET_R17_SECTORS 0 – 24 (25 bins)

4.6.2.89 HET_B_R17_SECT_PA  Pitch angle HETBR17SECT (degree)  
Size: 25 time-varying  
position>angle  
HET_R17_SECTORS 0 – 24 (25 bins)

4.6.2.90 HET_B_R17_SECT_RTN  RTN flow direction HETBR17SECT  
Size: 25 × 3 time-varying  
position>direction  
Unit vector, after Fraenz and Harper, PSS, 2002.  
HET_R17_SECTORS 0 – 24 (25 bins)

4.6.2.91 HET_B_R17_SECT_SA  Nominal Parker Spiral angle HETBR17SECT (degree)  
Size: 25 time-varying  
position>angle  
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.  
HET_R17_SECTORS 0 – 24 (25 bins)
4.6.2.92  HET_B_RTN  RTN flow direction HETB
Size: 3 time-varying
direction

4.6.2.93  HET_B_SA  Nominal Parker Spiral angle HETB (degree)
time-varying
angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind
and corotation breakdown at 10Rs.

4.6.2.94  HGC_Lat  HGC latitude (degrees)
time-varying
latitude

4.6.2.95  HGC_Lon  HGC longitude (degrees)
time-varying
longitude

4.6.2.96  HGC_R  Heliocentric distance (AU)
time-varying
radial

4.6.3  OTHER SUPPORT

4.7  PSP_ISOIS-EPIHI_L2-LET1-RATES10
ISOIS-EPIHI>Integrated Science Investigation of the Sun, Energetic Particle Instrument Hi
L2-LET1-rates10>Level 2 LET1 10-second rates
EPI-Hi 10 second rates cdf. Time tags indicate midpoint of integration.
Instrument paper: Integrated Science Investigation of the Sun (ISIS): Design of the Energetic
0059-1
1 minute to 1 hour
Cite McComas et al (2016), doi:10.1007/s11214-014-0059-1
4.7.1 PRIMARY VARIABLES

4.7.1.1 A_H_Flux  H flux side A (cm$^{-2}$sr$^{-1}$sec$^{-1}$MeV$^{-1}$)
Size: 18 time-varying
particle_flux>differential_directional_number
Energy Bins for H 1 – 15 MeV (18 bins)

4.7.1.2 A_He_Flux  He flux side A (cm$^{-2}$sr$^{-1}$sec$^{-1}$MeV$^{-1}$)
Size: 22 time-varying
particle_flux>differential_directional_number
Energy Bins for He 1 – 29 MeV/nuc (22 bins)

4.7.1.3 B_H_Flux  H flux side B (cm$^{-2}$sr$^{-1}$sec$^{-1}$MeV$^{-1}$)
Size: 18 time-varying
particle_flux>differential_directional_number
Energy Bins for H 1 – 15 MeV (18 bins)

4.7.1.4 B_He_Flux  He flux side B (cm$^{-2}$sr$^{-1}$sec$^{-1}$MeV$^{-1}$)
Size: 22 time-varying
particle_flux>differential_directional_number
Energy Bins for He 1 – 29 MeV/nuc (22 bins)

4.7.2 OTHER DATA

4.7.2.1 A_Electrons  Electrons counts side A (counts)
Size: 14 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Electrons 1 – 5 MeV (14 bins)

4.7.2.2 A_Electrons_Rate  Electrons count rate side A (counts s$^{-1}$)
Size: 14 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Electrons 1 – 5 MeV (14 bins)

4.7.2.3 A_H  H counts side A (counts)
Size: 18 time-varying
particle_flux>differential_directional_number_rate
EnergyBinsforH1–15MeV(18bins)

4.7.2.4 A_H_Rate  H count rate side A (counts s⁻¹)
Size: 18 time-varying
particle_flux>differential_directional_number_rate
EnergyBinsforH1–15MeV(18bins)

4.7.2.5 A_He  He counts side A (counts)
Size: 22 time-varying
particle_flux>differential_directional_number_rate
EnergyBinsforHe1–29MeV/nuc(22bins)

4.7.2.6 A_He_Rate  He count rate side A (counts s⁻¹)
Size: 22 time-varying
particle_flux>differential_directional_number_rate
EnergyBinsforHe1–29MeV/nuc(22bins)

4.7.2.7 B_Electrons  Electrons counts side B (counts)
Size: 14 time-varying
particle_flux>differential_directional_number_rate
EnergyBinsforElectrons1–5MeV(14bins)

4.7.2.8 B_Electrons_Rate  Electrons count rate side B (counts s⁻¹)
Size: 14 time-varying
particle_flux>differential_directional_number_rate
EnergyBinsforElectrons1–5MeV(14bins)

4.7.2.9 B_H  H counts side B (counts)
Size: 18 time-varying
particle_flux>differential_directional_number_rate
EnergyBinsforH1–15MeV(18bins)

4.7.2.10 B_H_Rate  H count rate side B (counts s⁻¹)
Size: 18 time-varying
4.7.2.11  **B_He**  He counts side B (counts)
Size: 22 time-varying

4.7.2.12  **B_He_Rate**  He count rate side B (counts s⁻¹)
Size: 22 time-varying

4.7.2.13  **HCI_Lat**  HCI latitude (degrees)
            time-varying
            position>latitude

4.7.2.14  **HCI_Lon**  HCI longitude (degrees)
            time-varying
            position>longitude

4.7.2.15  **HCI_R**  Heliocentric distance (AU)
            time-varying
            position>radial

4.7.2.16  **HGC_Lat**  HGC latitude (degrees)
            time-varying
            position>latitude
4.7.2.17  **HGC_Lon**  HGC longitude (degrees)  
  time-varying  
  position>longitude  

4.7.2.18  **HGC_R**  Heliocentric distance (AU)  
  time-varying  
  position>radial  

4.7.2.19  **LET1_A_HCI**  HCI flow direction LET1A  
  Size: 3 time-varying  
  position>direction  
  Unit vector, after Fraenz and Harper, PSS, 2002.

4.7.2.20  **LET1_A_PA**  Pitch angle LET1A (degree)  
  time-varying  
  position>angle

4.7.2.21  **LET1_A_RTN**  RTN flow direction LET1A  
  Size: 3 time-varying  
  position>direction  
  Unit vector, after Fraenz and Harper, PSS, 2002.

4.7.2.22  **LET1_A_SA**  Nominal Parker Spiral angle LET1A (degree)  
  time-varying  
  position>angle  
  Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.

4.7.2.23  **LET1_B_HCI**  HCI flow direction LET1B  
  Size: 3 time-varying  
  position>direction  
  Unit vector, after Fraenz and Harper, PSS, 2002.
4.7.2.24 **LET1_B_PA**  Pitch angle LET1B (degree)
time-varying
position>angle

4.7.2.25 **LET1_B_RTN**  RTN flow direction LET1B
Size: 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.7.2.26 **LET1_B_SA**  Nominal Parker Spiral angle LET1B (degree)
time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.

4.7.3 **OTHER SUPPORT**

4.8 **PSP_ISOIS-EPIHI_L2-LET1-RATES300**

ISOIS-EPIHI>Integrated Science Investigation of the Sun, Energetic Particle Instrument Hi
L2-LET1-rates300>Level 2 LET1 5-minute rates
EPI-Hi LET1 300 second rates cdf. Time tags indicate midpoint of integration.
1 minute to 1 hour
Cite McComas et al (2016), doi:10.1007/s11214-014-0059-1

4.8.1 **PRIMARY VARIABLES**

4.8.2 **OTHER DATA**

4.8.2.1 **HCI_Lat**  HCI latitude (degrees)
time-varying
position>latitude

4.8.2.2 **HCI_Lon**  HCI longitude (degrees)
time-varying
position>longitude

4.8.2.3 **HCI_R**  Heliocentric distance (AU)
- time-varying
- position>radial

4.8.2.4 **HGC_Lat**  HGC latitude (degrees)
- time-varying
- position>latitude

4.8.2.5 **HGC_Lon**  HGC longitude (degrees)
- time-varying
- position>longitude

4.8.2.6 **HGC_R**  Heliocentric distance (AU)
- time-varying
- position>radial

4.8.2.7 **LET1_A_HCI**  HCI flow direction LET1A
- Size: 3 time-varying
- position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.8.2.8 **LET1_A_PA**  Pitch angle LET1A (degree)
- time-varying
- position>angle

4.8.2.9 **LET1_A_R1_SECT_HCI**  HCI flow direction LET1AR1SECT
- Size: 9 × 3 time-varying
- position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET1_R1_SECTORS 0 – 8 (9 bins)

4.8.2.10 LET1_A_R1_SECT_PA Pitch angle LET1AR1SECT (degree)
Size: 9 time-varying
position>angle
LET1_R1_SECTORS 0 – 8 (9 bins)

4.8.2.11 LET1_A_R1_SECT_RTN RTN flow direction LET1AR1SECT
Size: 9 × 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET1_R1_SECTORS 0 – 8 (9 bins)

4.8.2.12 LET1_A_R1_SECT_SA Nominal Parker Spiral angle LET1AR1SECT (degree)
Size: 9 time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.
LET1_R1_SECTORS 0 – 8 (9 bins)

4.8.2.13 LET1_A_R26_SECT_HCI HCI flow direction LET1AR26SECT
Size: 25 × 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET1_R26_SECTORS 0 – 24 (25 bins)

4.8.2.14 LET1_A_R26_SECT_PA Pitch angle LET1AR26SECT (degree)
Size: 25 time-varying
position>angle
LET1_R26_SECTORS 0 – 24 (25 bins)

4.8.2.15 LET1_A_R26_SECT_RTN RTN flow direction LET1AR26SECT
Size: 25 × 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET1_R26_SECTORS 0 – 24 (25 bins)

4.8.2.16 LET1_A_R26_SECT_SA  Nominal Parker Spiral angle LET1AR26SECT (degree)
Size: 25 time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind
and corotation breakdown at 10Rs.
LET1_R26_SECTORS 0 – 24 (25 bins)

4.8.2.17 LET1_A_RTN  RTN flow direction LET1A
Size: 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.8.2.18 LET1_A_SA  Nominal Parker Spiral angle LET1A (degree)
time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind
and corotation breakdown at 10Rs.

4.8.2.19 LET1_B_HCI  HCI flow direction LET1B
Size: 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.8.2.20 LET1_B_PA  Pitch angle LET1B (degree)
time-varying
position>angle

4.8.2.21 LET1_B_R1_SECT_HCI  HCI flow direction LET1BR1SECT
Size: 9 × 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET1_R1_SECTORS 0 – 8 (9 bins)
4.8.2.22  LET1_B_R1_SECT_PA  Pitch angle LET1BR1SECT (degree)
Size: 9 time-varying
position>angle
LET1_R1_SECTORS 0 – 8 (9 bins)

4.8.2.23  LET1_B_R1_SECT_RTN  RTN flow direction LET1BR1SECT
Size: 9 × 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET1_R1_SECTORS 0 – 8 (9 bins)

4.8.2.24  LET1_B_R1_SECT_SA  Nominal Parker Spiral angle LET1BR1SECT (degree)
Size: 9 time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind
and corotation breakdown at 10Rs.
LET1_R1_SECTORS 0 – 8 (9 bins)

4.8.2.25  LET1_B_R26_SECT_HCI  HCI flow direction LET1BR26SECT
Size: 25 × 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET1_R26_SECTORS 0 – 24 (25 bins)

4.8.2.26  LET1_B_R26_SECT_PA  Pitch angle LET1BR26SECT (degree)
Size: 25 time-varying
position>angle
LET1_R26_SECTORS 0 – 24 (25 bins)

4.8.2.27  LET1_B_R26_SECT_RTN  RTN flow direction LET1BR26SECT
Size: 25 × 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET1_R26_SECTORS 0 – 24 (25 bins)
4.8.2.28 LET1_B_R26_SECT_SA  Nominal Parker Spiral angle LET1BR26SECT (degree)
Size: 25 time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.
LET1_R26_SECTORS 0 – 24 (25 bins)

4.8.2.29 LET1_B_RTN  RTN flow direction LET1B
Size: 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.8.2.30 LET1_B_SA  Nominal Parker Spiral angle LET1B (degree)
time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.

4.8.2.31 R1A_CNO_SECT_Rate  CNO sectored count rate R1A (counts s⁻¹)
Size: 1 × 9 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for R1 CNO SECT 3 – 3 MeV/nuc (1 bins)
LET1_R1_SECTORS 0 – 8 (9 bins)

4.8.2.32 R1A_FeGroup_SECT_Rate  FeGroup sectored count rate R1A (counts s⁻¹)
Size: 1 × 9 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for R1 FeGroup SECT 3 – 3 MeV/nuc (1 bins)
LET1_R1_SECTORS 0 – 8 (9 bins)

4.8.2.33 R1A_NetoSi_SECT_Rate  NetoSi sectored count rate R1A (counts s⁻¹)
Size: 1 × 9 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for R1 NetoSi SECT 3 – 3 MeV/nuc (1 bins)
LET1_R1_SECTORS 0 – 8 (9 bins)
4.8.2.34  **R1B_CNO_SECT_Rate**  CNO sectored count rate R1B (counts s\(^{-1}\))
Size: 1 × 9 time-varying
differential_flux > differential_directional_number_rate
Energy Bins for R1 CNO SECT 3 – 3 MeV/nuc (1 bins)
LET1_R1_SECTORS 0 – 8 (9 bins)

4.8.2.35  **R1B_FeGroup_SECT_Rate**  FeGroup sectored count rate R1B (counts s\(^{-1}\))
Size: 1 × 9 time-varying
differential_flux > differential_directional_number_rate
Energy Bins for R1 FeGroup SECT 3 – 3 MeV/nuc (1 bins)
LET1_R1_SECTORS 0 – 8 (9 bins)

4.8.2.36  **R1B_NetoSi_SECT_Rate**  NetoSi sectored count rate R1B (counts s\(^{-1}\))
Size: 1 × 9 time-varying
differential_flux > differential_directional_number_rate
Energy Bins for R1 NetoSi SECT 3 – 3 MeV/nuc (1 bins)
LET1_R1_SECTORS 0 – 8 (9 bins)

4.8.2.37  **R26A_CNO_SECT_Rate**  CNO sectored count rate R26A (counts s\(^{-1}\))
Size: 3 × 25 time-varying
differential_flux > differential_directional_number_rate
Energy Bins for R26 CNO SECT 6 – 23 MeV/nuc (3 bins)
LET1_R26_SECTORS 0 – 24 (25 bins)

4.8.2.38  **R26A_FeGroup_SECT_Rate**  FeGroup sectored count rate R26A (counts s\(^{-1}\))
Size: 3 × 25 time-varying
differential_flux > differential_directional_number_rate
Energy Bins for R26 FeGroup SECT 6 – 23 MeV/nuc (3 bins)
LET1_R26_SECTORS 0 – 24 (25 bins)

4.8.2.39  **R26A_NetoSi_SECT_Rate**  NetoSi sectored count rate R26A (counts s\(^{-1}\))
Size: 3 × 25 time-varying
differential_flux > differential_directional_number_rate
Energy Bins for R26 NetoSi SECT 6 – 23 MeV/nuc (3 bins)
LET1_R26_SECTORS 0 – 24 (25 bins)
4.8.2.40 **R26B_CNO_SECT_Rate**  CNO sectored count rate R26B (counts s⁻¹)
Size: 3 × 25 time-varying
\( \text{particle_flux} > \text{differential_directional_number_rate} \)
Energy Bins for R26 CNO SECT 6 – 23 MeV/nuc (3 bins)
LET1_R26_SECTORS 0 – 24 (25 bins)

4.8.2.41 **R26B_FeGroup_SECT_Rate**  FeGroup sectored count rate R26B (counts s⁻¹)
Size: 3 × 25 time-varying
\( \text{particle_flux} > \text{differential_directional_number_rate} \)
Energy Bins for R26 FeGroup SECT 6 – 23 MeV/nuc (3 bins)
LET1_R26_SECTORS 0 – 24 (25 bins)

4.8.2.42 **R26B_NetoSi_SECT_Rate**  NetoSi sectored count rate R26B (counts s⁻¹)
Size: 3 × 25 time-varying
\( \text{particle_flux} > \text{differential_directional_number_rate} \)
Energy Bins for R26 NetoSi SECT 6 – 23 MeV/nuc (3 bins)
LET1_R26_SECTORS 0 – 24 (25 bins)

4.8.3 **OTHER SUPPORT**

4.9 **PSP_ISOIS-EPIHI_L2-LET1-RATES3600**

ISOIS-EPIHI>Integrated Science Investigation of the Sun, Energetic Particle Instrument Hi
L2-LET1-rates3600>Level 2 LET1 hourly rates
EPI-Hi 3600 seconds rates cdf. Time tags indicate midpoint of integration.
Instrument paper: Integrated Science Investigation of the Sun (ISIS): Design of the Energetic
0059-1
1 minute to 1 hour
Cite McComas et al (2016), doi:10.1007/s11214-014-0059-1

4.9.1 **PRIMARY VARIABLES**

4.9.1.1 **A_H_Flux**  H flux side A (cm⁻²sr⁻¹sec⁻¹MeV⁻¹)
Size: 25 time-varying
\( \text{particle_flux} > \text{differential_directional_number} \)
Energy Bins for H 1 – 41 MeV (25 bins)

4.9.1.2 **A_He_Flux**  He flux side A (cm⁻²sr⁻¹sec⁻¹(MeV/nuc)⁻¹)
Size: 26 time-varying
4.9.1.3 B_H_Flux  H flux side B (cm$^{-2}$sr$^{-1}$sec$^{-1}$MeV$^{-1}$)
Size: 25 time-varying
Energy Bins for He 1 – 49 MeV/nuc (26 bins)

4.9.1.4 B_He_Flux  He flux side B (cm$^{-2}$sr$^{-1}$sec$^{-1}$MeV$^{-1}$)
Size: 26 time-varying
Energy Bins for He 1 – 49 MeV/nuc (26 bins)

4.9.1.5 R1A_H_SECT_Flux  H sectored flux R1A (cm$^{-2}$sr$^{-1}$sec$^{-1}$MeV$^{-1}$)
Size: 1 × 9 time-varying
Energy Bins for R1 H SECT 1 – 1 MeV (1 bins)
LET1_R1_SECTORS 0 – 8 (9 bins)

4.9.1.6 R1A_He_SECT_Flux  He sectored flux R1A (cm$^{-2}$sr$^{-1}$sec$^{-1}$MeV$^{-1}$)
Size: 1 × 9 time-varying
Energy Bins for R1 He SECT 1 – 1 MeV/nuc (1 bins)
LET1_R1_SECTORS 0 – 8 (9 bins)

4.9.1.7 R1B_H_SECT_Flux  H sectored flux R1B (cm$^{-2}$sr$^{-1}$sec$^{-1}$MeV$^{-1}$)
Size: 1 × 9 time-varying
Energy Bins for R1 H SECT 1 – 1 MeV (1 bins)
LET1_R1_SECTORS 0 – 8 (9 bins)

4.9.1.8 R1B_He_SECT_Flux  He sectored flux R1B (cm$^{-2}$sr$^{-1}$sec$^{-1}$MeV$^{-1}$)
Size: 1 × 9 time-varying
Energy Bins for R1 He SECT 1 – 1 MeV/nuc (1 bins)
4.9.1.9 **R26A_H_SECT_Flux**  H sectored flux R26A \( (\text{cm}^{-2}\text{sr}^{-1}\text{sec}^{-1}\text{MeV}^{-1}) \)
Size: 3 × 25 time-varying particle_flux > differential_directional_number 
Energy Bins for R26 H SECT 3 – 11 MeV (3 bins) 
LET1_R26_SECTORS 0 – 24 (25 bins)

4.9.1.10 **R26A_He_SECT_Flux**  He sectored flux R26A \( (\text{cm}^{-2}\text{sr}^{-1}\text{sec}^{-1}(\text{MeV}/\text{nuc})^{-1}) \)
Size: 3 × 25 time-varying particle_flux > differential_directional_number 
Energy Bins for R26 He SECT 3 – 11 MeV/nuc (3 bins) 
LET1_R26_SECTORS 0 – 24 (25 bins)

4.9.1.11 **R26B_H_SECT_Flux**  H sectored flux R26B \( (\text{cm}^{-2}\text{sr}^{-1}\text{sec}^{-1}\text{MeV}^{-1}) \)
Size: 3 × 25 time-varying particle_flux > differential_directional_number 
Energy Bins for R26 H SECT 3 – 11 MeV (3 bins) 
LET1_R26_SECTORS 0 – 24 (25 bins)

4.9.1.12 **R26B_He_SECT_Flux**  He sectored flux R26B \( (\text{cm}^{-2}\text{sr}^{-1}\text{sec}^{-1}(\text{MeV}/\text{nuc})^{-1}) \)
Size: 3 × 25 time-varying particle_flux > differential_directional_number 
Energy Bins for R26 He SECT 3 – 11 MeV/nuc (3 bins) 
LET1_R26_SECTORS 0 – 24 (25 bins)

4.9.2 **OTHER DATA**

4.9.2.1 **A_Al**  Al counts side A (counts) 
Size: 28 time-varying particle_flux > differential_directional_number_rate 
Energy Bins for Al 1 – 117 MeV/nuc (28 bins)

4.9.2.2 **A_Al_Rate**  Al count rate side A (counts s^{-1}) 
Size: 28 time-varying particle_flux > differential_directional_number_rate
Energy Bins for Al 1 – 117 MeV/nuc (28 bins)

4.9.2.3 A_Ar  Ar counts side A (counts)
Size: 29 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Ar 1 – 140 MeV/nuc (29 bins)

4.9.2.4 A_Ar_Rate  Ar count rate side A (counts s\(^{-1}\))
Size: 29 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Ar 1 – 140 MeV/nuc (29 bins)

4.9.2.5 A_C  C counts side A (counts)
Size: 27 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for C 1 – 99 MeV/nuc (27 bins)

4.9.2.6 A_C_Rate  C count rate side A (counts s\(^{-1}\))
Size: 27 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for C 1 – 99 MeV/nuc (27 bins)

4.9.2.7 A_Ca  Ca counts side A (counts)
Size: 30 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Ca 1 – 140 MeV/nuc (30 bins)

4.9.2.8 A_Ca_Rate  Ca count rate side A (counts s\(^{-1}\))
Size: 30 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Ca 1 – 140 MeV/nuc (30 bins)

4.9.2.9 A_Cr  Cr counts side A (counts)
Size: 31 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Cr 1 – 140 MeV/nuc (31 bins)

4.9.2.10 A_Cr_Rate Cr count rate side A (counts s⁻¹)
Size: 31 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Cr 1 – 140 MeV/nuc (31 bins)

4.9.2.11 A_Electrons Electrons counts side A (counts)
Size: 16 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Electrons 0 – 6 MeV (16 bins)

4.9.2.12 A_Electrons_Rate Electrons count rate side A (counts s⁻¹)
Size: 16 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Electrons 0 – 6 MeV (16 bins)

4.9.2.13 A_Fe Fe counts side A (counts)
Size: 32 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Fe 1 – 166 MeV/nuc (32 bins)

4.9.2.14 A_Fe_Rate Fe count rate side A (counts s⁻¹)
Size: 32 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Fe 1 – 166 MeV/nuc (32 bins)

4.9.2.15 A_H H counts side A (counts)
Size: 25 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for H 1 – 41 MeV (25 bins)
4.9.2.16  **A_H_Rate**  H count rate side A (counts s⁻¹)
Size: 25 time-varying
particle_flux> differential_directional_number_rate
Energy Bins for H 1 – 41 MeV (25 bins)

4.9.2.17  **A_He**  He counts side A (counts)
Size: 26 time-varying
particle_flux> differential_directional_number_rate
Energy Bins for He 1 – 49 MeV/nuc (26 bins)

4.9.2.18  **A_He_Rate**  He count rate side A (counts s⁻¹)
Size: 26 time-varying
particle_flux> differential_directional_number_rate
Energy Bins for He 1 – 49 MeV/nuc (26 bins)

4.9.2.19  **A_Mg**  Mg counts side A (counts)
Size: 28 time-varying
particle_flux> differential_directional_number_rate
Energy Bins for Mg 1 – 117 MeV/nuc (28 bins)

4.9.2.20  **A_Mg_Rate**  Mg count rate side A (counts s⁻¹)
Size: 28 time-varying
particle_flux> differential_directional_number_rate
Energy Bins for Mg 1 – 117 MeV/nuc (28 bins)

4.9.2.21  **A_N**  N counts side A (counts)
Size: 27 time-varying
particle_flux> differential_directional_number_rate
Energy Bins for N 1 – 99 MeV/nuc (27 bins)

4.9.2.22  **A_N_Rate**  N count rate side A (counts s⁻¹)
Size: 27 time-varying
particle_flux> differential_directional_number_rate
Energy Bins for N 1 – 99 MeV/nuc (27 bins)
4.9.2.23  **A_Na**  Na counts side A (counts)
Size: 28 time-varying
\[\text{particle_flux} \times \text{differential_directional_number_rate}\]
Energy Bins for Na 1 – 117 MeV/nuc (28 bins)

4.9.2.24  **A_Na_Rate**  Na count rate side A (counts s\(^{-1}\))
Size: 28 time-varying
\[\text{particle_flux} \times \text{differential_directional_number_rate}\]
Energy Bins for Na 1 – 117 MeV/nuc (28 bins)

4.9.2.25  **A_Ne**  Ne counts side A (counts)
Size: 28 time-varying
\[\text{particle_flux} \times \text{differential_directional_number_rate}\]
Energy Bins for Ne 1 – 117 MeV/nuc (28 bins)

4.9.2.26  **A_Ne_Rate**  Ne count rate side A (counts s\(^{-1}\))
Size: 28 time-varying
\[\text{particle_flux} \times \text{differential_directional_number_rate}\]
Energy Bins for Ne 1 – 117 MeV/nuc (28 bins)

4.9.2.27  **A_Ni**  Ni counts side A (counts)
Size: 33 time-varying
\[\text{particle_flux} \times \text{differential_directional_number_rate}\]
Energy Bins for Ni 1 – 197 MeV/nuc (33 bins)

4.9.2.28  **A_Ni_Rate**  Ni count rate side A (counts s\(^{-1}\))
Size: 33 time-varying
\[\text{particle_flux} \times \text{differential_directional_number_rate}\]
Energy Bins for Ni 1 – 197 MeV/nuc (33 bins)

4.9.2.29  **A_O**  O counts side A (counts)
Size: 28 time-varying
\[\text{particle_flux} \times \text{differential_directional_number_rate}\]
Energy Bins for O 1 – 117 MeV/nuc (28 bins)
4.9.2.30  **A_O_Rate**  O count rate side A (counts s\(^{-1}\))
Size: 28 time-varying
particle\_flux > differential\_directional\_number\_rate
Energy Bins for O 1 – 117 MeV/nuc (28 bins)

4.9.2.31  **A_S**  S counts side A (counts)
Size: 29 time-varying
particle\_flux > differential\_directional\_number\_rate
Energy Bins for S 1 – 140 MeV/nuc (29 bins)

4.9.2.32  **A_S_Rate**  S count rate side A (counts s\(^{-1}\))
Size: 29 time-varying
particle\_flux > differential\_directional\_number\_rate
Energy Bins for S 1 – 140 MeV/nuc (29 bins)

4.9.2.33  **A_Si**  Si counts side A (counts)
Size: 29 time-varying
particle\_flux > differential\_directional\_number\_rate
Energy Bins for Si 1 – 140 MeV/nuc (29 bins)

4.9.2.34  **A_Si_Rate**  Si count rate side A (counts s\(^{-1}\))
Size: 29 time-varying
particle\_flux > differential\_directional\_number\_rate
Energy Bins for Si 1 – 140 MeV/nuc (29 bins)

4.9.2.35  **B_Al**  Al counts side B (counts)
Size: 28 time-varying
particle\_flux > differential\_directional\_number\_rate
Energy Bins for Al 1 – 117 MeV/nuc (28 bins)

4.9.2.36  **B_Al_Rate**  Al count rate side B (counts s\(^{-1}\))
Size: 28 time-varying
particle\_flux > differential\_directional\_number\_rate
Energy Bins for Al 1 – 117 MeV/nuc (28 bins)
4.9.2.37  B_Ar  Ar counts side B (counts)
Size: 29 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Ar 1 – 140 MeV/nuc (29 bins)

4.9.2.38  B_Ar_Rate  Ar count rate side B (counts s\(^{-1}\))
Size: 29 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Ar 1 – 140 MeV/nuc (29 bins)

4.9.2.39  B_C  C counts side B (counts)
Size: 27 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for C 1 – 99 MeV/nuc (27 bins)

4.9.2.40  B_C_Rate  C count rate side B (counts s\(^{-1}\))
Size: 27 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for C 1 – 99 MeV/nuc (27 bins)

4.9.2.41  B_Ca  Ca counts side B (counts)
Size: 30 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Ca 1 – 140 MeV/nuc (30 bins)

4.9.2.42  B_Ca_Rate  Ca count rate side B (counts s\(^{-1}\))
Size: 30 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Ca 1 – 140 MeV/nuc (30 bins)

4.9.2.43  B_Cr  Cr counts side B (counts)
Size: 31 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Cr 1 – 140 MeV/nuc (31 bins)
4.9.2.44  **B_Cr_Rate**  Cr count rate side B (counts s\(^{-1}\))
Size: 31 time-varying
particle\_flux > differential\_directional\_number\_rate
Energy Bins for Cr 1 – 140 MeV/nuc (31 bins)

4.9.2.45  **B_Electrons**  Electrons counts side B (counts)
Size: 16 time-varying
particle\_flux > differential\_directional\_number\_rate
Energy Bins for Electrons 0 – 6 MeV (16 bins)

4.9.2.46  **B_Electrons_Rate**  Electrons count rate side B (counts s\(^{-1}\))
Size: 16 time-varying
particle\_flux > differential\_directional\_number\_rate
Energy Bins for Electrons 0 – 6 MeV (16 bins)

4.9.2.47  **B_Fe**  Fe counts side B (counts)
Size: 32 time-varying
particle\_flux > differential\_directional\_number\_rate
Energy Bins for Fe 1 – 166 MeV/nuc (32 bins)

4.9.2.48  **B_Fe_Rate**  Fe count rate side B (counts s\(^{-1}\))
Size: 32 time-varying
particle\_flux > differential\_directional\_number\_rate
Energy Bins for Fe 1 – 166 MeV/nuc (32 bins)

4.9.2.49  **B_H**  H counts side B (counts)
Size: 25 time-varying
particle\_flux > differential\_directional\_number\_rate
Energy Bins for H 1 – 41 MeV (25 bins)

4.9.2.50  **B_H_Rate**  H count rate side B (counts s\(^{-1}\))
Size: 25 time-varying
particle\_flux > differential\_directional\_number\_rate
Energy Bins for H 1 – 41 MeV (25 bins)
4.9.2.51  **B_He**  He counts side B (counts)
Size: 26 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for He 1 – 49 MeV/nuc (26 bins)

4.9.2.52  **B_He_Rate**  He count rate side B (counts s\(^{-1}\))
Size: 26 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for He 1 – 49 MeV/nuc (26 bins)

4.9.2.53  **B_Mg**  Mg counts side B (counts)
Size: 28 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Mg 1 – 117 MeV/nuc (28 bins)

4.9.2.54  **B_Mg_Rate**  Mg count rate side B (counts s\(^{-1}\))
Size: 28 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Mg 1 – 117 MeV/nuc (28 bins)

4.9.2.55  **B_N**  N counts side B (counts)
Size: 27 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for N 1 – 99 MeV/nuc (27 bins)

4.9.2.56  **B_N_Rate**  N count rate side B (counts s\(^{-1}\))
Size: 27 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for N 1 – 99 MeV/nuc (27 bins)

4.9.2.57  **B_Na**  Na counts side B (counts)
Size: 28 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Na 1 – 117 MeV/nuc (28 bins)
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.9.2.58</td>
<td>B_Na_Rate</td>
<td>Na count rate side B (counts s(^{-1})) Size: 28 time-varying particle_flux&gt;_differential_directional_number_rate Energy Bins for Na 1 – 117 MeV/nuc (28 bins)</td>
</tr>
<tr>
<td>4.9.2.59</td>
<td>B_Ne</td>
<td>Ne counts side B (counts) Size: 28 time-varying particle_flux&gt;_differential_directional_number_rate Energy Bins for Ne 1 – 117 MeV/nuc (28 bins)</td>
</tr>
<tr>
<td>4.9.2.60</td>
<td>B_Ne_Rate</td>
<td>Ne count rate side B (counts s(^{-1})) Size: 28 time-varying particle_flux&gt;_differential_directional_number_rate Energy Bins for Ne 1 – 117 MeV/nuc (28 bins)</td>
</tr>
<tr>
<td>4.9.2.61</td>
<td>B_Ni</td>
<td>Ni counts side B (counts) Size: 33 time-varying particle_flux&gt;_differential_directional_number_rate Energy Bins for Ni 1 – 197 MeV/nuc (33 bins)</td>
</tr>
<tr>
<td>4.9.2.62</td>
<td>B_Ni_Rate</td>
<td>Ni count rate side B (counts s(^{-1})) Size: 33 time-varying particle_flux&gt;_differential_directional_number_rate Energy Bins for Ni 1 – 197 MeV/nuc (33 bins)</td>
</tr>
<tr>
<td>4.9.2.63</td>
<td>B_O</td>
<td>O counts side B (counts) Size: 28 time-varying particle_flux&gt;_differential_directional_number_rate Energy Bins for O 1 – 117 MeV/nuc (28 bins)</td>
</tr>
<tr>
<td>4.9.2.64</td>
<td>B_O_Rate</td>
<td>O count rate side B (counts s(^{-1})) Size: 28 time-varying particle_flux&gt;_differential_directional_number_rate Energy Bins for O 1 – 117 MeV/nuc (28 bins)</td>
</tr>
</tbody>
</table>
4.9.2.65 B_S S counts side B (counts)
Size: 29 time-varying
\[ \text{particle\_flux} \times \text{differential\_directional\_number\_rate} \]
Energy Bins for S 1 – 140 MeV/nuc (29 bins)

4.9.2.66 B_S_Rate S count rate side B (counts s\(^{-1}\))
Size: 29 time-varying
\[ \text{particle\_flux} \times \text{differential\_directional\_number\_rate} \]
Energy Bins for S 1 – 140 MeV/nuc (29 bins)

4.9.2.67 B_Si Si counts side B (counts)
Size: 29 time-varying
\[ \text{particle\_flux} \times \text{differential\_directional\_number\_rate} \]
Energy Bins for Si 1 – 140 MeV/nuc (29 bins)

4.9.2.68 B_Si_Rate Si count rate side B (counts s\(^{-1}\))
Size: 29 time-varying
\[ \text{particle\_flux} \times \text{differential\_directional\_number\_rate} \]
Energy Bins for Si 1 – 140 MeV/nuc (29 bins)

4.9.2.69 HCI_Lat HCI latitude (degrees)
time-varying
\[ \text{position} \times \text{latitude} \]

4.9.2.70 HCI_Lon HCI longitude (degrees)
time-varying
\[ \text{position} \times \text{longitude} \]

4.9.2.71 HCI_R Heliocentric distance (AU)
time-varying
\[ \text{position} \times \text{radial} \]
4.9.2.72 HGC_Lat  HGC latitude (degrees)
time-varying
position>latitude

4.9.2.73 HGC_Lon  HGC longitude (degrees)
time-varying
position>longitude

4.9.2.74 HGC_R  Heliocentric distance (AU)
time-varying
position>radial

4.9.2.75 LET1_A_HCI  HCI flow direction LET1A
Size: 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.9.2.76 LET1_A_PA  Pitch angle LET1A (degree)
time-varying
position>angle

4.9.2.77 LET1_A_R1_SECT_HCI  HCI flow direction LET1AR1SECT
Size: 9 × 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET1_R1_SECTORS 0 – 8 (9 bins)

4.9.2.78 LET1_A_R1_SECT_PA  Pitch angle LET1AR1SECT (degree)
Size: 9 time-varying
position>angle
LET1_R1_SECTORS 0 – 8 (9 bins)
4.9.2.79 LET1_A_R1_SECT_RTN  RTN flow direction LET1AR1SECT
Size: 9 \times 3 \text{ time-varying}
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET1_R1_SECTORS 0 – 8 (9 bins)

4.9.2.80 LET1_A_R1_SECT_SA  Nominal Parker Spiral angle LET1AR1SECT (degree)
Size: 9 \text{ time-varying}
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.
LET1_R1_SECTORS 0 – 8 (9 bins)

4.9.2.81 LET1_A_R26_SECT_HCI  HCI flow direction LET1AR26SECT
Size: 25 \times 3 \text{ time-varying}
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET1_R26_SECTORS 0 – 24 (25 bins)

4.9.2.82 LET1_A_R26_SECT_PA  Pitch angle LET1AR26SECT (degree)
Size: 25 \text{ time-varying}
position>angle
LET1_R26_SECTORS 0 – 24 (25 bins)

4.9.2.83 LET1_A_R26_SECT_RTN  RTN flow direction LET1AR26SECT
Size: 25 \times 3 \text{ time-varying}
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET1_R26_SECTORS 0 – 24 (25 bins)

4.9.2.84 LET1_A_R26_SECT_SA  Nominal Parker Spiral angle LET1AR26SECT (degree)
Size: 25 \text{ time-varying}
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.
LET1_R26_SECTORS 0 – 24 (25 bins)
4.9.2.85 LET1_A_RTN  RTN flow direction LET1A
Size: 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.9.2.86 LET1_A_SA  Nominal Parker Spiral angle LET1A (degree)
time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.

4.9.2.87 LET1_B_HCI  HCI flow direction LET1B
Size: 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.9.2.88 LET1_B_PA  Pitch angle LET1B (degree)
time-varying
position>angle

4.9.2.89 LET1_B_R1_SECT_HCI  HCI flow direction LET1BR1SECT
Size: $9 \times 3$ time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET1_R1_SECTORS 0 – 8 (9 bins)

4.9.2.90 LET1_B_R1_SECT_PA  Pitch angle LET1BR1SECT (degree)
Size: 9 time-varying
position>angle
LET1_R1_SECTORS 0 – 8 (9 bins)

4.9.2.91 LET1_B_R1_SECT_RTN  RTN flow direction LET1BR1SECT
Size: $9 \times 3$ time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET1_R1_SECTORS 0 – 8 (9 bins)

4.9.2.92 LET1_B_R1_SECT_SA  Nominal Parker Spiral angle LET1BR1SECT (degree)
Size: 9 time-varying position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.
LET1_R1_SECTORS 0 – 8 (9 bins)

4.9.2.93 LET1_B_R26_SECT_HCI  HCI flow direction LET1BR26SECT
Size: 25 × 3 time-varying position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET1_R26_SECTORS 0 – 24 (25 bins)

4.9.2.94 LET1_B_R26_SECT_PA  Pitch angle LET1BR26SECT (degree)
Size: 25 time-varying position>angle
LET1_R26_SECTORS 0 – 24 (25 bins)

4.9.2.95 LET1_B_R26_SECT_RTN  RTN flow direction LET1BR26SECT
Size: 25 × 3 time-varying position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET1_R26_SECTORS 0 – 24 (25 bins)

4.9.2.96 LET1_B_R26_SECT_SA  Nominal Parker Spiral angle LET1BR26SECT (degree)
Size: 25 time-varying position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.
LET1_R26_SECTORS 0 – 24 (25 bins)

4.9.2.97 LET1_B_RTN  RTN flow direction LET1B
Size: 3 time-varying position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.9.2.98 LET1_B_SA Nominal Parker Spiral angle LET1B (degree)
   time-varying
   position>angle
   Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind
   and corotation breakdown at 10Rs.

4.9.2.99 R1A_CNO_SECT_Rate CNO sectored count rate R1A (counts s⁻¹)
   Size: 1 × 9 time-varying
   particle_flux>differential_directional_number_rate
   Energy Bins for R1 CNO SECT 3 – 3 MeV/nuc (1 bins)
   LET1_R1_SECTORS 0 – 8 (9 bins)

4.9.2.100 R1A_FeGroup_SECT_Rate FeGroup sectored count rate R1A (counts s⁻¹)
   Size: 1 × 9 time-varying
   particle_flux>differential_directional_number_rate
   Energy Bins for R1 FeGroup SECT 3 – 3 MeV/nuc (1 bins)
   LET1_R1_SECTORS 0 – 8 (9 bins)

4.9.2.101 R1A_H_SECT_Rate H sectored count rate R1A (counts s⁻¹)
   Size: 1 × 9 time-varying
   particle_flux>differential_directional_number_rate
   Energy Bins for R1 H SECT 1 – 1 MeV (1 bins)
   LET1_R1_SECTORS 0 – 8 (9 bins)

4.9.2.102 R1A_He_BIN R1A He Rates (counts)
   Size: 5 × 16 time-varying
   particle_flux>differential_directional_number_rate
   Energy Bins for R1 He BIN 1 – 3 MeV/nuc (5 bins)
   R1A_He_BIN_MASS_BIN 0 – 15 segment (16 bins)

4.9.2.103 R1A_He_SECT_Rate He sectored count rate R1A (counts s⁻¹)
   Size: 1 × 9 time-varying
   particle_flux>differential_directional_number_rate
   Energy Bins for R1 He SECT 1 – 1 MeV/nuc (1 bins)
LET1_R1_SECTORS 0 – 8 (9 bins)

**4.9.2.104 R1A_Ne_BIN**  
R1A Ne Rates (counts)  
Size: 5 × 8 time-varying  
\text{particle\_flux} > \text{differential\_directional\_number\_rate}  
Energy Bins for R1 Ne BIN 1 – 6 MeV/nuc (5 bins)  
R1A_Ne_BIN_MASS_BIN 0 – 7 segment (8 bins)

**4.9.2.105 R1A_NetoSi_SECT_Rate**  
NetoSi sectored count rate R1A (counts s$^{-1}$)  
Size: 1 × 9 time-varying  
\text{particle\_flux} > \text{differential\_directional\_number\_rate}  
Energy Bins for R1 NetoSi SECT 3 – 3 MeV/nuc (1 bins)  
LET1_R1_SECTORS 0 – 8 (9 bins)

**4.9.2.106 R1B_CNO_SECT_Rate**  
CNO sectored count rate R1B (counts s$^{-1}$)  
Size: 1 × 9 time-varying  
\text{particle\_flux} > \text{differential\_directional\_number\_rate}  
Energy Bins for R1 CNO SECT 3 – 3 MeV/nuc (1 bins)  
LET1_R1_SECTORS 0 – 8 (9 bins)

**4.9.2.107 R1B_FeGroup_SECT_Rate**  
FeGroup sectored count rate R1B (counts s$^{-1}$)  
Size: 1 × 9 time-varying  
\text{particle\_flux} > \text{differential\_directional\_number\_rate}  
Energy Bins for R1 FeGroup SECT 3 – 3 MeV/nuc (1 bins)  
LET1_R1_SECTORS 0 – 8 (9 bins)

**4.9.2.108 R1B_H_SECT_Rate**  
H sectored count rate R1B (counts s$^{-1}$)  
Size: 1 × 9 time-varying  
\text{particle\_flux} > \text{differential\_directional\_number\_rate}  
Energy Bins for R1 H SECT 1 – 1 MeV (1 bins)  
LET1_R1_SECTORS 0 – 8 (9 bins)

**4.9.2.109 R1B_He_BIN**  
R1B He Rates (counts)  
Size: 5 × 16 time-varying  
\text{particle\_flux} > \text{differential\_directional\_number\_rate}  
Energy Bins for R1 He BIN 1 – 3 MeV/nuc (5 bins)
4.9.2.110  **R1B_He_SECT_Rate**  
He sectored count rate R1B (counts s\(^{-1}\))  
Size: 1 \(\times\) 9 time-varying  
particle\_flux\_differential\_directional\_number\_rate  
Energy Bins for R1 He SECT 1 – 1 MeV/nuc (1 bins)  
LET1_R1\_SECTORS 0 – 8 (9 bins)

4.9.2.111  **R1B_Ne_BIN**  
R1B Ne Rates (counts)  
Size: 5 \(\times\) 8 time-varying  
particle\_flux\_differential\_directional\_number\_rate  
Energy Bins for R1 Ne BIN 1 – 6 MeV/nuc (5 bins)  
R1B_Ne_BIN\_MASS\_BIN 0 – 7 segment (8 bins)

4.9.2.112  **R1B_NetoSi_SECT_Rate**  
NetoSi sectored count rate R1B (counts s\(^{-1}\))  
Size: 1 \(\times\) 9 time-varying  
particle\_flux\_differential\_directional\_number\_rate  
Energy Bins for R1 NetoSi SECT 3 – 3 MeV/nuc (1 bins)  
LET1_R1\_SECTORS 0 – 8 (9 bins)

4.9.2.113  **R26A_CNO_SECT_Rate**  
CNO sectored count rate R26A (counts s\(^{-1}\))  
Size: 3 \(\times\) 25 time-varying  
particle\_flux\_differential\_directional\_number\_rate  
Energy Bins for R26 CNO SECT 6 – 23 MeV/nuc (3 bins)  
LET1_R26\_SECTORS 0 – 24 (25 bins)

4.9.2.114  **R26A_FeGroup_SECT_Rate**  
FeGroup sectored count rate R26A (counts s\(^{-1}\))  
Size: 3 \(\times\) 25 time-varying  
particle\_flux\_differential\_directional\_number\_rate  
Energy Bins for R26 FeGroup SECT 6 – 23 MeV/nuc (3 bins)  
LET1_R26\_SECTORS 0 – 24 (25 bins)

4.9.2.115  **R26A_H_SECT_Rate**  
H sectored count rate R26A (counts s\(^{-1}\))  
Size: 3 \(\times\) 25 time-varying  
particle\_flux\_differential\_directional\_number\_rate  
Energy Bins for R26 H SECT 3 – 11 MeV (3 bins)
4.9.2.116 R26A.He_SECT.Rate  He sectored count rate R26A (counts s\(^{-1}\))
Size: 3 × 25 time-varying
\text{particle\_flux} > \text{differential\_directional\_number\_rate}
Energy Bins for R26 He SECT 3 – 11 MeV/nuc (3 bins)
LET1_R26_SECTORS 0 – 24 (25 bins)

4.9.2.117 R26A.NetoSi_SECT.Rate  NetoS sectored count rate R26A (counts s\(^{-1}\))
Size: 3 × 25 time-varying
\text{particle\_flux} > \text{differential\_directional\_number\_rate}
Energy Bins for R26 NetoS SECT 6 – 23 MeV/nuc (3 bins)
LET1_R26_SECTORS 0 – 24 (25 bins)

4.9.2.118 R26B.CNO_SECT.Rate  CNO sectored count rate R26B (counts s\(^{-1}\))
Size: 3 × 25 time-varying
\text{particle\_flux} > \text{differential\_directional\_number\_rate}
Energy Bins for R26 CNO SECT 6 – 23 MeV/nuc (3 bins)
LET1_R26_SECTORS 0 – 24 (25 bins)

4.9.2.119 R26B.FeGroup_SECT.Rate  FeGroup sectored count rate R26B (counts s\(^{-1}\))
Size: 3 × 25 time-varying
\text{particle\_flux} > \text{differential\_directional\_number\_rate}
Energy Bins for R26 FeGroup SECT 6 – 23 MeV/nuc (3 bins)
LET1_R26_SECTORS 0 – 24 (25 bins)

4.9.2.120 R26B.H_SECT_Rate  H sectored count rate R26B (counts s\(^{-1}\))
Size: 3 × 25 time-varying
\text{particle\_flux} > \text{differential\_directional\_number\_rate}
Energy Bins for R26 H SECT 3 – 11 MeV (3 bins)
LET1_R26_SECTORS 0 – 24 (25 bins)

4.9.2.121 R26B.He_SECT.Rate  He sectored count rate R26B (counts s\(^{-1}\))
Size: 3 × 25 time-varying
\text{particle\_flux} > \text{differential\_directional\_number\_rate}
Energy Bins for R26 He SECT 3 – 11 MeV/nuc (3 bins)
LET1_R26_SECTORS 0 – 24 (25 bins)

**4.9.2.122 R26B_NetoSi_SECT_Rate**  NetoSi sectored count rate R26B (counts s\(^{-1}\))
Size: 3 × 25 time-varying
particle Flux × differential_directional_number_rate
Energy Bins for R26 NetoSi SECT 6 – 23 MeV/nuc (3 bins)
LET1_R26_SECTORS 0 – 24 (25 bins)

**4.9.2.123 R2A_He_BIN**  R2A He Rates (counts)
Size: 7 × 16 time-varying
particle Flux × differential_directional_number_rate
Energy Bins for R2 He BIN 2 – 16 MeV/nuc (7 bins)
R2A_He_BIN_MASS_BIN 0 – 15 segment (16 bins)

**4.9.2.124 R2A_Ne_BIN**  R2A Ne Rates (counts)
Size: 8 × 8 time-varying
particle Flux × differential_directional_number_rate
Energy Bins for R2 Ne BIN 3 – 32 MeV/nuc (8 bins)
R2A_Ne_BIN_MASS_BIN 0 – 7 segment (8 bins)

**4.9.2.125 R2B_He_BIN**  R2B He Rates (counts)
Size: 7 × 16 time-varying
particle Flux × differential_directional_number_rate
Energy Bins for R2 He BIN 2 – 16 MeV/nuc (7 bins)
R2B_He_BIN_MASS_BIN 0 – 15 segment (16 bins)

**4.9.2.126 R2B_Ne_BIN**  R2B Ne Rates (counts)
Size: 8 × 8 time-varying
particle Flux × differential_directional_number_rate
Energy Bins for R2 Ne BIN 3 – 32 MeV/nuc (8 bins)
R2B_Ne_BIN_MASS_BIN 0 – 7 segment (8 bins)

**4.9.2.127 R3A_He_BIN**  R3A He Rates (counts)
Size: 5 × 16 time-varying
particle Flux × differential_directional_number_rate
Energy Bins for R3 He BIN 8 – 32 MeV/nuc (5 bins)
R3A\textunderscore He\_BIN\_MASS\_BIN 0 – 15 segment (16 bins)

\textbf{4.9.2.128 R3A\_Ne\_BIN} \hspace{1em} \text{R3A Ne Rates (counts)}
Size: 6 \times 8 time-varying
\texttt{particle\_flux > differential\_directional\_number\_rate}
Energy Bins for R3 Ne BIN 16 – 91 MeV/nuc (6 bins)
R3A\_Ne\_BIN\_MASS\_BIN 0 – 7 segment (8 bins)

\textbf{4.9.2.129 R3B\_He\_BIN} \hspace{1em} \text{R3B He Rates (counts)}
Size: 5 \times 16 time-varying
\texttt{particle\_flux > differential\_directional\_number\_rate}
Energy Bins for R3 He BIN 8 – 32 MeV/nuc (5 bins)
R3B\_He\_BIN\_MASS\_BIN 0 – 15 segment (16 bins)

\textbf{4.9.2.130 R3B\_Ne\_BIN} \hspace{1em} \text{R3B Ne Rates (counts)}
Size: 6 \times 8 time-varying
\texttt{particle\_flux > differential\_directional\_number\_rate}
Energy Bins for R3 Ne BIN 16 – 91 MeV/nuc (6 bins)
R3B\_Ne\_BIN\_MASS\_BIN 0 – 7 segment (8 bins)

\textbf{4.9.2.131 R45A\_He\_BIN} \hspace{1em} \text{R45A He Rates (counts)}
Size: 5 \times 16 time-varying
\texttt{particle\_flux > differential\_directional\_number\_rate}
Energy Bins for R45 He BIN 8 – 32 MeV/nuc (5 bins)
R45A\_He\_BIN\_MASS\_BIN 0 – 15 segment (16 bins)

\textbf{4.9.2.132 R45A\_Ne\_BIN} \hspace{1em} \text{R45A Ne Rates (counts)}
Size: 6 \times 8 time-varying
\texttt{particle\_flux > differential\_directional\_number\_rate}
Energy Bins for R45 Ne BIN 16 – 91 MeV/nuc (6 bins)
R45A\_Ne\_BIN\_MASS\_BIN 0 – 7 segment (8 bins)

\textbf{4.9.2.133 R45B\_He\_BIN} \hspace{1em} \text{R45B He Rates (counts)}
Size: 5 \times 16 time-varying
\texttt{particle\_flux > differential\_directional\_number\_rate}
Energy Bins for R45 He BIN 8 – 32 MeV/nuc (5 bins)
4.9.2.134 **R45B Ne BIN**  
R45B Ne Rates (counts)  
Size: 6 \times 8 time-varying  
\textit{particle_flux>\textit{differential\_directional\_number\_rate}}  
Energy Bins for R45 Ne BIN 16 – 91 MeV/nuc (6 bins)  
R45B\_Ne\_BIN\_MASS\_BIN0–7 segment (8 bins)

4.9.2.135 **R6A He BIN**  
R6A He Rates (counts)  
Size: 3 \times 16 time-varying  
\textit{particle_flux>\textit{differential\_directional\_number\_rate}}  
Energy Bins for R6 He BIN 23 – 45 MeV/nuc (3 bins)  
R6A\_He\_BIN\_MASS\_BIN0–15 segment (16 bins)

4.9.2.136 **R6A Ne BIN**  
R6A Ne Rates (counts)  
Size: 3 \times 8 time-varying  
\textit{particle_flux>\textit{differential\_directional\_number\_rate}}  
Energy Bins for R6 Ne BIN 45 – 91 MeV/nuc (3 bins)  
R6A\_Ne\_BIN\_MASS\_BIN0–7 segment (8 bins)

4.9.2.137 **R6B He BIN**  
R6B He Rates (counts)  
Size: 3 \times 16 time-varying  
\textit{particle_flux>\textit{differential\_directional\_number\_rate}}  
Energy Bins for R6 He BIN 23 – 45 MeV/nuc (3 bins)  
R6B\_He\_BIN\_MASS\_BIN0–15 segment (16 bins)

4.9.2.138 **R6B Ne BIN**  
R6B Ne Rates (counts)  
Size: 3 \times 8 time-varying  
\textit{particle_flux>\textit{differential\_directional\_number\_rate}}  
Energy Bins for R6 Ne BIN 45 – 91 MeV/nuc (3 bins)  
R6B\_Ne\_BIN\_MASS\_BIN0–7 segment (8 bins)

4.9.3 OTHER SUPPORT

4.10 **PSP_ISOIS-EPIHI_L2-LET1-RATES60**
ISOIS-EPIHI>Integrated Science Investigation of the Sun, Energetic Particle Instrument Hi  
L2-LET1-rates60>Level 2 LET1 1-minute rates
EPI-Hi LET1 60 second rates cdf. Time tags indicate midpoint of integration.
Instrument paper: Integrated Science Investigation of the Sun (ISIS): Design of the Energetic
0059-1
1 minute to 1 hour
Cite McComas et al (2016), doi:10.1007/s11214-014-0059-1

4.10.1 PRIMARY VARIABLES

4.10.1.1 A_H_Flux  H flux side A (cm$^{-2}$sr$^{-1}$sec$^{-1}$MeV$^{-1}$)
Size: 25 time-varying
particle_flux>differential_directional_number
Energy Bins for H 1 – 41 MeV (25 bins)

4.10.1.2 A_He_Flux  He flux side A (cm$^{-2}$sr$^{-1}$sec$^{-1}$(MeV/nuc)$^{-1}$)
Size: 26 time-varying
particle_flux>differential_directional_number
Energy Bins for He 1 – 49 MeV/nuc (26 bins)

4.10.1.3 B_H_Flux  H flux side B (cm$^{-2}$sr$^{-1}$sec$^{-1}$MeV$^{-1}$)
Size: 25 time-varying
particle_flux>differential_directional_number
Energy Bins for H 1 – 41 MeV (25 bins)

4.10.1.4 B_He_Flux  He flux side B (cm$^{-2}$sr$^{-1}$sec$^{-1}$(MeV/nuc)$^{-1}$)
Size: 26 time-varying
particle_flux>differential_directional_number
Energy Bins for He 1 – 49 MeV/nuc (26 bins)

4.10.1.5 R1A_H_SECT_Flux  H sectored flux R1A (cm$^{-2}$sr$^{-1}$sec$^{-1}$MeV$^{-1}$)
Size: 1 $\times$ 9 time-varying
particle_flux>differential_directional_number
Energy Bins for R1 H SECT 1 – 1 MeV (1 bins)
LET1_R1_SECTORS 0 – 8 (9 bins)

4.10.1.6 R1A_He_SECT_Flux  He sectored flux R1A (cm$^{-2}$sr$^{-1}$sec$^{-1}$(MeV/nuc)$^{-1}$)
Size: 1 $\times$ 9 time-varying
4.10.1.7  **R1B_H_SECT_Flux**  H sectored flux R1B (cm$^{-2} \text{sr}^{-1} \text{sec}^{-1} \text{MeV}^{-1}$)
Size: 1 $\times$ 9 time-varying

4.10.1.8  **R1B_He_SECT_Flux**  He sectored flux R1B (cm$^{-2} \text{sr}^{-1} \text{sec}^{-1} (\text{MeV/nuc})^{-1}$)
Size: 1 $\times$ 9 time-varying

4.10.1.9  **R26A_H_SECT_Flux**  H sectored flux R26A (cm$^{-2} \text{sr}^{-1} \text{sec}^{-1} \text{MeV}^{-1}$)
Size: 3 $\times$ 25 time-varying

4.10.1.10  **R26A_He_SECT_Flux**  He sectored flux R26A (cm$^{-2} \text{sr}^{-1} \text{sec}^{-1} (\text{MeV/nuc})^{-1}$)
Size: 3 $\times$ 25 time-varying

4.10.1.11  **R26B_H_SECT_Flux**  H sectored flux R26B (cm$^{-2} \text{sr}^{-1} \text{sec}^{-1} \text{MeV}^{-1}$)
Size: 3 $\times$ 25 time-varying

4.10.1.12  **R26B_He_SECT_Flux**  He sectored flux R26B (cm$^{-2} \text{sr}^{-1} \text{sec}^{-1} (\text{MeV/nuc})^{-1}$)
Size: 3 $\times$ 25 time-varying
particle_flux>differential_directional_number
Energy Bins for R26 He SECT 3 – 11 MeV/nuc (3 bins)
LET1_R26_SECTORS 0 – 24 (25 bins)

4.10.2 OTHER DATA

4.10.2.1 A_AI  Al counts side A (counts)
Size: 28 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Al 1 – 117 MeV/nuc (28 bins)

4.10.2.2 A_AI_Rate  Al count rate side A (counts s$^{-1}$)
Size: 28 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Al 1 – 117 MeV/nuc (28 bins)

4.10.2.3 A_Ar  Ar counts side A (counts)
Size: 29 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Ar 1 – 140 MeV/nuc (29 bins)

4.10.2.4 A_Ar_Rate  Ar count rate side A (counts s$^{-1}$)
Size: 29 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Ar 1 – 140 MeV/nuc (29 bins)

4.10.2.5 A_C  C counts side A (counts)
Size: 27 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for C 1 – 99 MeV/nuc (27 bins)

4.10.2.6 A_C_Rate  C count rate side A (counts s$^{-1}$)
Size: 27 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for C 1 – 99 MeV/nuc (27 bins)
4.10.2.7  **A_Ca**  Ca counts side A (counts)
Size: 30 time-varying
*particle_flux>*differential_directional_number_rate
Energy Bins for Ca 1 – 140 MeV/nuc (30 bins)

4.10.2.8  **A_Ca_Rate**  Ca count rate side A (counts s\(^{-1}\))
Size: 30 time-varying
*particle_flux>*differential_directional_number_rate
Energy Bins for Ca 1 – 140 MeV/nuc (30 bins)

4.10.2.9  **A_Cr**  Cr counts side A (counts)
Size: 31 time-varying
*particle_flux>*differential_directional_number_rate
Energy Bins for Cr 1 – 140 MeV/nuc (31 bins)

4.10.2.10  **A_Cr_Rate**  Cr count rate side A (counts s\(^{-1}\))
Size: 31 time-varying
*particle_flux>*differential_directional_number_rate
Energy Bins for Cr 1 – 140 MeV/nuc (31 bins)

4.10.2.11  **A_Electrons**  Electrons counts side A (counts)
Size: 16 time-varying
*particle_flux>*differential_directional_number_rate
Energy Bins for Electrons 0 – 6 MeV (16 bins)

4.10.2.12  **A_Electrons_Rate**  Electrons count rate side A (counts s\(^{-1}\))
Size: 16 time-varying
*particle_flux>*differential_directional_number_rate
Energy Bins for Electrons 0 – 6 MeV (16 bins)

4.10.2.13  **A_Fe**  Fe counts side A (counts)
Size: 32 time-varying
*particle_flux>*differential_directional_number_rate
Energy Bins for Fe 1 – 166 MeV/nuc (32 bins)
4.10.2.14 A_Fe_Rate  Fe count rate side A (counts s\(^{-1}\))
Size: 32 time-varying
\(\text{particle}\_\text{flux} > \text{differential}\_\text{directional}\_\text{number}\_\text{rate}\)
Energy Bins for Fe 1 – 166 MeV/nuc (32 bins)

4.10.2.15 A_H  H counts side A (counts)
Size: 25 time-varying
\(\text{particle}\_\text{flux} > \text{differential}\_\text{directional}\_\text{number}\_\text{rate}\)
Energy Bins for H 1 – 41 MeV (25 bins)

4.10.2.16 A_H_Rate  H count rate side A (counts s\(^{-1}\))
Size: 25 time-varying
\(\text{particle}\_\text{flux} > \text{differential}\_\text{directional}\_\text{number}\_\text{rate}\)
Energy Bins for H 1 – 41 MeV (25 bins)

4.10.2.17 A_He  He counts side A (counts)
Size: 26 time-varying
\(\text{particle}\_\text{flux} > \text{differential}\_\text{directional}\_\text{number}\_\text{rate}\)
Energy Bins for He 1 – 49 MeV/nuc (26 bins)

4.10.2.18 A_He_Rate  He count rate side A (counts s\(^{-1}\))
Size: 26 time-varying
\(\text{particle}\_\text{flux} > \text{differential}\_\text{directional}\_\text{number}\_\text{rate}\)
Energy Bins for He 1 – 49 MeV/nuc (26 bins)

4.10.2.19 A_Mg  Mg counts side A (counts)
Size: 28 time-varying
\(\text{particle}\_\text{flux} > \text{differential}\_\text{directional}\_\text{number}\_\text{rate}\)
Energy Bins for Mg 1 – 117 MeV/nuc (28 bins)

4.10.2.20 A_Mg_Rate  Mg count rate side A (counts s\(^{-1}\))
Size: 28 time-varying
\(\text{particle}\_\text{flux} > \text{differential}\_\text{directional}\_\text{number}\_\text{rate}\)
Energy Bins for Mg 1 – 117 MeV/nuc (28 bins)
4.10.2.21 **A_N**  N counts side A (counts)
Size: 27 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for N 1 – 99 MeV/nuc (27 bins)

4.10.2.22 **A_N_Rate**  N count rate side A (counts $s^{-1}$)
Size: 27 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for N 1 – 99 MeV/nuc (27 bins)

4.10.2.23 **A_Na**  Na counts side A (counts)
Size: 28 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Na 1 – 117 MeV/nuc (28 bins)

4.10.2.24 **A_Na_Rate**  Na count rate side A (counts $s^{-1}$)
Size: 28 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Na 1 – 117 MeV/nuc (28 bins)

4.10.2.25 **A_Ne**  Ne counts side A (counts)
Size: 28 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Ne 1 – 117 MeV/nuc (28 bins)

4.10.2.26 **A_Ne_Rate**  Ne count rate side A (counts $s^{-1}$)
Size: 28 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Ne 1 – 117 MeV/nuc (28 bins)

4.10.2.27 **A_Ni**  Ni counts side A (counts)
Size: 33 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Ni 1 – 197 MeV/nuc (33 bins)
4.10.2.28 A_Ni_Rate  Ni count rate side A (counts s\(^{-1}\))
Size: 33 time-varying
particle_flux\textgreater{}differential_directional_number_rate
Energy Bins for Ni 1 – 197 MeV/nuc (33 bins)

4.10.2.29 A_O  O counts side A (counts)
Size: 28 time-varying
particle_flux\textgreater{}differential_directional_number_rate
Energy Bins for O 1 – 117 MeV/nuc (28 bins)

4.10.2.30 A_O_Rate  O count rate side A (counts s\(^{-1}\))
Size: 28 time-varying
particle_flux\textgreater{}differential_directional_number_rate
Energy Bins for O 1 – 117 MeV/nuc (28 bins)

4.10.2.31 A_S  S counts side A (counts)
Size: 29 time-varying
particle_flux\textgreater{}differential_directional_number_rate
Energy Bins for S 1 – 140 MeV/nuc (29 bins)

4.10.2.32 A_S_Rate  S count rate side A (counts s\(^{-1}\))
Size: 29 time-varying
particle_flux\textgreater{}differential_directional_number_rate
Energy Bins for S 1 – 140 MeV/nuc (29 bins)

4.10.2.33 A_Si  Si counts side A (counts)
Size: 29 time-varying
particle_flux\textgreater{}differential_directional_number_rate
Energy Bins for Si 1 – 140 MeV/nuc (29 bins)

4.10.2.34 A_Si_Rate  Si count rate side A (counts s\(^{-1}\))
Size: 29 time-varying
particle_flux\textgreater{}differential_directional_number_rate
Energy Bins for Si 1 – 140 MeV/nuc (29 bins)
4.10.2.35  **B_Al**  Al counts side B (counts)  
Size: 28 time-varying  
particle\_flux>differential\_directional\_number\_rate
Energy Bins for Al 1 – 117 MeV/nuc (28 bins)

4.10.2.36  **B_Al\_Rate**  Al count rate side B (counts s\(^{-1}\))  
Size: 28 time-varying  
particle\_flux>differential\_directional\_number\_rate
Energy Bins for Al 1 – 117 MeV/nuc (28 bins)

4.10.2.37  **B_Ar**  Ar counts side B (counts)  
Size: 29 time-varying  
particle\_flux>differential\_directional\_number\_rate
Energy Bins for Ar 1 – 140 MeV/nuc (29 bins)

4.10.2.38  **B_Ar\_Rate**  Ar count rate side B (counts s\(^{-1}\))  
Size: 29 time-varying  
particle\_flux>differential\_directional\_number\_rate
Energy Bins for Ar 1 – 140 MeV/nuc (29 bins)

4.10.2.39  **B_C**  C counts side B (counts)  
Size: 27 time-varying  
particle\_flux>differential\_directional\_number\_rate
Energy Bins for C 1 – 99 MeV/nuc (27 bins)

4.10.2.40  **B_C\_Rate**  C count rate side B (counts s\(^{-1}\))  
Size: 27 time-varying  
particle\_flux>differential\_directional\_number\_rate
Energy Bins for C 1 – 99 MeV/nuc (27 bins)

4.10.2.41  **B_Ca**  Ca counts side B (counts)  
Size: 30 time-varying  
particle\_flux>differential\_directional\_number\_rate
Energy Bins for Ca 1 – 140 MeV/nuc (30 bins)
4.10.2.42 B_Ca_Rate  Ca count rate side B (counts s\(^{-1}\))
Size: 30 time-varying
differential_directional_number_rate
Energy Bins for Ca 1 – 140 MeV/nuc (30 bins)

4.10.2.43 B_Cr  Cr counts side B (counts)
Size: 31 time-varying
differential_directional_number_rate
Energy Bins for Cr 1 – 140 MeV/nuc (31 bins)

4.10.2.44 B_Cr_Rate  Cr count rate side B (counts s\(^{-1}\))
Size: 31 time-varying
differential_directional_number_rate
Energy Bins for Cr 1 – 140 MeV/nuc (31 bins)

4.10.2.45 B_Electrons  Electrons counts side B (counts)
Size: 16 time-varying
differential_directional_number_rate
Energy Bins for Electrons 0 – 6 MeV (16 bins)

4.10.2.46 B_Electrons_Rate  Electrons count rate side B (counts s\(^{-1}\))
Size: 16 time-varying
differential_directional_number_rate
Energy Bins for Electrons 0 – 6 MeV (16 bins)

4.10.2.47 B_Fe  Fe counts side B (counts)
Size: 32 time-varying
differential_directional_number_rate
Energy Bins for Fe 1 – 166 MeV/nuc (32 bins)

4.10.2.48 B_Fe_Rate  Fe count rate side B (counts s\(^{-1}\))
Size: 32 time-varying
differential_directional_number_rate
Energy Bins for Fe 1 – 166 MeV/nuc (32 bins)
4.10.2.49  B_H  H counts side B (counts)
Size: 25 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for H 1 – 41 MeV (25 bins)

4.10.2.50  B_H_Rate  H count rate side B (counts s\(^{-1}\))
Size: 25 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for H 1 – 41 MeV (25 bins)

4.10.2.51  B_He  He counts side B (counts)
Size: 26 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for He 1 – 49 MeV/nuc (26 bins)

4.10.2.52  B_He_Rate  He count rate side B (counts s\(^{-1}\))
Size: 26 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for He 1 – 49 MeV/nuc (26 bins)

4.10.2.53  B_Mg  Mg counts side B (counts)
Size: 28 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Mg 1 – 117 MeV/nuc (28 bins)

4.10.2.54  B_Mg_Rate  Mg count rate side B (counts s\(^{-1}\))
Size: 28 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Mg 1 – 117 MeV/nuc (28 bins)

4.10.2.55  B_N  N counts side B (counts)
Size: 27 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for N 1 – 99 MeV/nuc (27 bins)
4.10.2.56 **B_N_Rate**  N count rate side B (counts s\(^{-1}\))
Size: 27 time-varying
\[\text{particle_flux} \times \text{differential}\_\text{directional}\_\text{number}\_\text{rate}\]
Energy Bins for N 1 – 99 MeV/nuc (27 bins)

4.10.2.57 **B_Na**  Na counts side B (counts)
Size: 28 time-varying
\[\text{particle_flux} \times \text{differential}\_\text{directional}\_\text{number}\_\text{rate}\]
Energy Bins for Na 1 – 117 MeV/nuc (28 bins)

4.10.2.58 **B_Na\_Rate**  Na count rate side B (counts s\(^{-1}\))
Size: 28 time-varying
\[\text{particle_flux} \times \text{differential}\_\text{directional}\_\text{number}\_\text{rate}\]
Energy Bins for Na 1 – 117 MeV/nuc (28 bins)

4.10.2.59 **B_Ne**  Ne counts side B (counts)
Size: 28 time-varying
\[\text{particle_flux} \times \text{differential}\_\text{directional}\_\text{number}\_\text{rate}\]
Energy Bins for Ne 1 – 117 MeV/nuc (28 bins)

4.10.2.60 **B_Ne\_Rate**  Ne count rate side B (counts s\(^{-1}\))
Size: 28 time-varying
\[\text{particle_flux} \times \text{differential}\_\text{directional}\_\text{number}\_\text{rate}\]
Energy Bins for Ne 1 – 117 MeV/nuc (28 bins)

4.10.2.61 **B_Ni**  Ni counts side B (counts)
Size: 33 time-varying
\[\text{particle_flux} \times \text{differential}\_\text{directional}\_\text{number}\_\text{rate}\]
Energy Bins for Ni 1 – 197 MeV/nuc (33 bins)

4.10.2.62 **B_Ni\_Rate**  Ni count rate side B (counts s\(^{-1}\))
Size: 33 time-varying
\[\text{particle_flux} \times \text{differential}\_\text{directional}\_\text{number}\_\text{rate}\]
Energy Bins for Ni 1 – 197 MeV/nuc (33 bins)
4.10.2.63  **B_O**  O counts side B (counts)
Size: 28 time-varying
particle flux＞differential directional number rate
Energy Bins for O 1 – 117 MeV/nuc (28 bins)

4.10.2.64  **B_O_Rate**  O count rate side B (counts s⁻¹)
Size: 28 time-varying
particle flux＞differential directional number rate
Energy Bins for O 1 – 117 MeV/nuc (28 bins)

4.10.2.65  **B_S**  S counts side B (counts)
Size: 29 time-varying
particle flux＞differential directional number rate
Energy Bins for S 1 – 140 MeV/nuc (29 bins)

4.10.2.66  **B_S_Rate**  S count rate side B (counts s⁻¹)
Size: 29 time-varying
particle flux＞differential directional number rate
Energy Bins for S 1 – 140 MeV/nuc (29 bins)

4.10.2.67  **B_Si**  Si counts side B (counts)
Size: 29 time-varying
particle flux＞differential directional number rate
Energy Bins for Si 1 – 140 MeV/nuc (29 bins)

4.10.2.68  **B_Si_Rate**  Si count rate side B (counts s⁻¹)
Size: 29 time-varying
particle flux＞differential directional number rate
Energy Bins for Si 1 – 140 MeV/nuc (29 bins)

4.10.2.69  **HCl_Lat**  HCl latitude (degrees)
time-varying
position＞latitude
4.10.2.70  HCI_Lon  HCI longitude (degrees)
time-varying
position>longitude

4.10.2.71  HCI_R  Heliocentric distance (AU)
time-varying
position>radial

4.10.2.72  HGC_Lat  HGC latitude (degrees)
time-varying
position>latitude

4.10.2.73  HGC_Lon  HGC longitude (degrees)
time-varying
position>longitude

4.10.2.74  HGC_R  Heliocentric distance (AU)
time-varying
position>radial

4.10.2.75  LET1_A_HCI  HCI flow direction LET1A
Size: 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.10.2.76  LET1_A_PA  Pitch angle LET1A (degree)
time-varying
position>angle
4.10.2.77  **LET1_A_R1_SECT_HCI**  HCI flow direction LET1AR1SECT
Size: 9 × 3 time-varying
position > direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET1_R1_SECTORS 0 – 8 (9 bins)

4.10.2.78  **LET1_A_R1_SECT_PA**  Pitch angle LET1AR1SECT (degree)
Size: 9 time-varying
position > angle
LET1_R1_SECTORS 0 – 8 (9 bins)

4.10.2.79  **LET1_A_R1_SECT_RTN**  RTN flow direction LET1AR1SECT
Size: 9 × 3 time-varying
position > direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET1_R1_SECTORS 0 – 8 (9 bins)

4.10.2.80  **LET1_A_R1_SECT_SA**  Nominal Parker Spiral angle LET1AR1SECT (degree)
Size: 9 time-varying
position > angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind
and corotation breakdown at 10Rs.
LET1_R1_SECTORS 0 – 8 (9 bins)

4.10.2.81  **LET1_A_R26_SECT_HCI**  HCI flow direction LET1AR26SECT
Size: 25 × 3 time-varying
position > direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET1_R26_SECTORS 0 – 24 (25 bins)

4.10.2.82  **LET1_A_R26_SECT_PA**  Pitch angle LET1AR26SECT (degree)
Size: 25 time-varying
position > angle
LET1_R26_SECTORS 0 – 24 (25 bins)
4.10.2.83 LET1_A_R26_SECT_RTN  RTN flow direction LET1AR26SECT
Size: 25 × 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET1_R26_SECTORS 0 – 24 (25 bins)

4.10.2.84 LET1_A_R26_SECT_SA  Nominal Parker Spiral angle LET1AR26SECT (degree)
Size: 25 time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind
and corotation breakdown at 10Rs.
LET1_R26_SECTORS 0 – 24 (25 bins)

4.10.2.85 LET1_A_RTN  RTN flow direction LET1A
Size: 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.10.2.86 LET1_A_SA  Nominal Parker Spiral angle LET1A (degree)
time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind
and corotation breakdown at 10Rs.

4.10.2.87 LET1_B_HCI  HCI flow direction LET1B
Size: 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.10.2.88 LET1_B_PA  Pitch angle LET1B (degree)
time-varying
position>angle

4.10.2.89 LET1_B_R1_SECT_HCI  HCI flow direction LET1BR1SECT
Size: 9 × 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

**LET1_R1_SECTORS 0 – 8 (9 bins)**

4.10.2.90  **LET1_B_R1_SECT_PA**  Pitch angle LET1BR1SECT (degree)
Size: 9 time-varying
position>angle
LET1_R1_SECTORS 0 – 8 (9 bins)

4.10.2.91  **LET1_B_R1_SECT_RTN**  RTN flow direction LET1BR1SECT
Size: 9 \times 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET1_R1_SECTORS 0 – 8 (9 bins)

4.10.2.92  **LET1_B_R1_SECT_SA**  Nominal Parker Spiral angle LET1BR1SECT (degree)
Size: 9 time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind
and corotation breakdown at 10Rs.
LET1_R1_SECTORS 0 – 8 (9 bins)

4.10.2.93  **LET1_B_R26_SECT_HCI**  HCI flow direction LET1BR26SECT
Size: 25 \times 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET1_R26_SECTORS 0 – 24 (25 bins)

4.10.2.94  **LET1_B_R26_SECT_PA**  Pitch angle LET1BR26SECT (degree)
Size: 25 time-varying
position>angle
LET1_R26_SECTORS 0 – 24 (25 bins)

4.10.2.95  **LET1_B_R26_SECT_RTN**  RTN flow direction LET1BR26SECT
Size: 25 \times 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET1_R26_SECTORS 0 – 24 (25 bins)

4.10.2.96 LET1_B_R26_SECT_SA   Nominal Parker Spiral angle LET1BR26SECT (degree)
Size: 25 time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.
LET1_R26_SECTORS 0 – 24 (25 bins)

4.10.2.97 LET1_B_RTN   RTN flow direction LET1B
Size: 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.10.2.98 LET1_B_SA   Nominal Parker Spiral angle LET1B (degree)
time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.

4.10.2.99 R1A_H_SECT_Rate   H sectored count rate R1A (counts s⁻¹)
Size: 1 × 9 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for R1 H SECT 1 – 1 MeV (1 bins)
LET1_R1_SECTORS 0 – 8 (9 bins)

4.10.2.100 R1A_He_SECT_Rate   He sectored count rate R1A (counts s⁻¹)
Size: 1 × 9 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for R1 He SECT 1 – 1 MeV/nuc (1 bins)
LET1_R1_SECTORS 0 – 8 (9 bins)

4.10.2.101 R1B_H_SECT_Rate   H sectored count rate R1B (counts s⁻¹)
Size: 1 × 9 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for R1 H SECT 1 – 1 MeV (1 bins)
LET1_R1_SECTORS 0 – 8 (9 bins)

4.10.2.102  R1B_He_SECT_Rate  He sectored count rate R1B (counts s\(^{-1}\))
Size: 1 × 9 time-varying
particle\_flux\_differential\_directional\_number\_rate
Energy Bins for R1 He SECT 1 – 1 MeV/nuc (1 bins)
LET1_R1_SECTORS 0 – 8 (9 bins)

4.10.2.103  R26A_H_SECT_Rate  H sectored count rate R26A (counts s\(^{-1}\))
Size: 3 × 25 time-varying
particle\_flux\_differential\_directional\_number\_rate
Energy Bins for R26 H SECT 3 – 11 MeV (3 bins)
LET1_R26_SECTORS 0 – 24 (25 bins)

4.10.2.104  R26A_He_SECT_Rate  He sectored count rate R26A (counts s\(^{-1}\))
Size: 3 × 25 time-varying
particle\_flux\_differential\_directional\_number\_rate
Energy Bins for R26 He SECT 3 – 11 MeV/nuc (3 bins)
LET1_R26_SECTORS 0 – 24 (25 bins)

4.10.2.105  R26B_H_SECT_Rate  H sectored count rate R26B (counts s\(^{-1}\))
Size: 3 × 25 time-varying
particle\_flux\_differential\_directional\_number\_rate
Energy Bins for R26 H SECT 3 – 11 MeV (3 bins)
LET1_R26_SECTORS 0 – 24 (25 bins)

4.10.2.106  R26B_He_SECT_Rate  He sectored count rate R26B (counts s\(^{-1}\))
Size: 3 × 25 time-varying
particle\_flux\_differential\_directional\_number\_rate
Energy Bins for R26 He SECT 3 – 11 MeV/nuc (3 bins)
LET1_R26_SECTORS 0 – 24 (25 bins)

4.10.3  OTHER SUPPORT

4.11  PSP_ISOIS-EPIHI_L2-LET2-RATES10
ISOIS-EPIHI>Integrated Science Investigation of the Sun, Energetic Particle Instrument Hi
L2-LET2-rates10>Level 2 LET2 10-second rates
EPI-Hi 10 second rates cdf. Time tags indicate midpoint of integration.
Instrument paper: Integrated Science Investigation of the Sun (ISIS): Design of the Energetic
0059-1
1 minute to 1 hour
Cite McComas et al (2016), doi:10.1007/s11214-014-0059-1

4.11.1 PRIMARY VARIABLES

4.11.1.1 C_H Flux  H flux side C (cm$^{-2}$sr$^{-1}$sec$^{-1}$MeV$^{-1}$)
Size: 18 time-varying
particle_flux>differential_directional_number
Energy Bins for H 1 – 15 MeV (18 bins)

4.11.1.2 C_He Flux  He flux side C (cm$^{-2}$sr$^{-1}$sec$^{-1}$(MeV/nuc)$^{-1}$)
Size: 22 time-varying
particle_flux>differential_directional_number
Energy Bins for He 1 – 29 MeV/nuc (22 bins)

4.11.2 OTHER DATA

4.11.2.1 C_Electrons  Electrons counts side C (counts)
Size: 13 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Electrons 1 – 4 MeV (13 bins)

4.11.2.2 C_Electrons_Rate  Electrons count rate side C (counts s$^{-1}$)
Size: 13 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Electrons 1 – 4 MeV (13 bins)

4.11.2.3 C_H  H counts side C (counts)
Size: 18 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for H 1 – 15 MeV (18 bins)

4.11.2.4 C_H_Rate  H count rate side C (counts s$^{-1}$)
Size: 18 time-varying
4.11.2.5 **C_He**  He counts side C (counts)  
Size: 22 time-varying  
Energy Bins for He 1 – 29 MeV/nuc (22 bins)

4.11.2.6 **C_He_Rate**  He count rate side C (counts s$^{-1}$)  
Size: 22 time-varying  
Energy Bins for He 1 – 29 MeV/nuc (22 bins)

4.11.2.7 **HCI_Lat**  HCI latitude (degrees)  
time-varying  
position>latitude  

4.11.2.8 **HCI_Lon**  HCI longitude (degrees)  
time-varying  
position>longitude  

4.11.2.9 **HCI_R**  Heliocentric distance (AU)  
time-varying  
position>radial  

4.11.2.10 **HGC_Lat**  HGC latitude (degrees)  
time-varying  
position>latitude  
4.11.2.11 HGC_Lon  HGC longitude (degrees)
time-varying
position>longitude

4.11.2.12 HGC_R  Heliocentric distance (AU)
time-varying
position>radial

4.11.2.13 LET2_C_HCI  HCI flow direction LET2C
Size: 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.11.2.14 LET2_C_PA  Pitch angle LET2C (degree)
time-varying
position>angle

4.11.2.15 LET2_C_RTN  RTN flow direction LET2C
Size: 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.11.2.16 LET2_C_SA  Nominal Parker Spiral angle LET2C (degree)
time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.

4.11.3 OTHER SUPPORT

4.12 PSP_ISOIS-EPIHI_L2-LET2-RATES300
ISOIS-EPIHI>Integrated Science Investigation of the Sun, Energetic Particle Instrument Hi L2-LET2-rates300>Level 2 LET2 5-minute rates
EPI-Hi LET2 300 second rates cdf. Time tags indicate midpoint of integration.
1 minute to 1 hour
Cite McComas et al (2016), doi:10.1007/s11214-014-0059-1

4.12.1 PRIMARY VARIABLES

4.12.2 OTHER DATA

4.12.2.1 HCI_Lat  HCI latitude (degrees)
time-varying
position>latitude

4.12.2.2 HCI_Lon  HCI longitude (degrees)
time-varying
position>longitude

4.12.2.3 HCI_R  Heliocentric distance (AU)
time-varying
position>radial

4.12.2.4 HGC_Lat  HGC latitude (degrees)
time-varying
position>latitude

4.12.2.5 HGC_Lon  HGC longitude (degrees)
time-varying
position>longitude

4.12.2.6 HGC_R  Heliocentric distance (AU)
time-varying
position>radial

4.12.2.7 LET2_C_HCI  HCI flow direction LET2C
Size: 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.12.2.8 LET2_C_PA  Pitch angle LET2C (degree)
time-varying
position>angle

4.12.2.9 LET2_C_R1_SECT_HCI  HCI flow direction LET2CR1SECT
Size: 9 \times 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET2_R1_SECTORS 0 – 8 (9 bins)

4.12.2.10 LET2_C_R1_SECT_PA  Pitch angle LET2CR1SECT (degree)
Size: 9 time-varying
position>angle
LET2_R1_SECTORS 0 – 8 (9 bins)

4.12.2.11 LET2_C_R1_SECT_RTN  RTN flow direction LET2CR1SECT
Size: 9 \times 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET2_R1_SECTORS 0 – 8 (9 bins)

4.12.2.12 LET2_C_R1_SECT_SA  Nominal Parker Spiral angle LET2CR1SECT (degree)
Size: 9 time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind
and corotation breakdown at 10Rs.
LET2_R1_SECTORS 0 – 8 (9 bins)
4.12.2.13 LET2_C_R25_SECT_HCI  HCI flow direction LET2CR25SECT
Size: 25 × 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET2_R25_SECTORS 0 – 24 (25 bins)

4.12.2.14 LET2_C_R25_SECT_PA  Pitch angle LET2CR25SECT (degree)
Size: 25 time-varying
position>angle
LET2_R25_SECTORS 0 – 24 (25 bins)

4.12.2.15 LET2_C_R25_SECT_RTN  RTN flow direction LET2CR25SECT
Size: 25 × 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET2_R25_SECTORS 0 – 24 (25 bins)

4.12.2.16 LET2_C_R25_SECT_SA  Nominal Parker Spiral angle LET2CR25SECT (degree)
Size: 25 time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.
LET2_R25_SECTORS 0 – 24 (25 bins)

4.12.2.17 LET2_C_RTN  RTN flow direction LET2C
Size: 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.12.2.18 LET2_C_SA  Nominal Parker Spiral angle LET2C (degree)
time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.
4.12.2.19 **RIC_CNO_SECT_Rate**  CNO sectored count rate R1C (counts s$^{-1}$)
Size: $1 \times 9$ time-varying
particle_flux $>$ differential_directional_number_rate
Energy Bins for R1 CNO SECT 3 – 3 MeV/nuc (1 bins)
LET2_R1_SECTORS 0 – 8 (9 bins)

4.12.2.20 **RIC_FeGroup_SECT_Rate**  FeGroup sectored count rate R1C (counts s$^{-1}$)
Size: $1 \times 9$ time-varying
particle_flux $>$ differential_directional_number_rate
Energy Bins for R1 FeGroup SECT 3 – 3 MeV/nuc (1 bins)
LET2_R1_SECTORS 0 – 8 (9 bins)

4.12.2.21 **RIC_NetoSi_SECT_Rate**  NetoSi sectored count rate R1C (counts s$^{-1}$)
Size: $1 \times 9$ time-varying
particle_flux $>$ differential_directional_number_rate
Energy Bins for R1 NetoSi SECT 3 – 3 MeV/nuc (1 bins)
LET2_R1_SECTORS 0 – 8 (9 bins)

4.12.2.22 **R25C_CNO_SECT_Rate**  CNO sectored count rate R25C (counts s$^{-1}$)
Size: $3 \times 25$ time-varying
particle_flux $>$ differential_directional_number_rate
Energy Bins for R25 CNO SECT 6 – 23 MeV/nuc (3 bins)
LET2_R25_SECTORS 0 – 24 (25 bins)

4.12.2.23 **R25C_FeGroup_SECT_Rate**  FeGroup sectored count rate R25C (counts s$^{-1}$)
Size: $3 \times 25$ time-varying
particle_flux $>$ differential_directional_number_rate
Energy Bins for R25 FeGroup SECT 6 – 23 MeV/nuc (3 bins)
LET2_R25_SECTORS 0 – 24 (25 bins)

4.12.2.24 **R25C_NetoSi_SECT_Rate**  NetoSi sectored count rate R25C (counts s$^{-1}$)
Size: $3 \times 25$ time-varying
particle_flux $>$ differential_directional_number_rate
Energy Bins for R25 NetoSi SECT 6 – 23 MeV/nuc (3 bins)
LET2_R25_SECTORS 0 – 24 (25 bins)
4.12.3 OTHER SUPPORT

4.13 PSP_ISOIS-EPIHI_L2-LET2-RATES3600

ISOIS-EPIHI>Integrated Science Investigation of the Sun, Energetic Particle Instrument Hi
L2-LET2-rates3600>Level 2 LET2 hourly rates
EPI-Hi LET2 3600 second rates cdf. Time tags indicate midpoint of integration.
Instrument paper: Integrated Science Investigation of the Sun (ISIS): Design of the Energetic
0059-1
1 minute to 1 hour
Cite McComas et al (2016), doi:10.1007/s11214-014-0059-1

4.13.1 PRIMARY VARIABLES

4.13.1.1 C_H_Flux  H flux side C (cm$^{-2}$sr$^{-1}$sec$^{-1}$MeV$^{-1}$)
Size: 24 time-varying
particle_flux>differential_directional_number
Energy Bins for H 1 – 35 MeV (24 bins)

4.13.1.2 C_He_Flux  He flux side C (cm$^{-2}$sr$^{-1}$sec$^{-1}$ (MeV/nuc)$^{-1}$)
Size: 25 time-varying
particle_flux>differential_directional_number
Energy Bins for He 1 – 41 MeV/nuc (25 bins)

4.13.1.3 R1C_H_SECT_Flux  H sectored flux R1C (cm$^{-2}$sr$^{-1}$sec$^{-1}$MeV$^{-1}$)
Size: 1 × 9 time-varying
particle_flux>differential_directional_number
Energy Bins for R1 H SECT 1 – 1 MeV (1 bins)
LET2_R1_SECTORS 0 – 8 (9 bins)

4.13.1.4 R1C_He_SECT_Flux  He sectored flux R1C (cm$^{-2}$sr$^{-1}$sec$^{-1}$ (MeV/nuc)$^{-1}$)
Size: 1 × 9 time-varying
particle_flux>differential_directional_number
Energy Bins for R1 He SECT 1 – 1 MeV/nuc (1 bins)
LET2_R1_SECTORS 0 – 8 (9 bins)

4.13.1.5 R25C_H_SECT_Flux  H sectored flux R25C (cm$^{-2}$sr$^{-1}$sec$^{-1}$MeV$^{-1}$)
Size: 3 × 25 time-varying
particle_flux>differential_directional_number
Energy Bins for R25 H SECT 3 – 11 MeV (3 bins)
LET2_R25_SECTORS 0 – 24 (25 bins)

4.13.1.6 R25C_He_SECT_Flux  He sectored flux R25C (cm\(^{-2}\)sr\(^{-1}\)sec\(^{-1}\)(MeV/nuc)\(^{-1}\))
Size: 3 × 25 time-varying
particle_flux>differential_directional_number
Energy Bins for R25 He SECT 3 – 11 MeV/nuc (3 bins)
LET2_R25_SECTORS 0 – 24 (25 bins)

4.13.2 OTHER DATA

4.13.2.1 C_Al  Al counts side C (counts)
Size: 27 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Al 1 – 99 MeV/nuc (27 bins)

4.13.2.2 C_Al_Rate  Al count rate side C (counts s\(^{-1}\))
Size: 27 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Al 1 – 99 MeV/nuc (27 bins)

4.13.2.3 C_Ar  Ar counts side C (counts)
Size: 28 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Ar 1 – 117 MeV/nuc (28 bins)

4.13.2.4 C_Ar_Rate  Ar count rate side C (counts s\(^{-1}\))
Size: 28 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Ar 1 – 117 MeV/nuc (28 bins)

4.13.2.5 C_C  C counts side C (counts)
Size: 25 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for C 1 – 70 MeV/nuc (25 bins)
4.13.2.6 **C_C_Rate**  C count rate side C (counts s\(^{-1}\))
Size: 25 time-varying
particle_flux+differential_directional_number_rate
Energy Bins for C 1 – 70 MeV/nuc (25 bins)

4.13.2.7 **C_Ca**  Ca counts side C (counts)
Size: 30 time-varying
particle_flux+differential_directional_number_rate
Energy Bins for Ca 1 – 140 MeV/nuc (30 bins)

4.13.2.8 **C_Ca_Rate**  Ca count rate side C (counts s\(^{-1}\))
Size: 30 time-varying
particle_flux+differential_directional_number_rate
Energy Bins for Ca 1 – 140 MeV/nuc (30 bins)

4.13.2.9 **C_Cr**  Cr counts side C (counts)
Size: 31 time-varying
particle_flux+differential_directional_number_rate
Energy Bins for Cr 1 – 140 MeV/nuc (31 bins)

4.13.2.10 **C_Cr_Rate**  Cr count rate side C (counts s\(^{-1}\))
Size: 31 time-varying
particle_flux+differential_directional_number_rate
Energy Bins for Cr 1 – 140 MeV/nuc (31 bins)

4.13.2.11 **C_Electrons**  Electrons counts side C (counts)
Size: 16 time-varying
particle_flux+differential_directional_number_rate
Energy Bins for Electrons 0 – 6 MeV (16 bins)

4.13.2.12 **C_Electrons_Rate**  Electrons count rate side C (counts s\(^{-1}\))
Size: 16 time-varying
particle_flux+differential_directional_number_rate
Energy Bins for Electrons 0 – 6 MeV (16 bins)
4.13.2.13  C_Fe  Fe counts side C (counts)
Size: 31 time-varying

particle_flux>differential_directional_number_rate
Energy Bins for Fe 1 – 140 MeV/nuc (31 bins)

4.13.2.14  C_Fe_Rate  Fe count rate side C (counts s⁻¹)
Size: 31 time-varying

particle_flux>differential_directional_number_rate
Energy Bins for Fe 1 – 140 MeV/nuc (31 bins)

4.13.2.15  C_H  H counts side C (counts)
Size: 24 time-varying

particle_flux>differential_directional_number_rate
Energy Bins for H 1 – 35 MeV (24 bins)

4.13.2.16  C_H_Rate  H count rate side C (counts s⁻¹)
Size: 24 time-varying

particle_flux>differential_directional_number_rate
Energy Bins for H 1 – 35 MeV (24 bins)

4.13.2.17  C_He  He counts side C (counts)
Size: 25 time-varying

particle_flux>differential_directional_number_rate
Energy Bins for He 1 – 41 MeV/nuc (25 bins)

4.13.2.18  C_He_Rate  He count rate side C (counts s⁻¹)
Size: 25 time-varying

particle_flux>differential_directional_number_rate
Energy Bins for He 1 – 41 MeV/nuc (25 bins)

4.13.2.19  C_Mg  Mg counts side C (counts)
Size: 27 time-varying

particle_flux>differential_directional_number_rate
Energy Bins for Mg 1 – 99 MeV/nuc (27 bins)
4.13.2.20  **C_Mg_Rate**  Mg count rate side C (counts s\(^{-1}\))  
Size: 27 time-varying  
particle\_flux\_differential\_directional\_number\_rate  
Energy Bins for Mg 1 – 99 MeV/nuc (27 bins)

4.13.2.21  **C_N**  N counts side C (counts)  
Size: 25 time-varying  
particle\_flux\_differential\_directional\_number\_rate  
Energy Bins for N 1 – 70 MeV/nuc (25 bins)

4.13.2.22  **C_N_Rate**  N count rate side C (counts s\(^{-1}\))  
Size: 25 time-varying  
particle\_flux\_differential\_directional\_number\_rate  
Energy Bins for N 1 – 70 MeV/nuc (25 bins)

4.13.2.23  **C_Na**  Na counts side C (counts)  
Size: 27 time-varying  
particle\_flux\_differential\_directional\_number\_rate  
Energy Bins for Na 1 – 99 MeV/nuc (27 bins)

4.13.2.24  **C_Na_Rate**  Na count rate side C (counts s\(^{-1}\))  
Size: 27 time-varying  
particle\_flux\_differential\_directional\_number\_rate  
Energy Bins for Na 1 – 99 MeV/nuc (27 bins)

4.13.2.25  **C_Ne**  Ne counts side C (counts)  
Size: 27 time-varying  
particle\_flux\_differential\_directional\_number\_rate  
Energy Bins for Ne 1 – 99 MeV/nuc (27 bins)

4.13.2.26  **C_Ne_Rate**  Ne count rate side C (counts s\(^{-1}\))  
Size: 27 time-varying  
particle\_flux\_differential\_directional\_number\_rate  
Energy Bins for Ne 1 – 99 MeV/nuc (27 bins)
4.13.2.27  **C_Ni**  Ni counts side C (counts)  
Size: 32 time-varying  
particle_flux\(\times\)differential_directional_number_rate  
Energy Bins for Ni 1 – 166 MeV/nuc (32 bins)

4.13.2.28  **C_Ni_Rate**  Ni count rate side C (counts s\(^{-1}\))  
Size: 32 time-varying  
particle_flux\(\times\)differential_directional_number_rate  
Energy Bins for Ni 1 – 166 MeV/nuc (32 bins)

4.13.2.29  **C_O**  O counts side C (counts)  
Size: 26 time-varying  
particle_flux\(\times\)differential_directional_number_rate  
Energy Bins for O 1 – 83 MeV/nuc (26 bins)

4.13.2.30  **C_O_Rate**  O count rate side C (counts s\(^{-1}\))  
Size: 26 time-varying  
particle_flux\(\times\)differential_directional_number_rate  
Energy Bins for O 1 – 83 MeV/nuc (26 bins)

4.13.2.31  **C_S**  S counts side C (counts)  
Size: 28 time-varying  
particle_flux\(\times\)differential_directional_number_rate  
Energy Bins for S 1 – 117 MeV/nuc (28 bins)

4.13.2.32  **C_S_Rate**  S count rate side C (counts s\(^{-1}\))  
Size: 28 time-varying  
particle_flux\(\times\)differential_directional_number_rate  
Energy Bins for S 1 – 117 MeV/nuc (28 bins)

4.13.2.33  **C_Si**  Si counts side C (counts)  
Size: 28 time-varying  
particle_flux\(\times\)differential_directional_number_rate  
Energy Bins for Si 1 – 117 MeV/nuc (28 bins)
4.13.2.34  **C_Si_Rate**  Si count rate side C (counts s\(^{-1}\))
Size: 28 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Si 1 – 117 MeV/nuc (28 bins)

4.13.2.35  **HCI_Lat**  HCI latitude (degrees)
time-varying
position>latitude

4.13.2.36  **HCI_Lon**  HCI longitude (degrees)
time-varying
position>longitude

4.13.2.37  **HCI_R**  Heliocentric distance (AU)
time-varying
position>radial

4.13.2.38  **HGC_Lat**  HGC latitude (degrees)
time-varying
position>latitude

4.13.2.39  **HGC_Lon**  HGC longitude (degrees)
time-varying
position>longitude

4.13.2.40  **HGC_R**  Heliocentric distance (AU)
time-varying
position>radial
4.13.2.41 LET2_C_HCI   HCI flow direction LET2C  
Size: 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.13.2.42 LET2_C_PA   Pitch angle LET2C (degree)
Size: 9 time-varying
position>angle

4.13.2.43 LET2_C_R1_SECT_HCI  HCI flow direction LET2CR1SECT  
Size: 9 \times 3 \text{ time-varying}
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET2_R1_SECTORS 0 – 8 (9 bins)

4.13.2.44 LET2_C_R1_SECT_PA  Pitch angle LET2CR1SECT (degree)
Size: 9 time-varying
position>angle
LET2_R1_SECTORS 0 – 8 (9 bins)

4.13.2.45 LET2_C_R1_SECT_RTN  RTN flow direction LET2CR1SECT  
Size: 9 \times 3 \text{ time-varying}
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET2_R1_SECTORS 0 – 8 (9 bins)

4.13.2.46 LET2_C_R1_SECT_SA  Nominal Parker Spiral angle LET2CR1SECT (degree)
Size: 9 time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.
LET2_R1_SECTORS 0 – 8 (9 bins)

4.13.2.47 LET2_C_R25_SECT_HCI  HCI flow direction LET2CR25SECT
Size: 25 \times 3 \text{ time-varying}
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

**LET2_R25_SECTORS 0 – 24 (25 bins)**

*4.13.2.48 LET2_C_R25_SECT_PA* Pitch angle LET2CR25SECT (degree)
Size: 25 time-varying
position>angle
LET2_R25_SECTORS 0 – 24 (25 bins)

*4.13.2.49 LET2_C_R25_SECT_RTN* RTN flow direction LET2CR25SECT
Size: $25 \times 3$ time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET2_R25_SECTORS 0 – 24 (25 bins)

*4.13.2.50 LET2_C_R25_SECT_SA* Nominal Parker Spiral angle LET2CR25SECT (degree)
Size: 25 time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.
LET2_R25_SECTORS 0 – 24 (25 bins)

*4.13.2.51 LET2_C_RTN* RTN flow direction LET2C
Size: 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

*4.13.2.52 LET2_C_SA* Nominal Parker Spiral angle LET2C (degree)
time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.

*4.13.2.53 R1C_CNO_SECT_Rate* CNO sectored count rate R1C (counts s$^{-1}$)
Size: $1 \times 9$ time-varying
particle_flux>differential_directional_number_rate
Energy Bins for R1 CNO SECT 3 – 3 MeV/nuc (1 bins)
4.13.2.54 **RIC_FeGroup_SECT_Rate**  FeGroup sectored count rate R1C (counts s⁻¹)
Size: 1 × 9 time-varying
particle Flux > differential_directional_number_rate
Energy Bins for R1 FeGroup SECT 3 – 3 MeV/nuc (1 bins)
LET2_R1_SECTORS 0 – 8 (9 bins)

4.13.2.55 **RIC_H_SECT_Rate**  H sectored count rate R1C (counts s⁻¹)
Size: 1 × 9 time-varying
particle Flux > differential_directional_number_rate
Energy Bins for R1 H SECT 1 – 1 MeV (1 bins)
LET2_R1_SECTORS 0 – 8 (9 bins)

4.13.2.56 **RIC_He_BIN**  R1C He Rates (counts)
Size: 5 × 16 time-varying
particle Flux > differential_directional_number_rate
Energy Bins for R1 He BIN 1 – 3 MeV/nuc (5 bins)
R1C_He_BIN_MASS_BIN 0 – 15 segment (16 bins)

4.13.2.57 **RIC_He_SECT_Rate**  He sectored count rate R1C (counts s⁻¹)
Size: 1 × 9 time-varying
particle Flux > differential_directional_number_rate
Energy Bins for R1 He SECT 1 – 1 MeV/nuc (1 bins)
LET2_R1_SECTORS 0 – 8 (9 bins)

4.13.2.58 **RIC_Ne_BIN**  R1C Ne Rates (counts)
Size: 5 × 8 time-varying
particle Flux > differential_directional_number_rate
Energy Bins for R1 Ne BIN 1 – 6 MeV/nuc (5 bins)
R1C_Ne_BIN_MASS_BIN 0 – 7 segment (8 bins)

4.13.2.59 **RIC_NetoSi_SECT_Rate**  NetoSi sectored count rate R1C (counts s⁻¹)
Size: 1 × 9 time-varying
particle Flux > differential_directional_number_rate
Energy Bins for R1 NetoSi SECT 3 – 3 MeV/nuc (1 bins)
4.13.2.60  **R25C_CNO_SECT_Rate**  CNO sectored count rate R25C (counts s\(^{-1}\))
Size: 3 × 25 time-varying
\(\text{particle}\_\text{flux} \times \text{differential}\_\text{directional}\_\text{number}\_\text{rate}\)
Energy Bins for R25 CNO SECT 6 – 23 MeV/nuc (3 bins)
LET2_R25_SECTORS 0 – 24 (25 bins)

4.13.2.61  **R25C_FeGroup_SECT_Rate**  FeGroup sectored count rate R25C (counts s\(^{-1}\))
Size: 3 × 25 time-varying
\(\text{particle}\_\text{flux} \times \text{differential}\_\text{directional}\_\text{number}\_\text{rate}\)
Energy Bins for R25 FeGroup SECT 6 – 23 MeV/nuc (3 bins)
LET2_R25_SECTORS 0 – 24 (25 bins)

4.13.2.62  **R25C_H_SECT_Rate**  H sectored count rate R25C (counts s\(^{-1}\))
Size: 3 × 25 time-varying
\(\text{particle}\_\text{flux} \times \text{differential}\_\text{directional}\_\text{number}\_\text{rate}\)
Energy Bins for R25 H SECT 3 – 11 MeV (3 bins)
LET2_R25_SECTORS 0 – 24 (25 bins)

4.13.2.63  **R25C_He_SECT_Rate**  He sectored count rate R25C (counts s\(^{-1}\))
Size: 3 × 25 time-varying
\(\text{particle}\_\text{flux} \times \text{differential}\_\text{directional}\_\text{number}\_\text{rate}\)
Energy Bins for R25 He SECT 3 – 11 MeV/nuc (3 bins)
LET2_R25_SECTORS 0 – 24 (25 bins)

4.13.2.64  **R25C_NetoSi_SECT_Rate**  NetoSi sectored count rate R25C (counts s\(^{-1}\))
Size: 3 × 25 time-varying
\(\text{particle}\_\text{flux} \times \text{differential}\_\text{directional}\_\text{number}\_\text{rate}\)
Energy Bins for R25 NetoSi SECT 6 – 23 MeV/nuc (3 bins)
LET2_R25_SECTORS 0 – 24 (25 bins)

4.13.2.65  **R2C_He_BIN**  R2C He Rates (counts)
Size: 7 × 16 time-varying
\(\text{particle}\_\text{flux} \times \text{differential}\_\text{directional}\_\text{number}\_\text{rate}\)
Energy Bins for R2 He BIN 2 – 16 MeV/nuc (7 bins)
R2C_He_BIN_MASS_BIN 0 – 15 segment (16 bins)

4.13.2.66 R2C_Ne_BIN  R2C Ne Rates (counts)  
Size: 8 × 8 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for R2 Ne BIN 3 – 32 MeV/nuc (8 bins)  
R2C_Ne_BIN_MASS_BIN 0 – 7 segment (8 bins)

4.13.2.67 R3C_He_BIN  R3C He Rates (counts)  
Size: 5 × 16 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for R3 He BIN 8 – 32 MeV/nuc (5 bins)  
R3C_He_BIN_MASS_BIN 0 – 15 segment (16 bins)

4.13.2.68 R3C_Ne_BIN  R3C Ne Rates (counts)  
Size: 6 × 8 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for R3 Ne BIN 16 – 91 MeV/nuc (6 bins)  
R3C_Ne_BIN_MASS_BIN 0 – 7 segment (8 bins)

4.13.2.69 R45C_He_BIN  R45C He Rates (counts)  
Size: 5 × 16 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for R45 He BIN 8 – 32 MeV/nuc (5 bins)  
R45C_He_BIN_MASS_BIN 0 – 15 segment (16 bins)

4.13.2.70 R45C_Ne_BIN  R45C Ne Rates (counts)  
Size: 6 × 8 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for R45 Ne BIN 16 – 91 MeV/nuc (6 bins)  
R45C_Ne_BIN_MASS_BIN 0 – 7 segment (8 bins)

4.13.3 OTHER SUPPORT

4.14 PSP_ISOIS-EPIHI_L2-LET2-RATES60
ISOIS-EPIHI>Integrated Science Investigation of the Sun, Energetic Particle Instrument Hi  
L2-LET2-rates60>Level 2 LET2 1-minute rates

1 minute to 1 hour
Cite McComas et al (2016), doi:10.1007/s11214-014-0059-1

4.14.1 PRIMARY VARIABLES

4.14.1.1 C_H_Flux  H flux side C (cm$^{-2}$sr$^{-1}$sec$^{-1}$MeV$^{-1}$)
Size: 24 time-varying
particle_flux>differential_directional_number
Energy Bins for H 1 – 35 MeV (24 bins)

4.14.1.2 C_He_Flux  He flux side C (cm$^{-2}$sr$^{-1}$sec$^{-1}$MeV/nuc$^{-1}$)
Size: 25 time-varying
particle_flux>differential_directional_number
Energy Bins for He 1 – 41 MeV/nuc (25 bins)

4.14.1.3 R1C_H_SECT_Flux  H sectored flux R1C (cm$^{-2}$sr$^{-1}$sec$^{-1}$MeV$^{-1}$)
Size: 1 × 9 time-varying
particle_flux>differential_directional_number
Energy Bins for R1 H SECT 1 – 1 MeV (1 bins)
LET2_R1_SECTORS 0 – 8 (9 bins)

4.14.1.4 R1C_He_SECT_Flux  He sectored flux R1C (cm$^{-2}$sr$^{-1}$sec$^{-1}$MeV/nuc$^{-1}$)
Size: 1 × 9 time-varying
particle_flux>differential_directional_number
Energy Bins for R1 He SECT 1 – 1 MeV/nuc (1 bins)
LET2_R1_SECTORS 0 – 8 (9 bins)

4.14.1.5 R25C_H_SECT_Flux  H sectored flux R25C (cm$^{-2}$sr$^{-1}$sec$^{-1}$MeV$^{-1}$)
Size: 3 × 25 time-varying
particle_flux>differential_directional_number
Energy Bins for R25 H SECT 3 – 11 MeV (3 bins)
LET2_R25_SECTORS 0 – 24 (25 bins)
4.14.1.6 R25C_He_SECT_Flux  He sectored flux R25C (cm$^{-2}$sr$^{-1}$sec$^{-1}$)(MeV/nuc)$^{-1}$)  
Size: 3 × 25 time-varying  
particle_flux>differential_directional_number  
Energy Bins for R25 He SECT 3 – 11 MeV/nuc (3 bins)  
LET2_R25_SECTORS 0 – 24 (25 bins)  

4.14.2 OTHER DATA  

4.14.2.1 C_Al  Al counts side C (counts)  
Size: 27 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for Al 1 – 99 MeV/nuc (27 bins)  

4.14.2.2 C_Al_Rate  Al count rate side C (counts s$^{-1}$)  
Size: 27 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for Al 1 – 99 MeV/nuc (27 bins)  

4.14.2.3 C_Ar  Ar counts side C (counts)  
Size: 28 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for Ar 1 – 117 MeV/nuc (28 bins)  

4.14.2.4 C_Ar_Rate  Ar count rate side C (counts s$^{-1}$)  
Size: 28 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for Ar 1 – 117 MeV/nuc (28 bins)  

4.14.2.5 C_C  C counts side C (counts)  
Size: 25 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for C 1 – 70 MeV/nuc (25 bins)  

4.14.2.6 C_C_Rate  C count rate side C (counts s$^{-1}$)  
Size: 25 time-varying  
particle_flux>differential_directional_number_rate
Energy Bins for C 1 – 70 MeV/nuc (25 bins)

4.14.2.7  C_Ca  Ca counts side C (counts)
Size: 30 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Ca 1 – 140 MeV/nuc (30 bins)

4.14.2.8  C_Ca_Rate  Ca count rate side C (counts s\(^{-1}\))
Size: 30 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Ca 1 – 140 MeV/nuc (30 bins)

4.14.2.9  C_Cr  Cr counts side C (counts)
Size: 31 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Cr 1 – 140 MeV/nuc (31 bins)

4.14.2.10  C_Cr_Rate  Cr count rate side C (counts s\(^{-1}\))
Size: 31 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Cr 1 – 140 MeV/nuc (31 bins)

4.14.2.11  C_Electrons  Electrons counts side C (counts)
Size: 16 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Electrons 0 – 6 MeV (16 bins)

4.14.2.12  C_Electrons_Rate  Electrons count rate side C (counts s\(^{-1}\))
Size: 16 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Electrons 0 – 6 MeV (16 bins)

4.14.2.13  C_Fe  Fe counts side C (counts)
Size: 31 time-varying
4.14.2.14 C_Fe_Rate  Fe count rate side C (counts s\(^{-1}\))
Size: 31 time-varying
Energy Bins for Fe 1 – 140 MeV/nuc (31 bins)

4.14.2.15 C_H  H counts side C (counts)
Size: 24 time-varying
Energy Bins for H 1 – 35 MeV (24 bins)

4.14.2.16 C_H_Rate  H count rate side C (counts s\(^{-1}\))
Size: 24 time-varying
Energy Bins for H 1 – 35 MeV (24 bins)

4.14.2.17 C_He  He counts side C (counts)
Size: 25 time-varying
Energy Bins for He 1 – 41 MeV/nuc (25 bins)

4.14.2.18 C_He_Rate  He count rate side C (counts s\(^{-1}\))
Size: 25 time-varying
Energy Bins for He 1 – 41 MeV/nuc (25 bins)

4.14.2.19 C_Mg  Mg counts side C (counts)
Size: 27 time-varying
Energy Bins for Mg 1 – 99 MeV/nuc (27 bins)
4.14.2.20  **C_Mg_Rate**  Mg count rate side C (counts s\(^{-1}\))
Size: 27 time-varying
\[\text{particle_flux} \times \text{differential_directional_number_rate}\]
Energy Bins for Mg 1 – 99 MeV/nuc (27 bins)

4.14.2.21  **C_N**  N counts side C (counts)
Size: 25 time-varying
\[\text{particle_flux} \times \text{differential_directional_number_rate}\]
Energy Bins for N 1 – 70 MeV/nuc (25 bins)

4.14.2.22  **C_N_Rate**  N count rate side C (counts s\(^{-1}\))
Size: 25 time-varying
\[\text{particle_flux} \times \text{differential_directional_number_rate}\]
Energy Bins for N 1 – 70 MeV/nuc (25 bins)

4.14.2.23  **C_Na**  Na counts side C (counts)
Size: 27 time-varying
\[\text{particle_flux} \times \text{differential_directional_number_rate}\]
Energy Bins for Na 1 – 99 MeV/nuc (27 bins)

4.14.2.24  **C_Na_Rate**  Na count rate side C (counts s\(^{-1}\))
Size: 27 time-varying
\[\text{particle_flux} \times \text{differential_directional_number_rate}\]
Energy Bins for Na 1 – 99 MeV/nuc (27 bins)

4.14.2.25  **C_Ne**  Ne counts side C (counts)
Size: 27 time-varying
\[\text{particle_flux} \times \text{differential_directional_number_rate}\]
Energy Bins for Ne 1 – 99 MeV/nuc (27 bins)

4.14.2.26  **C_Ne_Rate**  Ne count rate side C (counts s\(^{-1}\))
Size: 27 time-varying
\[\text{particle_flux} \times \text{differential_directional_number_rate}\]
Energy Bins for Ne 1 – 99 MeV/nuc (27 bins)
4.14.2.27  **C\_Ni**  Ni counts side C (counts)
Size: 32 time-varying
particle\_flux>\textit{differential\_directional\_number\_rate}
Energy Bins for Ni 1 – 166 MeV/nuc (32 bins)

4.14.2.28  **C\_Ni\_Rate**  Ni count rate side C (counts s\(^{-1}\))
Size: 32 time-varying
particle\_flux>\textit{differential\_directional\_number\_rate}
Energy Bins for Ni 1 – 166 MeV/nuc (32 bins)

4.14.2.29  **C\_O**  O counts side C (counts)
Size: 26 time-varying
particle\_flux>\textit{differential\_directional\_number\_rate}
Energy Bins for O 1 – 83 MeV/nuc (26 bins)

4.14.2.30  **C\_O\_Rate**  O count rate side C (counts s\(^{-1}\))
Size: 26 time-varying
particle\_flux>\textit{differential\_directional\_number\_rate}
Energy Bins for O 1 – 83 MeV/nuc (26 bins)

4.14.2.31  **C\_S**  S counts side C (counts)
Size: 28 time-varying
particle\_flux>\textit{differential\_directional\_number\_rate}
Energy Bins for S 1 – 117 MeV/nuc (28 bins)

4.14.2.32  **C\_S\_Rate**  S count rate side C (counts s\(^{-1}\))
Size: 28 time-varying
particle\_flux>\textit{differential\_directional\_number\_rate}
Energy Bins for S 1 – 117 MeV/nuc (28 bins)

4.14.2.33  **C\_Si**  Si counts side C (counts)
Size: 28 time-varying
particle\_flux>\textit{differential\_directional\_number\_rate}
Energy Bins for Si 1 – 117 MeV/nuc (28 bins)
4.14.2.34  **C_Si_Rate**  Si count rate side C (counts s⁻¹)
Size: 28 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for Si 1 – 117 MeV/nuc (28 bins)

4.14.2.35  **HCI_Lat**  HCI latitude (degrees)
time-varying
position>latitude

4.14.2.36  **HCI_Lon**  HCI longitude (degrees)
time-varying
position>longitude

4.14.2.37  **HCI_R**  Heliocentric distance (AU)
time-varying
position>radial

4.14.2.38  **HGC_Lat**  HGC latitude (degrees)
time-varying
position>latitude

4.14.2.39  **HGC_Lon**  HGC longitude (degrees)
time-varying
position>longitude

4.14.2.40  **HGC_R**  Heliocentric distance (AU)
time-varying
position>radial
4.14.2.41 LET2_C_HCI  HCI flow direction LET2C
Size: 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.14.2.42 LET2_C_PA  Pitch angle LET2C (degree)
time-varying
position>angle

4.14.2.43 LET2_C_R1_SECT_HCI  HCI flow direction LET2CR1SECT
Size: 9 × 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET2_R1_SECTORS 0 – 8 (9 bins)

4.14.2.44 LET2_C_R1_SECT_PA  Pitch angle LET2CR1SECT (degree)
Size: 9 time-varying
position>angle
LET2_R1_SECTORS 0 – 8 (9 bins)

4.14.2.45 LET2_C_R1_SECT_RTN  RTN flow direction LET2CR1SECT
Size: 9 × 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET2_R1_SECTORS 0 – 8 (9 bins)

4.14.2.46 LET2_C_R1_SECT_SA  Nominal Parker Spiral angle LET2CR1SECT (degree)
Size: 9 time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind
and corotation breakdown at 10Rs.
LET2_R1_SECTORS 0 – 8 (9 bins)

4.14.2.47 LET2_C_R25_SECT_HCI  HCI flow direction LET2CR25SECT
Size: 25 × 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET2_R25_SECTORS 0 – 24 (25 bins)

4.14.2.48 LET2_C_R25_SECT_PA Pitch angle LET2CR25SECT (degree)
Size: 25 time-varying
position>angle
LET2_R25_SECTORS 0 – 24 (25 bins)

4.14.2.49 LET2_C_R25_SECT_RTN RTN flow direction LET2CR25SECT
Size: 25 × 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.
LET2_R25_SECTORS 0 – 24 (25 bins)

4.14.2.50 LET2_C_R25_SECT_SA Nominal Parker Spiral angle LET2CR25SECT (degree)
Size: 25 time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.
LET2_R25_SECTORS 0 – 24 (25 bins)

4.14.2.51 LET2_C_RTN RTN flow direction LET2C
Size: 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.14.2.52 LET2_C_SA Nominal Parker Spiral angle LET2C (degree)
time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.

4.14.2.53 R1C_H_SECT_Rate H sectored count rate R1C (counts s⁻¹)
Size: 1 × 9 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for R1 H SECT 1 – 1 MeV (1 bins)
LET2_R1_SECTORS 0 – 8 (9 bins)

### 4.14.2.54 RIC_He_SECT_Rate
He sectored count rate R1C (counts s$^{-1}$)
Size: 1 × 9 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for R1 He SECT 1 – 1 MeV/nuc (1 bins)
LET2_R1_SECTORS 0 – 8 (9 bins)

### 4.14.2.55 R25C_H_SECT_Rate
H sectored count rate R25C (counts s$^{-1}$)
Size: 3 × 25 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for R25 H SECT 3 – 11 MeV (3 bins)
LET2_R25_SECTORS 0 – 24 (25 bins)

### 4.14.2.56 R25C_He_SECT_Rate
He sectored count rate R25C (counts s$^{-1}$)
Size: 3 × 25 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for R25 He SECT 3 – 11 MeV/nuc (3 bins)
LET2_R25_SECTORS 0 – 24 (25 bins)

### 4.14.3 OTHER SUPPORT

### 4.15 PSP_ISOIS-EPIHI_L2-SECOND-RATES
ISOIS-EPIHI>Integrated Science Investigation of the Sun, Energetic Particle Instrument Hi
L2-second-rates>Level 2 one-second rates
EPI-Hi second rates cdf. Time tags indicate time of collection.
Instrument paper: Integrated Science Investigation of the Sun (ISIS): Design of the Energetic
0059-1
1 minute to 1 hour
Cite McComas et al (2016), doi:10.1007/s11214-014-0059-1

### 4.15.1 PRIMARY VARIABLES

### 4.15.2 OTHER DATA

### 4.15.2.1 HCI_Lat
HCI latitude (degrees)
time-varying
position>latitude

4.15.2.2 **HCI_Lon**  
HCI longitude (degrees)  
time-varying  
position>longitude  

4.15.2.3 **HCI_R**  
Heliocentric distance (AU)  
time-varying  
position>radial  

4.15.2.4 **HET_A_Electrons**  
HET A-side electron rates (counts)  
Size: 3 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for HET Electrons 1 – 3 MeV (3 bins)

4.15.2.5 **HET_A_Electrons_Rate**  
Electrons rate HET A (counts s\(^{-1}\))  
Size: 3 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for HET Electrons 1 – 3 MeV (3 bins)

4.15.2.6 **HET_A_H**  
HET A-side hydrogen rates (counts)  
Size: 2 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for HET H 12 – 23 MeV (2 bins)

4.15.2.7 **HET_A_HCI**  
HCI flow direction HETA  
Size: 3 time-varying  
position>direction  
Unit vector, after Fraenz and Harper, PSS, 2002.

4.15.2.8 **HET_A_H_Rate**  
H rate HET A (counts s\(^{-1}\))  
Size: 2 time-varying
4.15.2.9 HET_A_PA  Pitch angle HETA (degree)
time-varying
position>angle

4.15.2.10 HET_A_RTN  RTN flow direction HETA
Size: 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.15.2.11 HET_A_SA  Nominal Parker Spiral angle HETA (degree)
time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.

4.15.2.12 HET_B_Electrons  HET B-side electron rates (counts)
Size: 3 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for HET Electrons 1 – 3 MeV (3 bins)

4.15.2.13 HET_B_Electrons_Rate  Electrons rate HET B (counts s⁻¹)
Size: 3 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for HET Electrons 1 – 3 MeV (3 bins)

4.15.2.14 HET_B_H  HET B-side hydrogen rates (counts)
Size: 2 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for HET H 12 – 23 MeV (2 bins)
4.15.2.15 HET_B_HCI  HCl flow direction HETB
Size: 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.15.2.16 HET_B_H_Rate  H rate HET B (counts s⁻¹)
Size: 2 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for HET H 12 – 23 MeV (2 bins)

4.15.2.17 HET_B_PA  Pitch angle HETB (degree)
time-varying
position>angle

4.15.2.18 HET_B_RTN  RTN flow direction HETB
Size: 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.15.2.19 HET_B_SA  Nominal Parker Spiral angle HETB (degree)
time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind
and corotation breakdown at 10Rs.

4.15.2.20 HGC_Lat  HGC latitude (degrees)
time-varying
position>latitude

4.15.2.21 HGC_Lon  HGC longitude (degrees)
time-varying
position>longitude
4.15.2.22 **HGC_R**  Heliocentric distance (AU)
time-varying
position>radial

4.15.2.23 **LET1_A_Electrons**  LET1 A-side electron rates (counts)
Size: 2 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for LET Electrons 1 – 1 MeV (2 bins)

4.15.2.24 **LET1_A_Electrons_Rate**  Electrons rate LET1 A (counts s⁻¹)
Size: 2 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for LET Electrons 1 – 1 MeV (2 bins)

4.15.2.25 **LET1_A_H**  LET1 A-side hydrogen rates (counts)
Size: 3 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for LET H 2 – 10 MeV (3 bins)

4.15.2.26 **LET1_A_HCI**  HCI flow direction LET1A
Size: 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.15.2.27 **LET1_A_H_Rate**  H rate LET1 A (counts s⁻¹)
Size: 3 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for LET H 2 – 10 MeV (3 bins)

4.15.2.28 **LET1_A_PA**  Pitch angle LET1A (degree)
time-varying
position>angle
4.15.2.29 LET1_A_RTN  RTN flow direction LET1A
SIZE: 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.15.2.30 LET1_A_SA  Nominal Parker Spiral angle LET1A (degree)
time-varying
position>angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind
and corotation breakdown at 10Rs.

4.15.2.31 LET1_B_Electrons  LET1 B-side electron rates (counts)
SIZE: 2 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for LET Electrons 1 – 1 MeV (2 bins)

4.15.2.32 LET1_B_Electrons_Rate  Electrons rate LET1 B (counts s⁻¹)
SIZE: 2 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for LET Electrons 1 – 1 MeV (2 bins)

4.15.2.33 LET1_B_H  LET1 B-side hydrogen rates (counts)
SIZE: 3 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for LET H 2 – 10 MeV (3 bins)

4.15.2.34 LET1_B_HCI  HCI flow direction LET1B
SIZE: 3 time-varying
position>direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.15.2.35 LET1_B_H_Rate  H rate LET1 B (counts s⁻¹)
SIZE: 3 time-varying
particle_flux>differential_directional_number_rate
Energy Bins for LET H 2 – 10 MeV (3 bins)
4.15.2.36  LET1_B_PA  Pitch angle LET1B (degree)  
time-varying  
position>angle

4.15.2.37  LET1_B_RTN  RTN flow direction LET1B  
Size: 3 time-varying  
position>direction  
Unit vector, after Fraenz and Harper, PSS, 2002.

4.15.2.38  LET1_B_SA  Nominal Parker Spiral angle LET1B (degree)  
time-varying  
position>angle  
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.

4.15.2.39  LET2_C_Electrons  LET2 C-side electron rates (counts)  
Size: 2 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for LET Electrons 1 – 1 MeV (2 bins)

4.15.2.40  LET2_C_Electrons_Rate  Electrons rate LET2 C (counts s⁻¹)  
Size: 2 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for LET Electrons 1 – 1 MeV (2 bins)

4.15.2.41  LET2_C_H  LET2 C-side hydrogen rates (counts)  
Size: 3 time-varying  
particle_flux>differential_directional_number_rate  
Energy Bins for LET H 2 – 10 MeV (3 bins)

4.15.2.42  LET2_C_HCI  HCI flow direction LET2C  
Size: 3 time-varying  
position>direction  
Unit vector, after Fraenz and Harper, PSS, 2002.
4.15.2.43 LET2_C_H_Rate  H rate LET2 C (counts s\(^{-1}\))
Size: 3 time-varying
particle_flux\(\rightarrow\)differential_directional_number_rate
Energy Bins for LET H 2 – 10 MeV (3 bins)

4.15.2.44 LET2_C_PA  Pitch angle LET2C (degree)
time-varying
position\(\rightarrow\)angle

4.15.2.45 LET2_C_RTN  RTN flow direction LET2C
Size: 3 time-varying
position\(\rightarrow\)direction
Unit vector, after Fraenz and Harper, PSS, 2002.

4.15.2.46 LET2_C_SA  Nominal Parker Spiral angle LET2C (degree)
time-varying
position\(\rightarrow\)angle
Angle between particle direction and nominal outward Parker Spiral, based on 400km/s solar wind and corotation breakdown at 10Rs.

4.15.3 OTHER SUPPORT

4.16 PSP_ISOIS_L2-EPHEM

ISOIS\(\rightarrow\)Integrated Science Investigation of the Sun
L2-ephem\(\rightarrow\)Level 2 ephem
1 minute to 1 hour
Cite McComas et al (2016), doi:10.1007/s11214-014-0059-1

4.16.1 PRIMARY VARIABLES

4.16.2 OTHER DATA

4.16.2.1 Clock_Angle  angle of off-pointing from ecliptic north when not in encounter (degrees)
time-varying
position\(\rightarrow\)angle
Angle (around +R axis) between SC +Z projected into the TN plane and +N axis. Nominally zero (roughly ecliptic north). Ascends CCW (right-handed) despite the name, so positive values are toward -T (opposite ram) and negative towards +T (into ram). Undefined (fill) if Sun Angle is small.

4.16.2.2 HCl_Lat  HCI latitude (degrees)
    time-varying
    position>latitude

4.16.2.3 HCl_Lon  HCI longitude (degrees)
    time-varying
    position>longitude

4.16.2.4 HCl_R  Heliocentric distance (AU)
    time-varying
    position>radial

4.16.2.5 HGC_Lat  HGC latitude (degrees)
    time-varying
    position>latitude

4.16.2.6 HGC_Lon  HGC longitude (degrees)
    time-varying
    position>longitude

4.16.2.7 HGC_R  Heliocentric distance (AU)
    time-varying
    position>radial
4.16.2.8 Ram_Pointing  Spacecraft is ram pointing
time-varying
flag>status
1 if roll angle is small, and either sun angle or clock angle are small (pointing into ram).

4.16.2.9 Roll_Angle  Angle between nominal ram and actual ram, 0 in encounter (degrees)
time-varying
position>angle
Angle between s/c +X and RTN +T. Positive if s/c +X is towards +N (roughly ecliptic north); right-handed in RTN.

4.16.2.10 Spiral_HETA  HETA look angle with nominal parker spiral (degrees)
time-varying
position>angle
Angle between +Z HETA frame and nominal parker spiral assuming constant 400 km/s solar wind speed and a corotation boundary of 20 solar radii

4.16.2.11 Spiral_LET1A  LET1A look angle with nominal parker spiral (degrees)
time-varying
position>angle
Angle between +Z LET1A frame and nominal parker spiral assuming constant 400 km/s solar wind speed and a corotation boundary of 20 solar radii

4.16.2.12 Spiral_LET2C  LET2C look angle with nominal parker spiral (degrees)
time-varying
position>angle
Angle between +Z LET2C frame and nominal parker spiral assuming constant 400 km/s solar wind speed and a corotation boundary of 20 solar radii

4.16.2.13 Spiral.Lo  Lo look angle with nominal parker spiral (degrees)
time-varying
position>angle
Angle between +Z Lo frame (look directions x9) and nominal parker spiral assuming constant 400 km/s solar wind speed and a corotation boundary of 20 solar radii
4.16.2.14 Sun_Angle Angle between TPS and Sun, 0 in encounter (degrees)
time-varying
position>angle
Angle between s/c +Z and RTN -R. Always positive.

4.16.2.15 Umbra_Pointing Spacecraft is umbra pointing
time-varying
flag>status
1 (nominal for encounter) if Sun angle = 0 else 0

4.16.3 OTHER SUPPORT

4.17 PSP_ISOIS_L2-SUMMARY
ISOIS>Integrated Science Investigation of the Sun
L2-Summary>level 2 summary
EPI-Hi HET 3600 second rates cdf. Time tags indicate midpoint of integration.
Instrument paper: Integrated Science Investigation of the Sun (ISIS): Design of the Energetic
0059-1
EPI-Hi 3600 seconds rates cdf. Time tags indicate midpoint of integration.
EPI-Lo, Ion Composition mode.
EPI-Lo, Particle Energy mode.
1 minute to 1 hour
Cite McComas et al (2016), doi:10.1007/s11214-014-0059-1

4.17.1 PRIMARY VARIABLES

4.17.2 OTHER DATA

4.17.2.1 A_H_Rate_TS H count rate side A 2-10MeV (counts s⁻¹)
time-varying
particle_flux>differential_directional_number_rate

4.17.2.2 A_Heavy_Rate_TS Heavy (6<=z<=28) ion count rate side A 4-40 MeV/nuc
(counts s⁻¹)
time-varying
particle_flux>differential_directional_number_rate

4.17.2.3 Electron_CountRate_ChanE Electron count rate channel E (HiResElectrons)
(counts/sec)
Size: 48 time-varying
particle_flux>differential_directional_number_rate
Particle Energy mode. Corrected for deadtime. May contain substantial non-electron background.
Electron_ChannelE_Energy 130 – 9079 keV (32 bins)

4.17.2.4  **HET_A_Electrons_Rate_TS**  HET Electrons count rate side A 1-5MeV (counts s$$^{-1}$$)
time-varying
particle_flux>differential_directional_number_rate

4.17.2.5  **HET_A_H_Rate_TS**  HET H count rate side A 10-50MeV (counts s$$^{-1}$$)
time-varying
particle_flux>differential_directional_number_rate

4.17.2.6  **H_CountRate_ChannelP_SP**  H count rate channel P (HiResProtons) (counts/sec)
Size: 48 time-varying
particle_flux>differential_directional_number_rate
Ion Composition mode. Corrected for deadtime.
H_ChannelP_Energy 50 – 8063 keV (41 bins)

4.17.3  **OTHER SUPPORT**
5 EPI-LO DECODER RING

We have produced a summary of the EPI-Lo data called the EPI-Lo Channel Definition “crib sheet”. The intent is to guide the user from a description of physical measurements to specific data products. Note that this relationship is time dependent and Figure 4 only applies during the first eight orbits (launch until 14 June 2021, LUT Regime Index = 6). The time dependence is due to instrument configuration changes (e.g., changing definitions of species and energy bins due to adjustment to lookup tables or LUTs) and unplanned changes (e.g., sensitivity variations or background increase due to dust impacts admitting more light).

The lookup tables were adjusted on 14 June 2021 and were updated to adjust box locations for species and Figure 5 reflects the updates.

The upper table in Figure 5 references only data products that include time-of-flight TOF measurements and the lower table references only measurements that employ the energy/solid state detector (SSD) system. Both have the same columns. The Mode identifies one of four instrument modes: Ion Composition (IC), Particle Composition (PC), Ion Energy (IE) or Particle Energy (PE), (PC and IE are not included in Release 1) which relate to the types of measurements made. The instrument can cycle through up to eight different mode intervals (slots) per second. Typically the slot pattern covers all four modes in an alternating pattern (e.g., IC,PE,IC,IE,IC,PE,IC,PC). The next column is the channel/rate name and the associated mnemonic. Different channels can measure multiple types of particles, so it is useful to provide a non-descriptive, but memorable, name for the different data products to help avoid confusion like “During this period the Electron data are mostly protons” in favor of “During this period the [E] rates are mostly protons. The mnemonic and associated system is based largely on what we expect to see in each the given channel (e.g., [E] for electrons). The next column provides the official, descriptive label for each data type. The Channel ID provides the useful range and naming of individual channels associated with each data type or subgroup thereof. Species mass provides the species or type (or alternate information). The energy range associated with the channel ID list is given in keV and MeV/nuc (where applicable). The CDF data file needed to study the particles described on a given row are in the Logical Source. Within each file the variable name is given for physical units and counting rate. Finally, there are miscellaneous notes on each row in the last column. See Release Notes on details for variables and calibrated data products.
### PSP / ISOIS / EPI-Lo Rate Channel Definitions

**LUT Regime Index 0 to 5**

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<th>E (MeV/nuc)</th>
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<th>Variable</th>
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### PSP / ISOIS / EPI-Lo Rate Channel Definitions

**LUT Regime Index 0 to 5**

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### PSP / ISOIS / EPI-Lo Rate Channel Definitions

**LUT Regime Index 0 to 5**

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### PSP / IS0IS / EPI-Lo Rate Channel Definitions

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#### Comments

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- background box
- high gain, no comp.
- low gain, no comp.
- null

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### PSP / IS0IS / EPI-Lo Rate Channel Definitions

#### LUT Regime Index 6 to TBD

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#### Comments

- low gain, no comp.
6 ACRONYMS

For detailed information on the various coordinate systems, refer to Franz and Harper (2002).

**ApID:** Application Identifier  
**EPI-Lo:** Energetic Particle Instrument - Low Energy  
**EPI-Hi:** Energetic Particle - High Energy  
**FOV:** Field of View  
**GSE:** Geocentric Solar Ecliptic  
**GSM:** Geocentric Solar Magnetospheric  
**HGC:** Heliographic Coordinates  
**HAE:** Heliocentric Aries Ecliptic  
**HCI:** Heliocentric Inertial  
**HEE:** Heliocentric Earth Ecliptic  
**HEEQ:** Heliocentric Earth Equatorial  
**IC:** Ion Composition  
**IE:** Ion Energy  
**IS⊙IS:** Integrated Science Investigations of the Sun  
**PC:** Particle Composition  
**PE:** Particle Energy  
**PSP:** Parker Solar Probe  
**RTN:** Heliocentric  
**TAI:** International Atomic Time, defined by SI seconds  
**TOF:** Time of Flight  
**TPS:** Thermal Protection System  
**UTC:** Coordinated Universal Time

REFERENCES


