

PEPE CODMAC level 2 data format  
(F.Crary, 13 JAN 02)

There will be one file per product, per day. The file shall contain measurements which begin between 00:00:00 on that day and 00:00:00 on the following day (SCET). Measurement numbers will be the same for all data products, i.e. if a measurement of ELC data is missing, the measurement numbers in the ELC file will skip the appropriate number.

The files will be flat, binary data, with a fixed series of values repeated as many times as necessary. This format only describes the data products generated during and around the encounter with P/19 Borrelly.

File names are of the form xxxyyddd.dat where

|     |   |     |                           |
|-----|---|-----|---------------------------|
| xxx | = | elc | Electron data             |
|     |   | hsk | Housekeeping data         |
|     |   | ion | Ion singles data          |
|     |   | log | Ion logicals data         |
|     |   | mq  | Ion mass over charge data |
|     |   | tof | Ion time of flight data   |
| yy  | = | 01  | Year                      |
| ddd | = |     | Day of year               |

Electron data are the flux of electrons as a function of energy and angle.

Housekeeping data are selected housekeeping values of use in analysis of the PEPE data.

Ion singles are the flux of all ions as a function of energy and angle. (In terms of instrument operations, these are the number of start counts in the time of flight system, regardless of the ion's time of flight, or even whether or not a valid stop signal was measured.)

Ion mass over charge data are the flux of selected ions as a function of energy and angle. The ions are selected on the basis of time of flight (i.e. composition) For example, the MQ 0 data are the energy/angle spectra of all proton. The 15 MQ bins have a one-to-one correspondence to time of flight, but not necessarily to species (e.g. most of the counts in MQ bin 1 are He<sup>++</sup>, but some protons also fall into the MQ 1 time of flight bin.)

TOF spectra are the flux of ions as a function of time of flight (related to composition) and summed over all energies and angles.

All integers are unsigned

Electron (elc\*) data format:

| <i>Name</i>        | <i>Type</i> | <i>Length</i> | <i>Description</i>                   |
|--------------------|-------------|---------------|--------------------------------------|
| Measurement number | Integer     | 16            | Measurement number from start of day |

| <i>Name</i>     | <i>Type</i> | <i>Length</i> | <i>Description</i>                      |
|-----------------|-------------|---------------|---|
| Time            | Integer     | 32            | Measurement start time, sec. from J2000 |
| Offset time     | Integer     | 16            | Seconds from start of measurement       |
| Energy Step     | Integer     | 16            | Energy step number                      |
| Elevation Step  | Integer     | 16            | Elevation step number                   |
| Data, Azimuth 1 | Integer     | 16            | Counts in azimuth 1                     |
| Data, Azimuth 2 | Integer     | 16            | Counts in azimuth 2                     |
| Data, Azimuth 3 | Integer     | 16            | Counts in azimuth 3                     |
| Data, Azimuth 4 | Integer     | 16            | Counts in azimuth 4                     |

There are 144 bits per row and 256 rows per measurement

Ion singles (ion\*) data format:

| <i>Name</i>        | <i>Type</i> | <i>Length</i> | <i>Description</i>                      |
|--------------------|-------------|---------------|---|
| Measurement number | Integer     | 16            | Measurement number from start of day    |
| Time               | Integer     | 32            | Measurement start time, sec. from J2000 |
| Offset time        | Integer     | 16            | Seconds from start of measurement       |
| Energy Step        | Integer     | 16            | Energy step number                      |
| Elevation Step     | Integer     | 16            | Elevation step number                   |
| Data, Azimuth 1    | Integer     | 16            | Counts in azimuth 1                     |
| Data, Azimuth 2    | Integer     | 16            | Counts in azimuth 2                     |
| Data, Azimuth 3    | Integer     | 16            | Counts in azimuth 3                     |
| Data, Azimuth 4    | Integer     | 16            | Counts in azimuth 4                     |
| Data, Azimuth 5    | Integer     | 16            | Counts in azimuth 5                     |
| Data, Azimuth 6    | Integer     | 16            | Counts in azimuth 6                     |
| Data, Azimuth 7    | Integer     | 16            | Counts in azimuth 7                     |
| Data, Azimuth 8    | Integer     | 16            | Counts in azimuth 8                     |

There are 208 bits per row and 512 rows per measurement

Logicals (LOG) data format:

| <i>Name</i>         | <i>Type</i> | <i>Length</i> | <i>Description</i>                      |
|---------------------|-------------|---------------|---|
| Measurement number  | Integer     | 16            | Measurement number from start of day    |
| Time                | Integer     | 32            | Measurement start time, sec. from J2000 |
| Offset time         | Integer     | 16            | Seconds from start of measurement       |
| Energy Step         | Integer     | 16            | Energy step number                      |
| Elevation Step      | Integer     | 16            | Elevation step number                   |
| Data, Coarse starts | Integer     | 16            | Start counts in coarse azimuths         |
| Data, Fine starts   | Integer     | 16            | Start counts in fine azimuths           |
| Data, Stops         | Integer     | 16            | Stop counts                             |
| Data, Resets        | Integer     | 16            | Resets                                  |

There are 144 bits per row and 128 rows per measurement

Mass over charge (MQ) data format:

| <i>Name</i>        | <i>Type</i> | <i>Length</i> | <i>Description</i>                   |
|--------------------|-------------|---------------|--------------------------------------|
| Measurement number | Integer     | 16            | Measurement number from start of day |

| <i>Name</i>      | <i>Type</i> | <i>Length</i> | <i>Description</i>                      |
|------------------|-------------|---------------|---|
| Time             | Integer     | 32            | Measurement start time, sec. from J2000 |
| Offset time      | Integer     | 16            | Seconds from start of measurement       |
| Energy Step      | Integer     | 16            | Energy step number                      |
| Data, M/Q bin 0  | Integer     | 16            | Counts in M/Q bin 0                     |
| Data, M/Q bin 1  | Integer     | 16            | Counts in M/Q bin 1                     |
| Data, M/Q bin 2  | Integer     | 16            | Counts in M/Q bin 2                     |
| Data, M/Q bin 3  | Integer     | 16            | Counts in M/Q bin 3                     |
| Data, M/Q bin 4  | Integer     | 16            | Counts in M/Q bin 4                     |
| Data, M/Q bin 5  | Integer     | 16            | Counts in M/Q bin 5                     |
| Data, M/Q bin 6  | Integer     | 16            | Counts in M/Q bin 6                     |
| Data, M/Q bin 7  | Integer     | 16            | Counts in M/Q bin 7                     |
| Data, M/Q bin 8  | Integer     | 16            | Counts in M/Q bin 8                     |
| Data, M/Q bin 9  | Integer     | 16            | Counts in M/Q bin 9                     |
| Data, M/Q bin 10 | Integer     | 16            | Counts in M/Q bin 10                    |
| Data, M/Q bin 11 | Integer     | 16            | Counts in M/Q bin 11                    |
| Data, M/Q bin 12 | Integer     | 16            | Counts in M/Q bin 12                    |
| Data, M/Q bin 13 | Integer     | 16            | Counts in M/Q bin 13                    |
| Data, M/Q bin 14 | Integer     | 16            | Counts in M/Q bin 14                    |

There are 312 bits per row and 64 rows per measurement

Time of flight (TOF) data format:

| <i>Name</i>        | <i>Type</i> | <i>Length</i> | <i>Description</i>                      |
|--------------------|-------------|---------------|---|
| Measurement number | Integer     | 16            | Measurement number from start of day    |
| Time               | Integer     | 32            | Measurement start time, sec. from J2000 |
| Data, bin 0        | Integer     | 16            | Counts in TOF bin 0                     |
| Data, bin 1        | Integer     | 16            | Counts in TOF bin 1                     |
| ...                |             |               |   |
| Data, bin 1023     | Integer     | 16            | Counts in TOF bin 1023                  |

There are 16432 bits per row and one row per measurement

Housekeeping (HSK) data format: (Data files TBS)

| <i>Name</i>        | <i>Type</i> | <i>Length</i> | <i>Description</i>   |
|--------------------|-------------|---------------|--|
| Measurement number | Integer     | 16            | Measurement number from start of day   |
| Time               | Integer     | 32            | Measurement start time, sec. from J2000  |
| Time               | Integer     | 32            | Measurement start time, SCLK   |
| Integration time   | Integer     | 16            | Integration time per sample, multiples of 28.62 ms (legal values are 1, 10 and 20) |
| SC_IPS             | Integer     | 16            | Ion propulsion system thrust level, [1/10 mN]                                      |
| SC_RSC_SUM         | Integer     | 16            | RSC thruster on time, [1/16 sec]   |
| SC_SUN_AZ          | Integer     | 16            | Sun azimuth, s/c coordinates [deg]   |
| SC_SUN_EL          | Integer     | 16            | Sun elevation, s/c coordinates [deg]   |
| ION_HIST_MOD       | Integer     | 8             | TBS  |
| ION_HIST_PK        | Integer     | 8             | TBS  |

| <i>Name</i>  | <i>Type</i> | <i>Length</i> | <i>Description</i> |
|--------------|-------------|---------------|--------------------|
| ION_HIST_DMD | Integer     | 8             | TBS                |
| ION_HIST_DPK | Integer     | 8             | TBS                |

192 bits/measurement, 1507 measurements in the encounter data set