MPPE LEP HEP Data Meeting Memo

**11 November 2016 1030-1700**

 **@ ISAS 5F Meeting Room (Room No. 1537)**

**1) Confirm agreements @ previous LEP Meetings**

(1) Definition of Level0-3 data

Level 0 Data

almost raw data (equivalent to “data dump” using QL: SDTP packet is decoded and header is removed) all the information are included

“without internet access, all the higher level data can be made with this data”

not to be registered to MMO working archive

Level 1 Data : to be released within TBD days after receiving data

made from LVL0 data

de-compressed & decoded data

remove error data -> ex. Checksum error/ automatic correction

multiple files

not efficiency corrected, not background corrected

**CDF format data -> to be registered to MMO working archive**

can be used for initial data analysis but not for publication

Level-1 CDF and Level-2 CDF files can have different format.

ex. Level1: integer Level2: floating point

 Level1: FOV direction Level2: channel sector remapped data

but preferably be as close as possible…

Level 2 Data

made from LVL1 data

calibrated data (it takes some time to provide)

count data (further processed from Level1 Data) + separate efficiency table

back-ground corrected data (UV contamination / background noise etc.)

“efficiency corrected velocity moment” or “ efficiency not corrected velocity moment + separate efficiency table”

velocity moment calculated from 3D data

CDF format data -> to be registered to MMO working archive

to be used for data analysis and publication

differential number flux, differential energy flux, phase space density are added (T.B.C. is approved depending on the version of Level 2 data)

Pitch angle distribution data (at least MEA)

Level 3 Data

higher level data ex. Ion Species – Location Map etc.

cross-calibrated data (ex, HEP+ MEA MIA MSA , MIA <-> MSA )

(2) MEA/MIA/MSA/HEP　will have data storage for internal use (starting from MEA1, MEA2, MIA, MSA, HEP to be added ENA).

ISAS, IRAP, LPP, and MPS will have the same MEA1, MEA2, MIA, MSA data. The generated data files are copied every T.B.D. days.

ISAS is responsible for making MIA data files, registering CDF files to MMO working archive. Possibly MGF data will be provided from ISAS??

IRAP is responsible for making MEA1, MEA2 data files, registering CDF files to MMO working archive .

LPP/MPS are responsible for making MSA data files, registering CDF files to MMO working archive.

ISAS/Takashima-san is responsible for making HEP data files, registering CDF file to MMO working archive.

Note:

1. MMO working archive: managed by MMO project / archive will be somewhere in ISAS
2. MMO-MPPE internal data storage @ each participating institute

(2) CDF　Data Format of L1 Data

CDF　file name?

Ex. Bepi\_mmo\_level\_mppe\_instrument\_productname\_YYMMDD

(may be automatically generated from Global Attribute information)

MPPE-LEP preference : 1 file/ 1 Earth day (easy to compare MMO-MPO)

separate file for each data products/rate (possible grouping is considered)

<HK data>

1. User HK 128bytes + MDP Software HK (MEA ~50bytes MSA~0 MIA~30)

AI-20161111-1

MPPE will request User HK every 10/20minutes

(In case of emergency or special events higher rate is necessary.)

2) 20bytes HK: system HK to be provided every 4s/8s etc.

3) mission data HK: each group is responsible for these HKs

separate file: all bits will be decoded for self-explanatory

It is allowed to make Level-2 HK data (analogue HK data are converted to physical value) without creating Level-1 HK data.

in data cdf files: limited information is included

 ~~Ex. mode etc.~~

~~Mode information -> Global Attribute~~

SunPulse: Obs. Start time

TI 4bytes+2bytes or converted total msec/day

IF we can decide the definition of EPOCH

 EPOCH is the same time as sun pulse (converted to real time)

EPOCH: TT2000

CDF\_file variables from the beginning:

1)EPOCH TT2000

2) Unix\_time : CDF\_CHAR 1dim 128/256

3) Sunpulse : TI 4bytes+2bytes or ex. converted total\_msec

4) some additional information

 quality flag: definition will be made in the future

5) data

 count data

 COUNT[instrument CH][spin\_sector][energy]

 COUNT[view direction/pich angle][energy]

 COUNT[energy][TOF]

 event data (MSA)

 EVENT M-mode

A(without event) or E(with event) can be selected

Velocity moment:

 Converted to physical value: RELA4

 Density (mass included for MSA)

 nV (mass included for MSA)

 P (mass included for MSA)

 (not calculate fluid moments for LEVEL1)

**2) CDF file format proposal from LPP (Bruno-san)**

32 cdf files -> it may be necessary to consider further grouping

L-mode data -> to be divided into multiple CDF files

Variable Attributes: to be added in the near future

**3) CDF file format proposal from IRAP**

**2HSK + 5 L-mode +5 M-mode +2 H-mode +2 moments = 16 CDF files**

**(2HSK data sets : MEA1 and MEA2)**

**moments: Both M-mode and L-mode data are included.**

**Fixed FOV direction information:**

**Energy Step information**

**G-factor information**

 **Preferably Common to MEA, MIA, MSA, and HEP**

**Necessary Variable Attributes(from MEA team’s experience):**

1. DEPEND\_i (in case of C order=raw majority)

(DEPEND\_0 EPOCH

 DEPEND\_1 Channel

 DEPEND\_2 Sector

 DEPEND\_3 Energy)

1. DELTA\_PLUS/MINUS
2. REFERENCE\_FRAME
3. UNITS
4. SI\_CONVERSION : conversion factor from SI-unit

NOTE: these variable attributes are necessary in addition to ISTP mandatory variable attributes

**Count Data**

Array (example)

 Dims 3

 Dim Sizes [8(channel) 16(sector) 32(energy)]

**In case of angle mapping mode, this definition cannot be used.**

AI-20161111-2

LPP will send MSA’s Count Mapping explanation to IRAP. IRAP will propose how to define Variable Attribute for angle mapping mode data.

(One of the solutions may be to re-construct (channel)-(sector)-(energy) data from mapped angle data. Another solution may be Dims 2 Dim Sizes [36(fov) 32(energy)]

Array: MPPE’s BASELINE: Raw Majority C order

<C-order = Raw Majority>

Count [anode] [sector] [enegy]

 DEPEND-1 DEPEND-2 DEPEND-3

<Fortran-order = Column Majority>

**4) HEP data (Hirahara-san)**

Explanation of the HEP data products.

SSD mode: 3 dims

2 angular directions 1 energy

TOF mode: 3dims

2 angular directions 1 TOF

**5) Others**

**Time TAG**

1. EPOCH: TT2000 mandatory

TT2000: leap second is taken into account

1. Sun-pulse: TI 4bytes+2bytes CDF UINT4
2. Time Stamp(UNIX) CDF CHARACTER 128

AI-20161111-3

ISAS will ask Markus-san the definition of “CDF CHARACTER Unix Time” and if it is usueful / necessary.

AI-20161111-4

ISAS will ask Bijorn-san what is the output timing of MSA’s “TI4bytes+2bytes(time elapsed since last sun pulse)” in mission packet.

AI-20161111-5

ISAS will CHECK the definition of TI +2bytes described on the design document and send the documents to all the team.

**Quality Flag**Quality flag: necessary zVariable 1byte

The detailed usage will be considered in the future.

 Ex. intermediate data between mode change->can be automatically set

 Scientific evaluation -> difficult to be automatically set

**6) Action Item Status**

AI-20160519-1

Bruno-san will make draft Level1 CDF skelton file and send it to MIA, and MEA teams. Due: E. August

-> CLOSE

<MPPE MODE>

AI-20150415-13

Consider how to use MSA Table E for M-mode data. If additional macro command is necessary, one of the MSA macro commands may be converted to MPPE mode change macro command. -> CLOSE

MSA will use 2 macro commands:

1. Initiate MSA & threshold setup
2. MCP check

Table E: ration of event stream increases

Event stream: used for magnetospheric science

Changing to table-E mode requires 2 commnads. They will be put into one of the MPPE macro commands (one of the 5 MPPE macro-commands) or use two discrete commands.

AI-20150911-1

MSA team will send ISAS the information about 2 MSA macro-commands and commands to change to / recover from table-E mode. -> CLOSE (not necessary: current Mactro Command is OK. For this only two commands are necessary.)

AI-20150415-1

ISAS will send “MPPE DATA MODE ver 2.00 20150413 (After 2nd Integration Test@ISAS)” to MEA/MIA/MSA teams. -> CLOSE

AI-20150415-2

MEA/MSA/MIA teams will check the contents of “MPPE DATA MODE ver 2.00 20150413 (After 2nd Integration Test@ISAS)” and send comments to ISAS by 15 May. -> CLOSE

AI-20150911-2

Y. Saito will start talking with SERENA team in order to mutually understand the operation / data mode. -> CLOSE(MPPE has started talking SERENA at HEWG meeting @ Rovaniemi (submitted data/operation information with other instruments on MMO))

<Data Management>

AI-20150415-3

MSA will test download data from ISAS data server using SDTP.

IRAP will help. -> CLOSE

AI-20150415-4

Level0 data format will be decided by negotiation between ISAS and IRAP.I RAP will transfer the information to LPP.

-> CHANGED to new AI (AI-20161111-6)

AI-20161111-6

Level0 data format will be decided by negotiation between ISAS/IRAP/LPP.

ISAS made a header file to make MIA Level0 data The detail of the data format (including the necessity of the common information) will be determined through the comparison of CDF skeleton file between the teams.

AI-20150415-5

ISAS will check the requirement on CDF data format (relating with the future conversion to PDS 4.0). -> CLOSE

<status>

Conversion from CDF to PDS4 will be automatically made by a conversion

software, that imposes some limitations on the CDF format. Therefore CDF

should not be made freely.

The structure of CDF should be simple.

Simple time series 2D or 3D data are preferable.

(In this sense, there will be no problem with magnetic field, velocity

moments.

There will be some problem with energy spectra of ions/electrons, when

(for example) energy step number, FOV resolution, observation timing etc.

will change depending on the observation(data) modes.

One possibility is to prepare all the data format into one CDF and put

invalid data to the data for unused data mode or prepare multiple CDF

files (one CDF for each observation(data) mode).

The detail of the CDF->PDS conversion limitation will be informed in the

near future.

AI-20150415-6

IRAP will make proposal about the CDF data format. Based on the information and negotiation between IRAP/ISAS/LPP, the detailed CDF data format will be decided. (MEA, MIA, MSA CDF file format should be similar.) -> CLOSE (Change to a new AI)

Based on the information (two files concerning the requirements to be compatible with PDS4.0; MMS CDF format specification) and the requirements to be compatible with “auto-plot”/SPEDAS, MEA, MIA, MSA teams will make CDF skeleton file for Level1 data and compare / modify the skeleton file. Comparison will star from MSA<-> MIA (CDF file for ion data should have much similarity), then MSA/MIA <-> MEA.

AI-20150911-3

MEA team will circulate MMS CDF format specification document to MSA(LPP), MIA(ISAS). -> CLOSE (each team has the document)

AI-20150911-4

Based on the information (two files concerning the requirements to be compatible with PDS4.0; MMS CDF format specification) and the requirements to be compatible with “auto-plot”/SPEDAS, MEA, MIA, MSA teams will make CDF skeleton file for Level1 data and compare / modify the skeleton file. Comparison will start from MSA<-> MIA (CDF file for ion data should have much similarity: within ~4 months), then MSA/MIA <-> MEA (by next LEP meeting in April 2016).

-> OPEN (20161111: started comparison between MEA<->MSA <-> MIA)

AI-20150415-7

ISAS will talk with MGF team about inclusion of MGF data in the “data storage for internal use”. Low time resolution / direction only data will also be OK if the full resolution data is difficult.

-> OPEN

(not started talking with MGF PI) : Y.Saito talked with A. Matsuoka (Co-PI of MGF) There will be no problem but official request should be sent to the MGF PI in the future. (20161111: the request has not been sent yet)

AI-20150415-8

TI <-> real time conversion is better to be common to MEA/MIA/MSA.

Need further discussion at MMO SWG.

-> OPEN (20161111: Y. Saito mentioned this point @ MMO SWG in September 2016.)

<ESTEC TEST>

AI-20150415-9

ISAS will send the participants information to MMO project by 17 April. -> CLOSE

<Initial Check>

AI-20150415-10

MSA team will send HV & LV initial check plan to ISAS by 22 April. -> CLOSE

AI-20150415-11

MEA team will send LV initial check plan to ISAS by 22 April. -> CLOSE

The HV initial check procedure should take into account the data block loss (due to the clock timing difference between MPO and MMO). If data block loss is found, it is necessary to wait for about 30minuts.

MEA will revise HV initial check procedure in order to reduce the risk of high voltage discharge.

In order to reduce the risk of high voltage discharge during the initial high voltage check, high voltage should be powered on with low voltage (in order to heat up and outgass) for some time before start raising high voltage.

AI-20150911-6

MEA will revise HV initial check procedure in order to reduce the risk of high voltage discharge. MEA team will send ISAS revised HV initial check procedure by around 20 Sep 2015. -> OPEN

AI-20150911-6

Each team will check the agreed definition of the Level0-3 data. The definition can be modifies/improved in the future. -> CLOSE

<Others>

AI-20150415-12

MEA MIA and MSA teams will have next data management meeting at SWT meeting in September 2015. -> CLOSE

AI-20160519-2

MPPE’s Science Target Document@proposal will be revised. ISAS will initiate the revision process. Revision should be finished by next MPPE tutorial @ SWT Italy,

* OPEN

(20161111: The output of the young scientists’ activity will be included as a part of this document. Nishino-san is participating to this activity from MPPE.)

AI-20161111-7

ISAS will ask SWT tutorial coordinator not to consider MPPE as a single instrument team but as a large instrument consortium. At least ~ One Hour is necessary.

AI-20161111-8

ISAS will inform MMO project that MEA will upload revised sensitivity table to MDP at the similar time when MSA CPU program and MIA velocity moment calculation table are uploaded. MEA will also upload HV table to MEA’s RAM at the time of testing unsent commands.

AI-20160519-3

MPPE data -> CDPP@IRAP will be considered @SWG meeting in fall 2016

* CLOSE (20161111 Y. Saito raised this point @ SWG in September 2016.)
1. **Next LHEP meeting ?**

Twice / year : baseline

During SWT@Toulouse 2 June 2017

October – June – October is irregular … to be considered another between October and June…