IMP8 Data Processing Documentation

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Project Background Information

APL has been processing IMP8 data since the spacecraft launch in 1973. Over the years the processing procedures have changed many times due to resources available and technological advances.

Initially CPME data processing was performed on an IBM 360 system located at Goddard Space Flight Center (GSFC). The EPE data processing was performed on an IBM clone located in Boulder, Colorado.

In 1990 APL software personnel converted the CPME processing so that all processing could be performed on the APLSP VAX/VMS cluster.

In 1993 the EPE processing performed by Boulder, Colorado was turned over to APL for processing on the APLSP VAX/VMS cluster.

In 1998 APL software personnel modified both the CPME and EPE software so that nine track tapes were no longer used for processing of the data. The data is now processed using online disk files, and instead of archiving the nine track tapes, data are archived to recordable compact disk.

Processing of the IMP8 data set

Retrieving Raw Satellite Data

The IMP8 satellite data processing starts with the retrieval of the raw satellite data from (GSFC). GSFC provides us with data for both the Charged Particle Measurement Experiment (CPME) and the Energetic Particle Experiment (EPE).

The IMP8 satellite data is received electronically via ftp from node 150.144.199.71. The process that retrieves the data GET_IMP.COM is run each night on the APLSP cluster node S1PVX4. This process checks the files on the GSFC system and retrieves files containing new run id numbers. The GET_IMP process maintains a log file called RUN_ID.LOG that keeps track of all the previously retrieved data.

There are four types of data files pulled from GSFC for each run id; 1.) LAP files that contain the CPME decom data 2.) MCE files that contain the EPE MCE data 3.) APP files that contain the EPE decom data 4.) SHP files that contain an inventory of the APP data files for the run id. The set of files for each run id contains approximately four days worth of data. The naming convention used for the files supplied by GSFC is as follows:

I8_type_runid_yearmonthdayhourminute.;
where:
I8 = a constant indicating that this is IMP8 data.
type = a three character identifier indicating the data file type
LAP = CPME decom data
APP = EPE decom data
MCE = EPE MCE data
SHP = Shipping inventory file[1]
runid = 4 digit run identification number
year = 4 digit data start year
month = 2 digit data start month
day = 2 digit data start day
hour = 2 digit data start hour
minute = 2 digit data start minute

The data files that are pulled from GSFC for each run id are compressed into a single ZIP file named IMP_runid.ZIP. This zip file is located in the directory IMPDISK:[TRANSFER.DATA], additionally this zip file is automatically backed up to DISK15:[IMP]. Through the use of data compression and backup we are capable of maintaining an entire years worth of raw input data online on two physically different disks. This reduces the need for cumbersome time consuming backups throughout the year.

EPE Processing

The EPE processing is performed using the command procedure IMPDISK:[EPE.CODE]GENARCH.COM. This procedure requires that the name of the input data file be specified on the command line (i.e. @GENARCH DATA:IMP_2193). Additional inputs required by genarch are the run id number and the output file name.

The following is a sample for processing run id 2100:

$ @GENARCH <DATA:IMP_2100>
What is the run id NUMBER: <2100>
Enter the output file name: <epe2100>

When processing is completed the operator is reminded to print the postscript plots

EPE Output Data Products

A single postscript plot is created and printed for each day of data. The postscript data files are manually transferred to the Unix systems and converted to PDF format files that are placed onto the WWW.

Two data files are produced; 1.) EPE'run id'.DAT and 2.) FOR'run id'.SUM. these two files are put into a single zip file EPE_'run id'.ZIP that is located in the directory IMDISK:[EPE.DATA].

[1] Shipping inventory files do not contain the year month day hour and minute in there file names.

CPME Level 1 Processing

CPME Level 1 processing is performed using the command procedure IMPDISK:[CPME.CODE]IMP98.COM. IMP98.COM runs the program CPMEJ90 that uses the IMP8 LAP file as input to produce the output data products.

The following is a sample for processing run id 2100:

$ @IMP98
What is the run id NUMBER: <2100>

CPME Level 1 Output Data Products

Three files are produced during the level 1 processing; 1.) JA'run id'.DAT which contains high high-resolution 20.48 second data. This file is stored in the directory IMPDISK:[CPME.DATA.JA]. 2.) SUM'run id'.DAT which is a summary listing of the processed data. This file is stored in the directory IMPDISK:[CPME.DATA.SUM]. 3.) MST'run id'.DAT which contains 5.5 minute averaged data. This file is stored in the directory IMPDISK:[CPME.DATA.MST].

CPME Level 2 Processing

CPME level 2 processing involves creating files which contain 24 days of data. This is accomplished by using the command procedure IMPDISK:[CPME.CODE]MST98.COM. MST98.COM merges six MST files into a temporary file that contains 24 days of 5.5 minute averaged data.

The following is a sample for processing run id 2100:

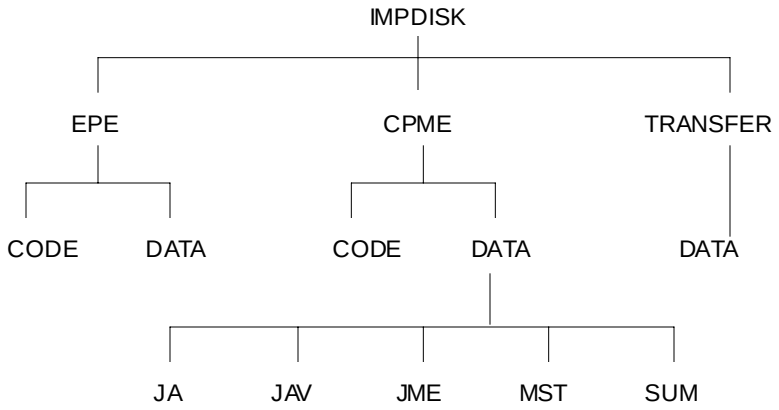
$ @MST98
What is the JME file number? (e.g.349) <366>
What is the MST FILE number? (e.g. 2082) <2140>

CPME Level 2 Output Data Products

The temporary file created by MST98.COM is run through the program JEDIT which eleminates overlapping records from the input file to create a contiguous 24 day 5.5 minute averaged JME data file. This JME file is stored in the directory IMPDISK:[CPME.DATA.JME]. This JME file is then used as input to the program RAJ which creates an hourly averaged JAV data. The JAV file is stored in the directory IMPDISK:[CPME.DATA.JAV].

IMPDISK directory structure

The IMPDISK is structured as the following diagram shows to allow easy access to specific data types:



IMP8 file Mnemonics

LAP	LAP files contain the CPME decom data retrieved from GSFC.
MCE	MCE files contain the orbit data retrieved from GSFC.
APP	APP files contain the EPE decom data.
SHP	SHP files contain shipping reports from GSFC.
EPE	EPE files are the final EPE output data produced by GENARCH.
FSUM	FSUM files are the summary listing produced by GENARCH.
JA	JA files are the high-resolution 20.48 second CPME data produced by CPMEJ90.
SUM	SUM files are the summary listing produced by CPMEJ90.
MST	MST files are the 5.5 minute averaged Master Science Files produced by CPMEJ90.
JME	JME files are the edited 5.5 minute averaged Master Science Files produced by JEDIT.
JAV	JAV files 1 hour averaged Master Science Files produced by RAJ.