Data Management

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Highlights of Plan

- **Goal to provide high quality data as efficiently as possible**
- **Central point of contact – ODM at POC**
- **Different levels of data products for different user groups**
- **Open access to all data and data production software**

Key Elements of Talk

- **Data Products**
- **Data Production Software**
- **Software Timeline**
- **Data Flow**

Data Products

- Beacon Data
- Level 1 Data
- Level 2 Data
- Level 3 Data

Beacon Data

- **Beacon Mode Telemetry processed and distributed by SSC.**
- **IMPACT Team provides any beacon data processing software to SSC.**
- **IMPACT Team monitors beacon data quality together with housekeeping data and provides software updates to SSC.**
- **IMPACT Beacon data processing software archived together with Level Zero data by SSC.**
- **Nominal merged data set at 1 min resolution, synchronized with PLASTIC Beacon data.**

MAG Beacon Data

B vectors, 3 samples/minute in spacecraft coordinates. Beacon processing software to transform to other coordinates.

STE Beacon Data

Given in 2 directions, 8 energies, 16 samples/minute.

SWEA Beacon Data

Moments (electron density, bulk velocity, temperature), 13 samples/minute.

Pitch Angle Distributions, 2 energies, 12 directions, 24 samples/minute.

SEP Beacon Data for all SEP instruments

SEP status

SEP-SEPT Beacon Data

- Electrons, 2E, 4 dir
- Electrons, 2E, 4 dir (summed)
- Ions, E2, 4 dir
- Ions, E2, 4dir (summed)
- SEPT status
- 1-minute averages

SEP-LET Beacon Data

- **Protons, 1E, 2 dir**
- **Protons, 1E, 1 dir**
- **He, 2E, 2 dir**
- **He, 1E, 1 dir**
- **3He, 2E, 1 dir**
- **CNO, 3E, 1 dir**
- **Fe, 4E, 1 dir**

SEP-LET Beacon Data (continued)

- **Livetime Counter**
- **H/He-Effic**
- **Z-Effic**
- **L1A-th**
- **L1B-th**
- **L2L2th**
- **1-minute resolution**

SEP-HET Beacon Data

- Electrons, 1E, 1 dir
- Protons, 3E, 1dir
- He, 3E, 1 dir
- CNO, 2E, 1 dir
- Fe, 1E, 1dir
- Livetime Counter
- Stop Effic
- Pen Effic
- HET Status
- 1 minute resolution

SEP-SIT Beacon Data

- **He, 4E, 1 dir**
- **CNO, 4E, 1 dir**
- **Fe, 4E, 1dir**

Other Beacon Data

- **Instrument Status**
- **Packet Overhead**
- **Total Beacon Data, 36.27 bps, 272 bytes/minute = 1 packet**

Level 1 Data

- High time resolution data for detailed analysis and archive available via POC web interface or at NASA archive.
- All data products from instruments in physical units with latest calibrations applied and key ancillary data (e.g. magnetic field) merged in.
- Level 1 data will include stop-gap (basically Beacon) data during data gaps.
- Level 1 data will be reprocessed if calibrations are changed.
- Using “Heritage” formats for each instrument for efficiency. Archived with format translators and/or software for reading files using e.g. IDL, Fortran, C.

MAG Level 1 Data

- **Binary flatfile with ASCII header**
- **Time (TBR UCLA)**
- **Bx, By, Bz, B (nanoteslas)**
- **Spacecraft and Stereo Solar Orbital Coordinates**

SWEA Level 1 Data

- CDF File Format
- Time of measurement, sec since 1970
- PAD [NE, NA], flux units
- Look Angles [NA], degrees
- Energy Steps [NE], eV
- Density, 1/cc
- Velocity, km/s
- Temperature, eV
- Heat Flux (along B), eV*km/s/cc
- SC Potential, volts
- Magnetic Field, nT
- NE = 16, NA = 8
- Stereo Solar Orbital Coordinates

STE Level 1 Data

- CDF File Format
- Time of measurement, seconds since 1970
- Flux [NE, NA], flux
- Look Angles [NA], degrees
- PAD [NE, NPad] (possibly, TBR (UCB), flux
- Energy Steps [NE], eV
- Magnetic Field Vector, nT
- Misc housekeeping and instrument settings
- Stereo Solar Orbital Coordinates

SEP-HET Level 1 Data

- **ASCII header, ASCII flatfile**
- **Time (units TBR Caltech)**
- **Solar energetic particle intensities in units of flux in one-minute averages for: H, 3HE, 4HE, C, O, Ne, Mg, Si, Fe at energy intervals TBD (Caltech)**
- **Event counts will be included for each intensity**

SEP-LET Level 1 Data
Unsectored Data

- **ASCII header, ASCII flatfile**
- **Time (units TBR Caltech)**
- **Solar energetic particle intensities in units of flux in one-minute averages for: H, 3HE, 4HE, C, N, O, Ne, Mg, Si, Fe at energy intervals TBD (Caltech)**
- **Event counts will be included for each intensity**

SEP-LET Level 1 Data
Sectored Data

- **ASCII header, ASCII flatfile**
- **Time (in units TBR Caltech)**
- **Solar energetic particle intensities in flux units in one-minute averages for 16 look directions for: H, HE, CNO, Fe at energies TBD (Caltech)**
- **Event counts will be included for each intensity**
- **Stereo Solar Orbital or RTN coordinates (TBR Caltech/IMPACT Team)**

SEP-SEPT Level 1 Data

- **ASCII header, ASCII flatfile**
- **Time (in units TBR Caltech/GSFC)**
- **Count rates in 4 look directions at 32 energies for electrons and ions**
- **Stereo Solar Orbital or RTN Coordinates (TBR Caltech/GSFC and IMPACT team)**

SEP-SIT Level 1 Data

- ASCII header, ASCII flatfile
- Time (in units TBD UMd)
- Particle intensities in flux units in one-minute averages at energy intervals TBD (UMd) : H, 3He, 4He, C, O, NeS, Fe
- Event counts will be included for each intensity

Level 1 Burst Data

- **Burst Data produced by:**
  - **MAG: 32 B vectors per second**
  - **SWEA: 3D electron distributions (16 energies*80 angles) every 2 seconds**
  - **STE: 24 Monitor Rates and a spectrum (32 energies*8 angles) every 2 seconds**
- **Burst Data will not be included in normal data Level 1 files. A flag will exist in the normal L1 files to indicate when Burst Data is available.**
- **2 Burst Data files will be produced for each day that Burst Data exists:**
  - **MAG file: Will contain the MAG burst data at highest resolution**
  - **SWEA/STE file: Will contain SWEA and STE Burst Data with 2 second averages of the MAG burst data**
- **File format TBD (UCB and UCLA)**

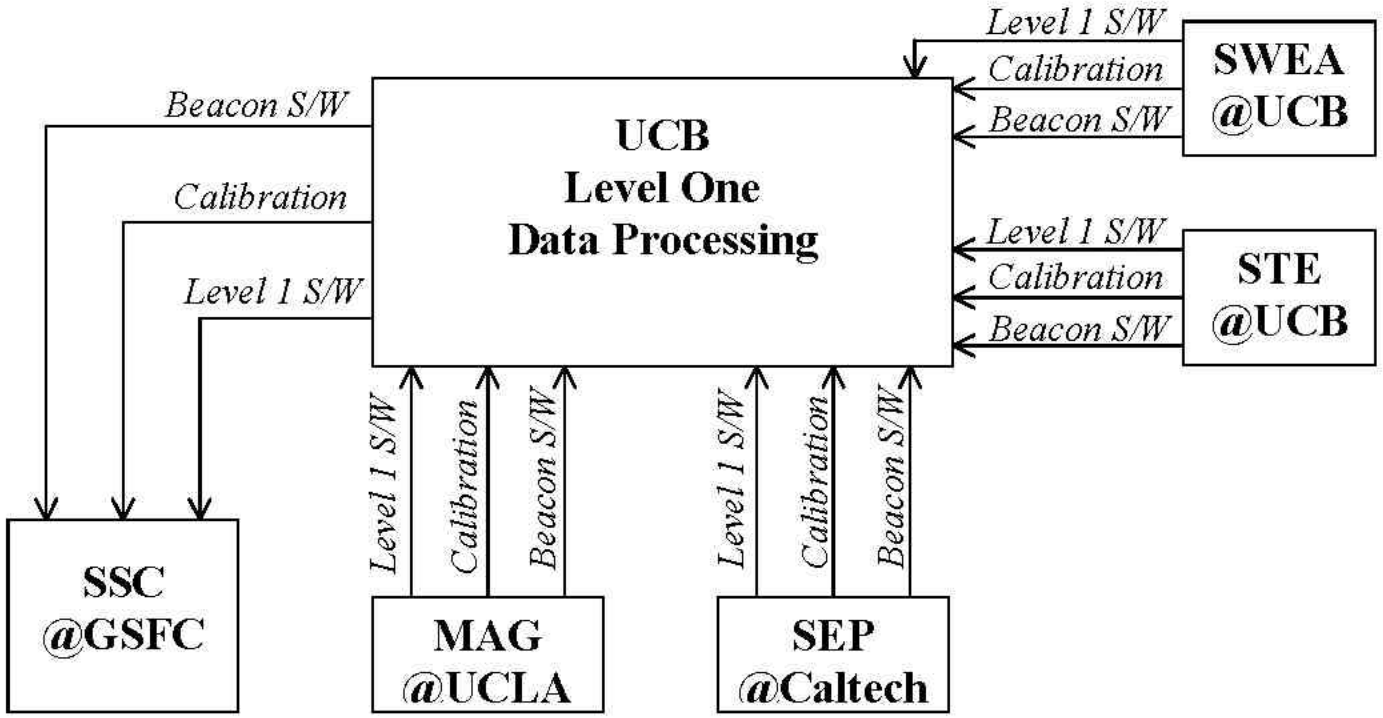
Level 2 Data

- Key parameter data consisting of one-minute averaged, synchronized sets containing the most often used quantities from IMPACT, PLASTIC, and SWAVES
- Data to be included TBD (IMPACT, PLASTIC, SWAVES teams)
- Both ASCII and binary flat file data formats will be available for all Level 2 data.
- Processed and served by a web-server sited at UCLA that includes a browser.
- To be archived with IMPACT data.

Level 3 Data

- Value-added products that enhance access to and use of data
- Will include products like event lists with shocks, ICME's, current sheet crossings
- Also, will include tables and plots contributed by team members.
- Data will be made available through UCLA's Level 2 web server or through links to team sites from server.

Software Flow



Data Production Software

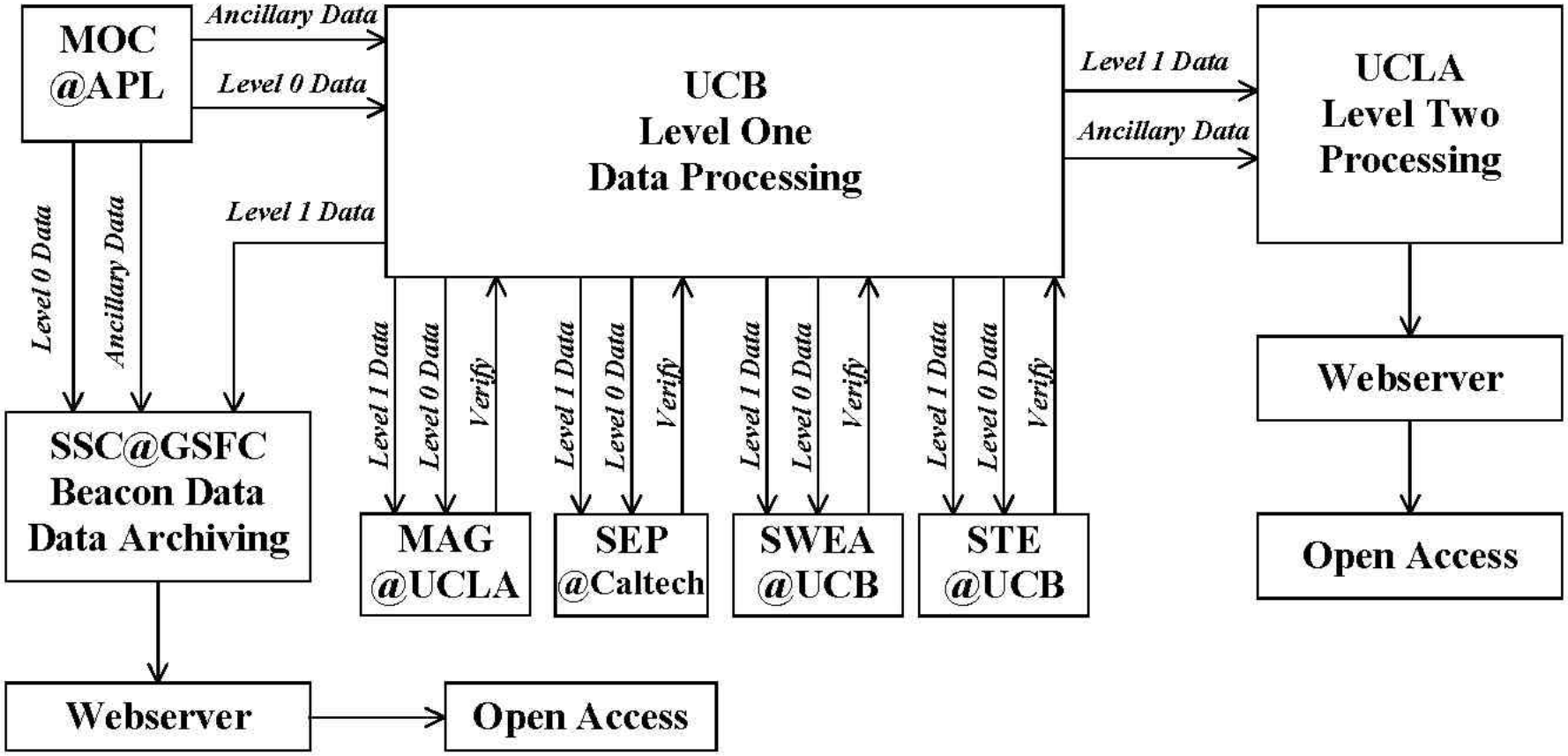
- **POC will host a web-based data tracking and retrieval system to be central mechanism for recording status of and disseminating data products.**

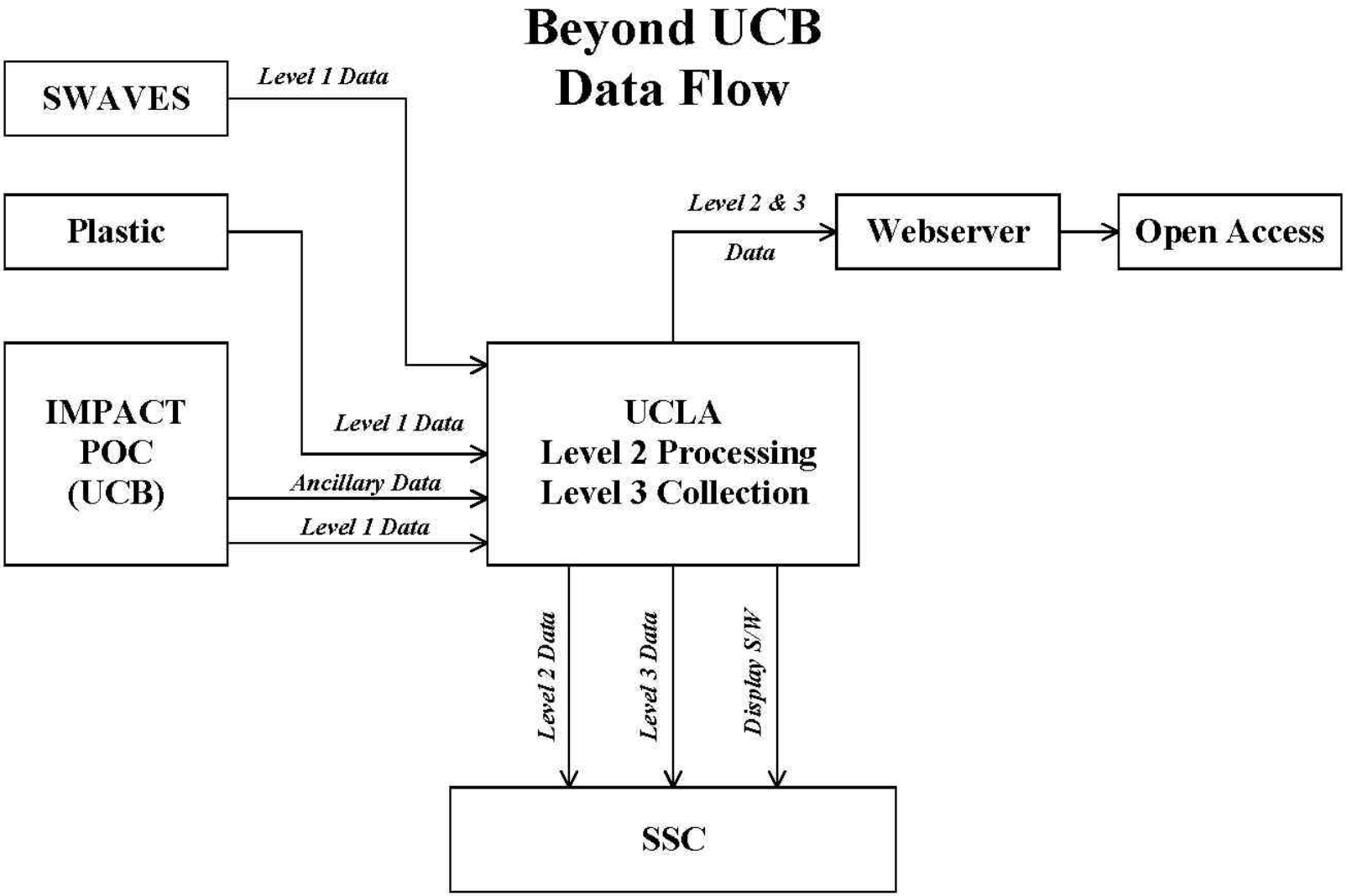
- **Level 2 software, data access, and data archiving, will be overseen by UCLA. Instrument teams will collaborate with UCLA to produce Level 2 software.**

Software Timeline

- Need test SPICE and IMPACT data for software testing. SPICE data will come from Project. IMPACT test data will come from instrument reps.
- Beacon data software delivered to POC one month before first IMPACT simulation which will produce Beacon Data.
- Level 1 software to be delivered to POC one month before second simulation.
- Level 2 software due date TBD (UCLA and IMPACT, SWAVES, and PLASTIC Teams)

Data Flow


MOC
@APL
Ancillary Data
Level 0 Data
UCB
Level One
Data Processing
Level 1 Data
Ancillary Data
UCLA
Level Two
Processing
Level 0 Data
Ancillary Data
Level 1 Data
Webserver
SSC@GSFC
Beacon Data
Data Archiving
Level 1 Data
Level 0 Data
Verify
MAG
@UCLA
SEP
@Caltech
SWEA
@UCB
STE
@UCB
Open Access
Webserver
Open Access


Beyond UCB
Data Flow
SWAVES
Level 1 Data
Plastic
Level 2 & 3
Data
Webserver
Open Access
IMPACT
POC
(UCB)
Level 1 Data
Ancillary Data
Level 1 Data
UCLA
Level 2 Processing
Level 3 Collection
Level 2 Data
Level 3 Data
Display S/W
SSC

Data Flow (continued)

Data Timeline

Process	Time Required from Release of Data (location)
Check and verify Level 0, catalogue	< 3 hours (UCB)
Run Calibration on Level 0 --> Level 1	24 hours (UCB)
Level 0 and 1 data+software to Archive	2 months(UCB)
Process Level 2 (summary database)	2.5 months (UCLA)
Level 2 Products to SOC and Archive	2.5 months (UCLA)
Create Level 3 Value-added Products	3 months (UCLA)
Level 3 Products to SOC and Archive	3 months (UCLA)

Data Flow (continued)

- **ODM will conduct teleconferences as needed. Data issues will also be discussed in monthly IMPACT telecons and at Team meetings.**