

# **IMPACT POCC**

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## **IMPACT POCC Design**

- **POCC generates commands and monitors instrument state of health telemetry**
- **POCC also coordinates data production activities:**
  - Level 0 data collection and higher level product generation
  - Higher level product archiving (to SSC) and dissemination to IMPACT team and the community (via UCLA and SSC)
- **Command and Telemetry monitoring activities make use of the IMPACT Command and Telemetry GSE**
- **Data Analysis tasks make use of UNIX workstation-based system**
  - Wind / Cluster / MGS / Lunar Prospector / FAST / HESSI Heritage software and systems
- **PLASTIC has its own POCC**
  - IMPACT Command & Telemetry GSE will be used during PLASTIC software development and can be used as a backup for PLASTIC POCC for commanding and state of health monitoring
  - IMPACT C&T GSE software available to PLASTIC if desired

## **IMPACT POCC Hardware/Software**

- **The IMPACT POCC uses the Command & Telemetry GSE used throughout instrument bench testing, I&T and Operations**
  - PC-based system
  - Labview CVI based software
  - Heritage from many previous missions (most recently HESSI, Lunar Prospector)
  - Communicates with MOC over secure network connection per the MOC/POC ICD
  - Documented by the POCC users manual and associated documents/ICDs
- **System is in operation now for bench testing IMPACT ETU and flight software development**
  - Using APL-provided spacecraft emulator

## **IMPACT POCC Commanding Features**

- **STOL-like command parser/scripting language**
- **Database driven command encoder**
- **Hazardous commanding support (requires operator verification)**
- **Memory Load support**
  - **Translator programs to convert native development formats to POCC command scripts**
  - **Memory dump verification program compares load to dump**
- **Can also forward pre-formatted commands from files or a TCP/IP socket connection to support SEP**
  - **Uses “Supplemented Command Message” format and protocol as described in the MOC/POC ICD**
- **Supports time tagged command generation**
  - **Both MOC and Spacecraft time tags supported**
- **Verifies command receipt from instrument housekeeping data**
- **Commands will be verified on the bench ETU setup prior to sending**

## **IMPACT POCC Telemetry Features**

- **Decomputates, Converts, Displays, and Limit-Checks IMPACT state of health data**
  - Database-driven decoding, conversion, and limit checking levels
- **Out-of-limit and other error conditions will generate an alarm**
  - Alarm will page the operator with a text message indicating the problem
  - Same paging system used for RHESSEI spacecraft operations
- **Real-time plotting capability for quick-look trending**
- **Quick-look Science data can be viewed on a separate science display computer (not used for normal operations)**

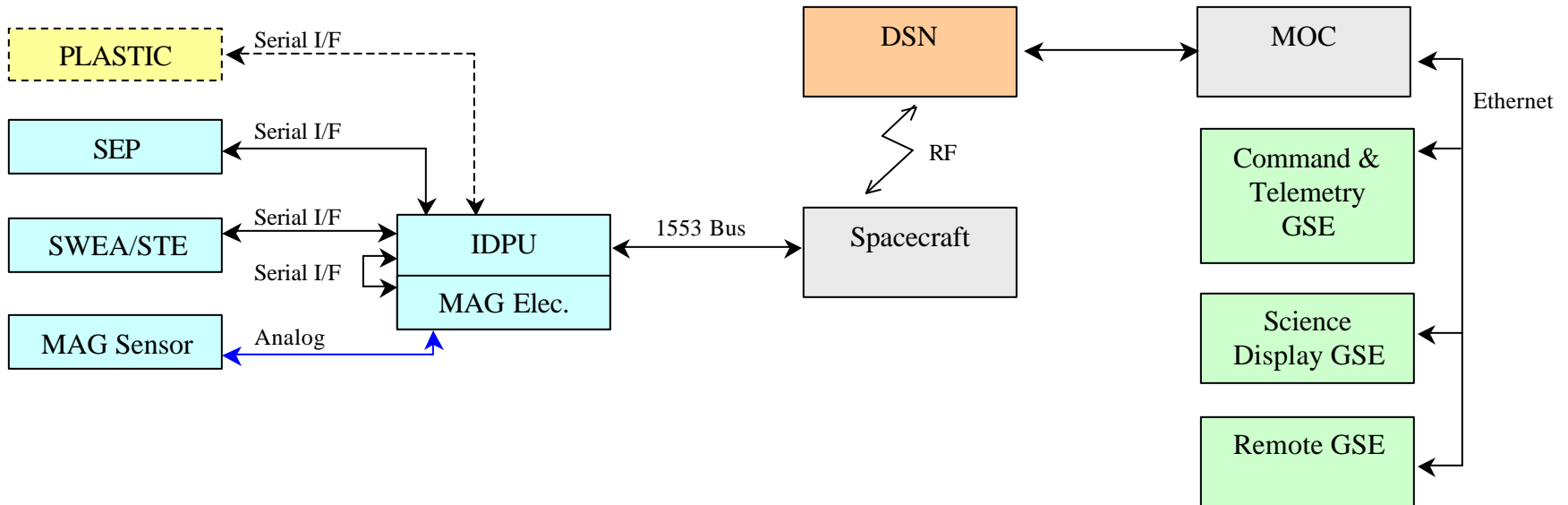
## IMPACT POCC Sample Display

The screenshot displays the STEREO COMMAND AND TELEMETRY GSE 09-12-02 software interface. The main window is titled "STEREO COMMAND AND TELEMETRY GSE 09-12-02" and contains several panels:

- Event Log:** Shows a list of events including "START MOCSET" and "SET MOC BEGN" with timestamps. A "Wait" field is set to 0, and a "Start" button is visible.
- Commands:** A table titled "IMPACT IDPU COMMAND CODES" with columns for IDENTIFIER, ApID / Root, Value, and Val. The table contains entries for SYSTEM (0x200) and MAG (0x210).
- Received Data:** Includes a "Display" section with "Bytes Received" set to 298 and "ON/OFF" buttons for TCP/IP, CMD, and TLM. A "Record" button is also present.
- IDPU\_SOH:** A list of parameters for the IDPU\_SOH command, including UTCs.f (2002 OCT 17 21:29:30.422), ISampleTime (00:02:04), ISoftwareVersion (20), IHardwareVersion (3), IPollTime (0.004416), and ICmdSeqRunning (255).
- SOH Plot:** A graph showing "Counts" on a logarithmic scale (0.001 to 1.000) versus "Time, Secs \* Plot I". A single peak is visible in the data.
- DISPLAY BY APID:** A table showing data for APID 200, with columns for Display Start, Display Number, Apid, and Count. The count for Apid 200 is 59.

The Windows taskbar at the bottom shows the Start button, a taskbar with "stgsect" and "STEREO COMMAND AN...", and the system clock showing 2:29 PM.

## IMPACT POCC Configuration



## **POCC Facility**

- **Command & Telemetry POCC will be set up at the Berkeley Mission and Science Operations Center**
  - Facility currently used to run the FAST, HESSI, and CHIPS spacecraft
  - Secure facility with controlled access
  - Firewall will be used between the POCC and the open internet to limit access





## **POCC Operations**

- **During early operations POCC will be manned during contacts**
- **During normal operations POCC will run unattended**
  - **Page operator if anomaly detected**
  - **Command generation and Trending data reviewed by operator during normal working hours**
- **POCC will automatically connect to MOC during passes and monitor real time telemetry**
  - **Need to identify a method for coordinating the pass plan so the POCC knows when to connect**
- **POCC will reconnect to the MOC to replay the recorded telemetry right after the pass to look for glitches between passes**
- **Data Analysis system will collect Level 0 data from the MOC and deliver archive data to the SSC periodically via ftp**

## **IMPACT Commissioning**

- **IMPACT Commissioning consists of:**
  - Instrument power-on and check-out
  - High voltage ramp-up
  - **IMPACT Boom deployment and instrument door opening**
    - **Want boom deployment done ASAP with MAG & SWEA instrument powered on**
  - Spacecraft rolls for magnetometer offset calibration
- **Most of the commissioning activities will take a few days to complete**
  - Final ramp-up of SIT high voltages takes several days
  - SIT and SEPT door opening and final commissioning activities must wait for heliocentric orbit
- **Commissioning planned as a real-time activity, using mostly the same scripts used during I&T**
  - Modest command volume requirement, mostly adjusting parameters
  - Real-time telemetry will be required to monitor instruments during commissioning
    - The nominal IMPACT telemetry rate is adequate; some enhancement (~2-3x nominal bitrate) would speed up commissioning, and would be helpful during rolls.
- **As we transition to normal operations, commanding will transition to batch mode, and will be infrequent**

# **Normal Operations**

**Peter Schroeder**  
**peters@ssl.berkeley.edu**

## **Pre-Normal Ops**

- **IMPACT Program Manager (Dave Curtis) to be in charge of operations at this point.**

## **Operations/Data Manager**

- **During Normal Operations, ODM (Operations and Data Manager) at UCB to be in charge of both IMPACT operations and data management.**
- **ODM will be Peter Schroeder who performs this function for WIND/3DP currently.**
- **ODM will be principal IMPACT contact with STEREO MOC and SSC.**
- **ODM also has experience with SPICE.**

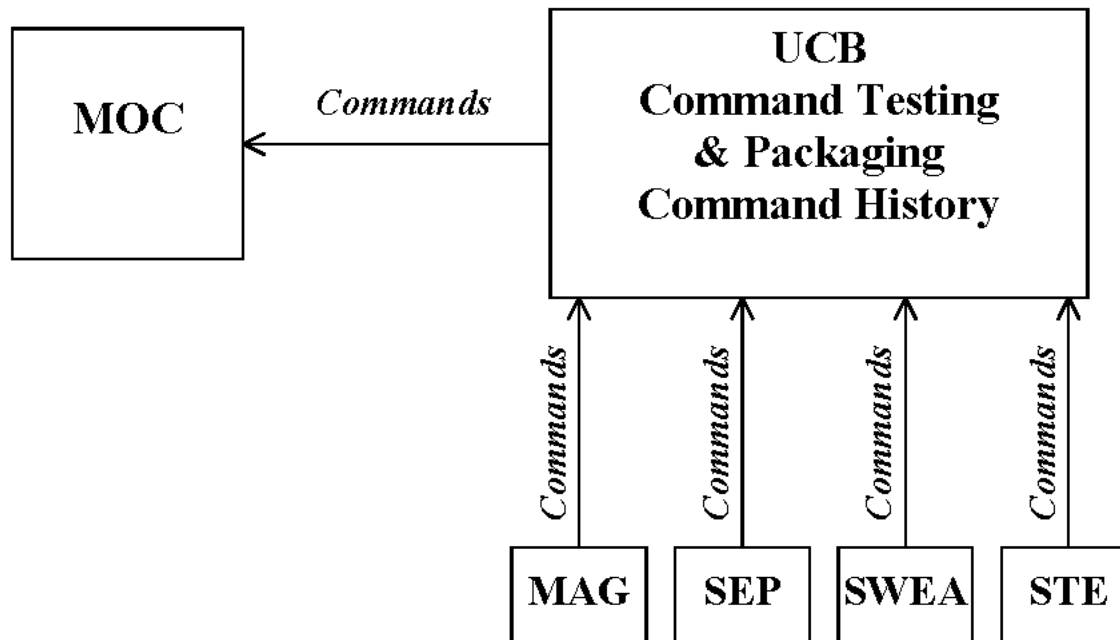
## **Commanding**

- **Commands that do not originate at UCB are sent to UCB by the instrument teams by email, phone, or fax.**
- **All teams except SEP will send a description of a command sequence. SEP team will send actual command sequence.**
- **ODM will write up command sequences and test commands on Spacecraft Emulator.**
- **ODM will send command sequences using the POCC (originally GSE units) which sends commands as required by the MOC/POC/SSC ICD (ie. using ssh2, etc.).**
- **Routine commands will be sent at least 8 hours before the pass in which they are to be transmitted (as required by the MOC/POC/SSC/ICD.**

## **Commanding (contd)**

- **ODM will maintain a web-accessible log of operations and commanding information.**

## Commanding

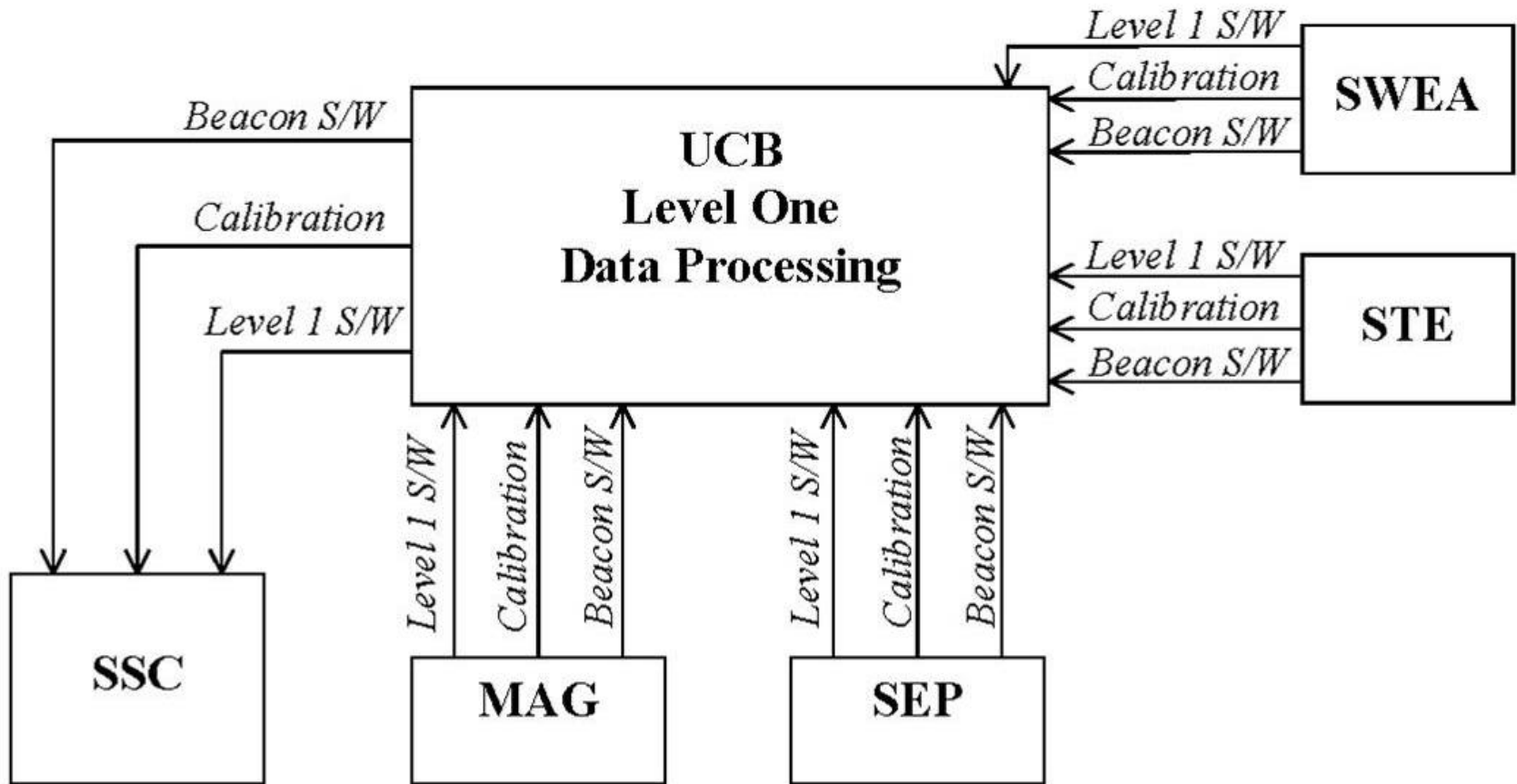




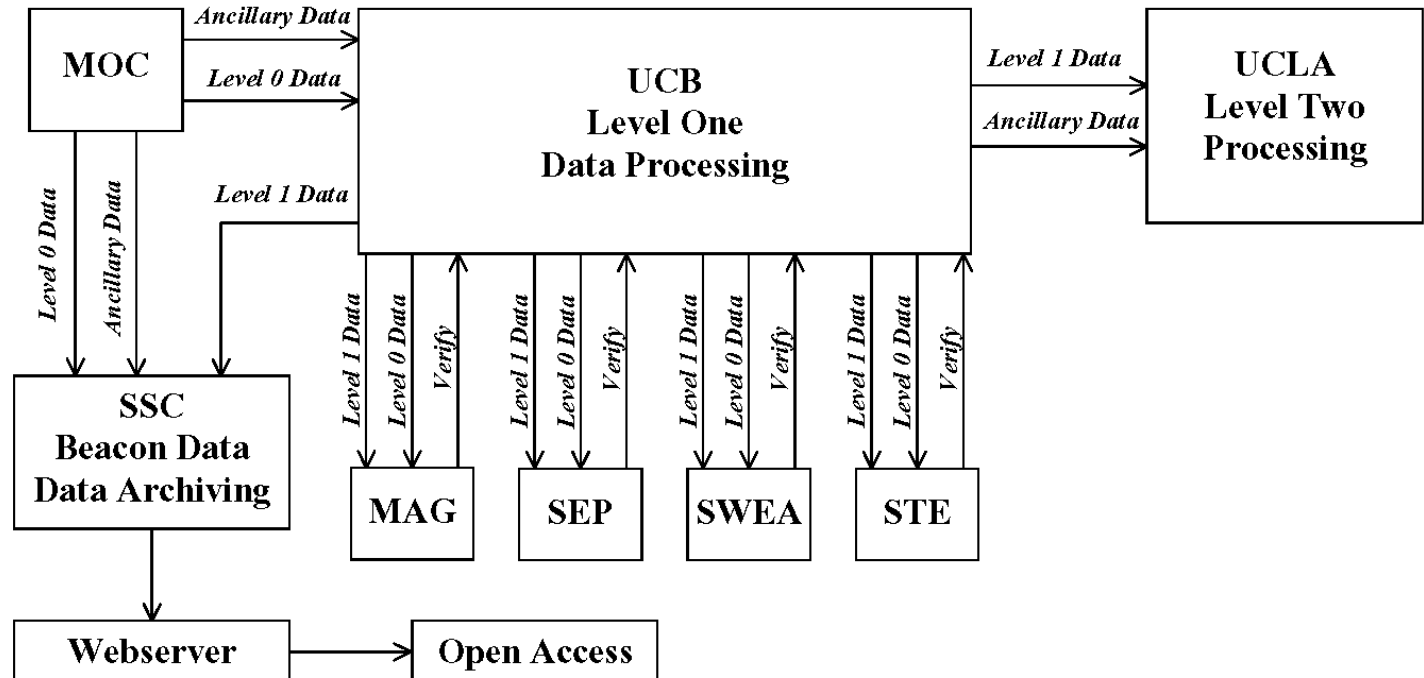
## **Level 0 Data Handling**

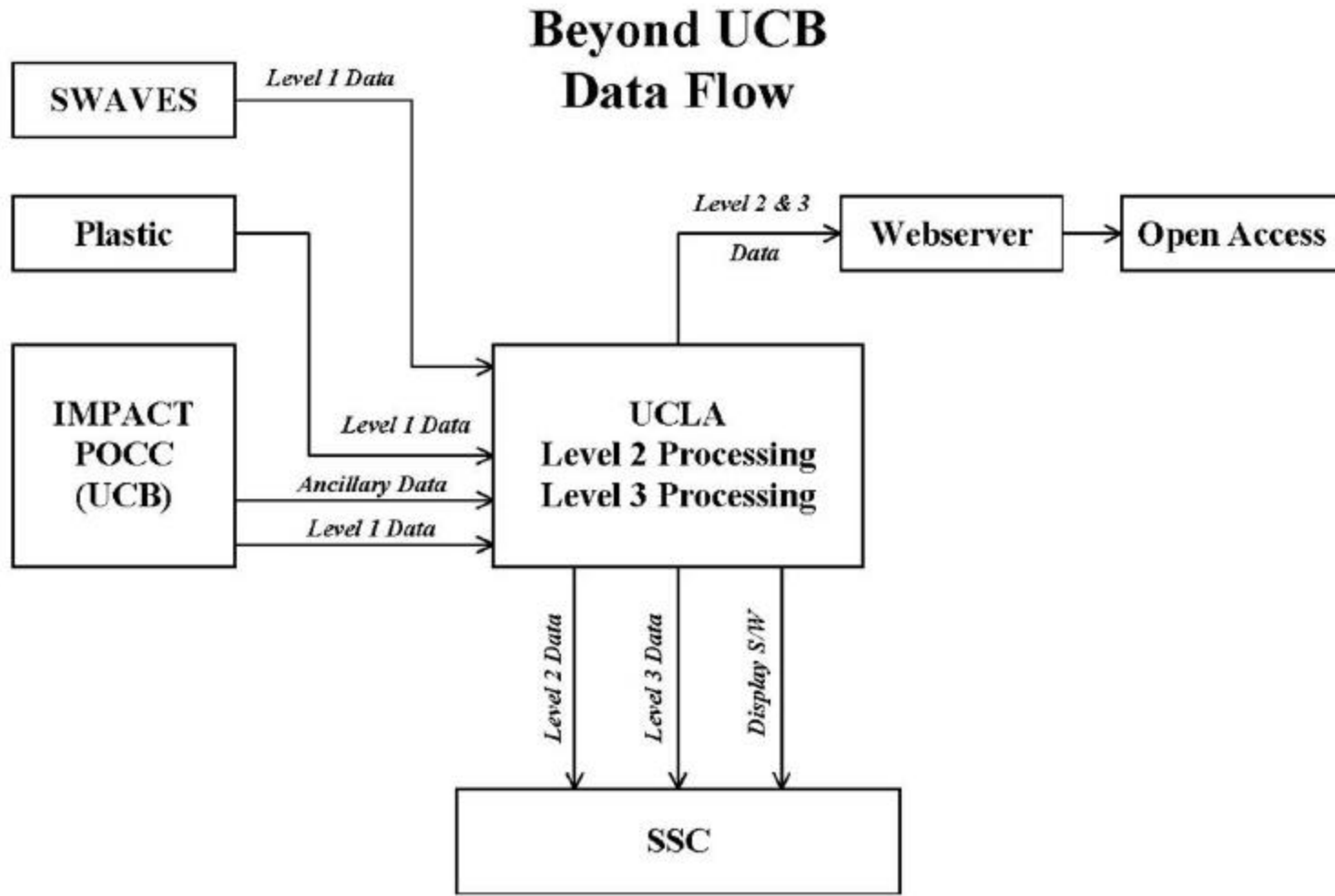
- **Level 0 data will be retrieved via the ftp interface described in the MOC/POC/SSC ICD at least daily in order to process data as soon as possible.**
- **This data will be digested immediately and disseminated to the instrument teams.**

## Software Flow



## Data Flow





## **Data Product Exchanges**

- **IMPACT data will be available to the public via websites at SSC and UCLA.**
- **UCB will maintain webserver to serve out L0 and L1 data to instrument teams. Other STEREO projects and SSC will also have access to this site for retrieving L1 data.**
- **This webserver is the main interface between instrument teams and UCB to verify L1 data. UCLA will also use this interface to retrieve L1 data to do L2 processing.**
- **This website will have restrictions on its use depending on the kind of user accessing it (IMPACT team member, other STEREO project, SSC, etc.). Could be used to serve verified L1 data to public.**

## **Playback Telemetry Data**

- **POCC will play back data directly after a pass using MOC/POC/SSC ICD protocol to monitor instrument status.**
- **Other IMPACT teams will be able to playback telemetry data by mirroring through POCC.**

## **Monitoring Instrument Status**

- **POCC will monitor instrument status by monitoring real-time data and post-pass playback data.**
- **POCC will maintain a database of instrument status data for trending purposes.**
- **Instrument teams will inform UCB of instrument conditions that require attention. POCC will automatically detect error conditions.**

## **Contingency Plans**

- **When POCC detects an error condition, the POCC will send a text page to the ODM or the ODM's alternate. ODM maintains a list instrument team and MOC contacts. In response to page, ODM will immediately contact appropriate IMPACT team members. ODM will also contact MOC personnel immediately if real-time commands must be sent.**
- **If MOC detects an error condition, they, too, will be able to use the pager system to contact the ODM.**
- **Pager system will be similar to that used at UCB for RHESSI. The RHESSI pager system has worked well.**