

## **Themis Software Task Priorities (In Play / In the Queue) - 9/05/08**

### To Be Discussed - Top of Meeting

1. Data and Misc Issues
  - a. Version # for data files
  - b. SPDF Slide – L2 Instrument Status
2. Jim McFadden
  - a. n\_3d\_new\_3
3. Davin
4. John B.
  - a. Document EFI caveats
5. Harald
  - a. Re-process new Keograms from Calgary Rsync. No jpegs since May (no answer from Canadians).
  - b. issue with the thumbnail mosaic that it displays YKNF, but not properly
  - c. Rankin missing Feb 2008 thumbnails???
6. Web
  - a. Addition of logos with links
  - b. Beef up instrument web pages and include caveats for each.
  - c. Enhanced Data Drop Down web page and new Data web pages.
7. GOES

The following will be provided by Howard Singer:

  - a. GOES 10-12: Read-me file, Coord Trans Corrections, binary files
  - b. Sort out GOES-13

## Tim

1. Help request from : Sheng-Hsien – Summary plots

1. Support Mirror Sites: a. Japan (ISAS) b. Austria c. France (**Rumi** - not always up to date for gmags)  
d. UCLA – mirror site set-up awaiting UCLA hardware issues resolved  
Status: UCB sent 04T UCLA loaded 00T  
UCLA will need to supply SSH key - RSYNC Key

1. Support gmag data remote sites:

- a. Augsburg - cdf generation - ping Erik late September to see how they are doing
- b. Japan - made contact c. Alberta d. APL

2. Once Jim M reprocesses ASI Feb 2008 – reprocess movies?

2. Automate ASI Processing

- a. ~~Automate job to run every night to create ASI Summary Plots and create L1 cdf's on low resolution data.~~
- b. ~~Automate job that runs every night that creates Orbit and ground track plots accessing Themis data.~~
- c. Once Hard Drives from Calgary automate job that runs Software to create full resolution cdf's and replaces Keograms and Overview plots. **Awaiting Harald's Review**

3. Summary Plot Production link

4. 20 Themis scripts review to optimize processing. (40% complete)

4. ~~Inventory of Products, monitoring and building new alarms for Production Data Processing.~~  
~~Draft document produced.~~ Next version with Harald's info as well. (On Hold)

## Hannes

1. V03 State

a. definitive attitude info - in progress awaiting the following from Jim L:

- a1. thm\_contrans mods checked into the trunk
- a2. Verify V02 reprocessed State data in QA
- a3. V03 State with spin phase offsets

2. L2 State cdf

- a. See email concerning parms ("thx\_sci\_mode", "thx\_hsk\_issr\_mode") sci\_mode - know fast survey  
issr\_mode - when IDPU thinks fast survey
- b. quality flag for FGM data - talk to Uli

3. Spin Axis offsets – Improve the new spin axis offsets calibration routine – In progress. A new technique has been developed for inside magnetosphere with high accuracy. Once complete a paper to be published.  
Sent data to Karl Heinz, included in the distribution.

## Jim L.

1. "Add spin model data to state CDFs", format change, reprocessing will be needed
  - b. thm\_cotrans changed to use spin model instead of current method of interpolating spin period. - in testing
    - b1. ~~Once code in the trunk to be reviewed with Hannes.~~
    - b2. ~~Once Jim completes his testing, Hannes will be asked to QA new functionality. BugzID=100.~~
    - b3. Ask Olivier about making default and to check noise removal code with new sun pulse data.  
Jim sent email to Olivier. b4. thm\_cal\_fgm - awaiting #b2 to be complete. (needs to call thm\_cotrans)
    - b5. Review QA scripts and test suites
  - c. Reprocess V00, V01, V02 State cdf's with the new master cdf from Hannes into Prod.  
Check-in thm\_load\_state into the trunk.
  - d. Announcement to users.
  - e. changes to tdas spin model routines to use spin phase offset provided by Hannes for V03 State.
  - f. Work with Hannes to independently verify V03 QA State cdf's from reprocessed STATE files (#1c)
1. Starting Sept. 8th Splash GUI: a. Tasks as Needed b. v05 QA scripts c. v05 QA suites
2. ESA Sweep Mode - L0->L1 Processing Issue from Davin.
  - a. patch for sweep mode timing - in progress eta 9/12
  - b. Create QA Test Files for ESA, SST and MOM's for review by scientists
  - c. Reprocess ESA, SST and MOM's: L0->L1, then notify Jim M to reprocess L1->L2
  - d. The SST reprocessing will handle the removal of some or all \_hed variables.
3. Feedback for Thomas on L1 ESA cdf
3. GOES 10-12 Test data: a. create read to cdf routine b. load cdf routine c. master cdf
4. FBK Frequency Bin Definitions – assignment tbd
4. thm\_cotrans test script updates for bugs found
4. L1 File definitions Document. BugzID=xx.
5. Refactor repeated CDF library code in CDF processing tools BugZid=50
5. Bfield mid-packet jumps.
5. L0 to L1 processing: look ahead to the next packet before processing the current packet. BugzID=67
5. Repeated timestamps and gaps in spin fit data BugZid=113 (#67 may fix this one as well).
6. Separate E and B timestamps for spin fits
  - a) make a revised V02 master CDF with E and B separated
  - b) change thm\_load\_fit to support V01 and V02 of the L1 CDFs
  - c) change the L0->L1 processing code d) change the L1->L2 processing code
  - e) test the changes, then reprocess to create the V02 CDFs (keeping the V01 files around for a while to ease the transition) BugzID=45
7. FGS sample times and values, showing repeated timestamps. BugzID=113 (BugzID=67 must be done first)
7. FGM range changes in the mid packet. Post Proc maybe a solution to eliminate the spike. BugzID=44.
8. Non Monotonic timestamps. BugzID=72
9. Latest ESA modes not yet implemented (BugzID=4) (Hold until sent to Probes)
10. bau\_sunpulse\_met assumes x86 endiannes (BugzID=13)
11. FGL issue. We have learned that FGL data from probes C, D and E has a 0.25 sec timing error, starting in summer 2007, and continuing to the present (Feb 2008) time. We would like to fix these timestamps in the L1 CDF files. Process should be generic so future corrections can be easily handled. Low Priority steps or tasks:
  - a. create a flag for the affected L1 variables somehow, to prevent confusion about which corrections have or have not yet been applied. So each entry in the proposed correction file should have some sort of tag identifying what the correction is, which could be looked up in the CDF as a variable, variable attribute, or global attribute. (low priority)
  - b. Change L0-L1 code to take corrections into account. (low priority)
12. "Phantom packets" cause non-monotonic distribution times. BugzID=25, low priority.
13. Evaluate CDF compression algorithms BugZid=81, low priority.
14. Spin modeling during shadows BugZid=43. low priority.
15. Add "last processed" time to L1 (and L2?) CDFs BugZid=115, low priority

Jim M.

1. Review popen changes from Bryan

1. Reprocess ASI data (full resolution) for **Feb 2008**. Setup completed. Reprocess started.

Take 2 days to Process 1 day. Will start two jobs to finish in a month.

1. FFT (onboard) L2 cdf – Awaiting SPDF okay on test data and then reprocess all.

1. FGM – awaiting new calibration files from Hannes, put online and then reprocess the FGM L2 cdf's

2. ESA and MOM quality flags (actual variables) – in testing

a. create new variables   b. update meta-data   c. create test data for SPDF

2. Provide in the L2 cdf's a version # and/or SVN version # as a global attribute.

With global attributes provide the users the ability to know what changed when the L2 cdf has been changed. Scheme needs to provide Scientists with a way to know what changed with new versions and the ability to request and receive previous versions of L2 cdf's - in progress

Will go into production 8/25-8/29. Must update document for Pat and Michael.

2. Starting Sept. 8th Splash GUI

a. Tasks as Needed   b. Analysis Pull Down Menu   c. v05 QA scripts   d. v05 QA suites

2. FBK Frequency Bin Definitions – assignment tbd

a. program changes   b. when new L1 FBK files are available reprocess L2 FBK data.

3. Feedback for Thomas on L1 ESA cdf

3. SCM L2 cdf - keep Olivier in the loop. In repository.

3. SCM CAL File Processing Doc - produce table of contents and assign sections with Patrick R. (talk to Ken)

3. Summary Plot mods

a. Fix duplicate velocity units by removing 'km/s' from ytitle and maintaining 'km/s' in ysubtitle.

b. Either make velocity labels into ('X','Y','Z') or make velocity labels into 'VX','VY','VZ'.

So that the components are easier to distinguish.

c. Modify ytitles on esa eflux and sst eflux so that they do not collide.

(Insert '!C's or change setting to make tplot do this automatically).

d. Set the scales on the zoomed out(24 hr) plots so that they are not autoscaled.

Information on appropriate yranges should come from Vassilis.

e. Change labels on temperature lines so that they are done in different colors

(and possibly different linestyles).

f. If necessary, Update the plot key so that it reflects any of the changes above. It'd probably be best to give this task to me, since I've done the past modifications of the plot key.

4. Orbit Plot on Summary Plot web page - on the right side, 3 plots vertically, each overview plot there would be orbit panels (coordinate with Harald).

5. thm\_load\_mom: for quantities like velocity, the coordinate system isn't stored in the meta data, and none of the units are stored in the place we normally try to store them (from Pat - Vassilis concurs) Will take a look.

6. Thm\_fgm\_overviews currently loads the data out of the fit file. It should probably load the data out of the fgm file. That was it only needs to load from one data source.

Jim M: I think the thm\_load\_fit can be deleted without any problems.

6. routine that streamlines the generation of gmag stackplots and a crib to show how to do this. (< than a day)

6. Once Jim McFadden completes his mods for n\_3d\_new\_3 reprocess L2 cdf's - entire mission.

7. Administrator's Guide

8. Themis Developers Guide

9. thm\_load\_mom changes - reconcile mods with Davin at an appropriate time.

10. AE Indexes Issue Jan 8-12, keyograms Jan 12-13, Stripes- Vassilis: minor nuisance - low priority

11. Overview plot change: mode bar seems thick (nothing we can do easily - low priority)

12. Extraneous scmcdir directory under L1 products (from Jim L.) BugzID=98.

13. Mosaic Processing - permanent script needed (very low priority)

L2 Product Status:

Completed: ESA, MOM, FIT (onboard), FBK, FGM, SST (needs upgrades), GMAG

In Progress: FFT (onboard) – SPDF Testing

Yet to be done: SCM, EFI (Michael), ASI (Harald)

Pat

1. Particle Instrument tasks. In Progress
  - a. Plot generation for Vassilis - as required
1. Mini language to operate on tplot variables - basic model for IDL and non IDL Licensees eta 9/12-9/15
  - a. ~~Develop Lexical Analyzer~~
  - b. ~~Implement library functions/operators~~
  - c. Develop Parser – more testing needed
  - d. Develop evaluator – in progress
  - e. Assemble & Test
1. Starting Sept. 8th Splash GUI
  - a. Edit Pull Down Menu
  - b. View Pull Down Menu
  - c. Analysis Pull Down Menu
  - d. Update Test Suites
  - e. v05 QA scripts and suites
2. High pass filter issues
  - a. Fix bug where NaN is inserted into result accidentally.
  - b. Generate warning notification if high pass filter is going to allocate an especially large array or take a very long time
  - c. Provide an option for the user to select binning resolution.
2. Training on the day to day operations of the Summary Plots and Mosaics (2009)
3. An option in tdegap so that if you provide several inputs, it will interpolate the outputs onto the same time cadence.(Given time to do this, it should be a pretty straightforward change for me to make.)
3. wavapol.pro and twavapol.pro - Put Olivier's into the distribution, test
3. VMO Deliverables: data product description files (only L2 data goes to VMO)  
VMO Product Status:
  - Completed: FGM (all probes) , State, ESA (all probes), FIT (onboard for all probes)
  - In Progress: GMAG – Observatory complete, Instrument in progress eta – 9/2 (numerical in queue)
  - On hold: EFI (awaiting EFI caveats from John B)
  - Yet to be done: SST, FBK, FFT (onboard), MOM, SCM, ASI
4. Tplot enhanced crib - Davin should be involved and the cribs should not be to overwhelming.  
Possibly multiple cribs by functions.
4. boundary normal coordinates. On Hold. BugzID=59.
5. Christine's code to rotate the XY coord's along Earth direction was very effective. Also it was used by others. We need to streamline it, and it's very similar to the others you've already written.
5. Error msg for when timestamps of data do not match in tvector\_rotate, tdotp, and tcrossp.
6. Tplot auto scaling. BugzID=41.
6. invalid inputs to the version keyword
7. Clean-up of makepng and makegif
7. General Routine 'Add magnitude' vector - adding it's magnitude in its structure. 4 vectors, colors=BGRB.

## Bryan

1. Specplot – popen issue to be reviewed by Jim M
1. Outlier Removal code and Transformation to the boundary-normal coordinates into distribution.
1. Starting Sept. 8th Splash GUI
  - a. File Pull Down Menu: a1. Themis Document a2. Load Themis Data a3. Themes
  - b. Update Test Suites c. v05 QA scripts and suites
1. Setup ARTEMIS (Solaris 8 machine for mission design)
  - e. Install OS patches as needed f. ~~Install IDL 6.4~~
  - f. For GDDS/GMAN IDL and FDC setup files – in progress (may not need recompilation)
  - g. Install Sun compilers – On hold h. Setup so that anyone with IGPP acct can log in
  - i. Security j. Install working web browser (Netscape's very slow and crashes)
2. Think about making 2D slices through distribution. See medical imaging code in IDL demo."
  - a. 2D first migrate code into crib - in progress b. 2D with med imaging code c. 3D slices
3. thm\_load\_state - phase II (consult with Ken)
  - a. For STATE CDF files, the following variable attributes should be defined, consistent with they way they are defined in the L2 FGM file: units, coordinate\_system (consult with Jim L.)
  - b. Once defined in the CDF, thm\_load\_state should take the values from the dlimits.cdf.vatt to set the metadata for the tplot variables: dlimits.data\_att.units, dlimits.data\_att.coord\_sys
  - c. For thm\_load\_state, the suffix gets added to support data, but support data is not transformed: if you call thm\_load\_state, coord='gse', suffix='\_gse', /get\_support\_data only the pos and vel get transformed, but all get the \_gse suffix.
  - d. in thm\_load\_state, the code to delete support data that was loaded for coordinate transformation should be just del\_data, '\*\_state\_temp' e. THC braid photoelectrons
  - f. Finishing the coordinate transformation of the thm\_load\_state data at input, to include transformation of spinaxis attitude, need to determine keyword switch, implement the rotation of the spinaxis elevation/azimuth from gei to arbitrary coordinates (consult with Pat, Vassilis and Ken)
4. From Hannes:
  - a. Provided is the most common plot used by scientists that look at magnetic field data. Four panels Bx By Bz Bt and the position X Y Z as variables. Often the radial distance R is another variable. It would be great if someone enters e.g. tplot,'tha\_fgs\_gsm' such a useful default plot would appear. I am currently not able to produce such a plot using tplot. Another useful plot would be instead of one trace per panel, 5 traces per panel. One for each spacecraft and 5 sets of positions as variables at the bottom. For example: tplot,'th?\_fgs\_gsm' could produce such a plot. Also some standard plots that combine ground and spacecraft data could be useful. Notes from Vassilis: define keyword /positions default 'none', allow GSM X Y Z, R Lat Long,.....
  - b. The level 2 CDF files at [http://themis.ssl.berkeley.edu/data\\_download.shtml](http://themis.ssl.berkeley.edu/data_download.shtml) should contain position in various coordinate systems as well. Preferably in the same resolution as the data. Otherwise Scientists need to get the position from another source. Notes from Vassilis: option to introduce the data in RE with keyword (one RE =6,478 kilometers ???). Like thm\_load\_fgm /pos\_units= 'RE'. Also thm\_load\_state keyword out\_coord = 'GSM', 'GSE',...etc.
  - c. If one loads fgm data from probe 'a' and let's say there are no data for the chosen interval. The variables tha\_fgl and tha\_fgl\_gsm etc. should all be empty. It could be those variables still contain data from the previously loaded interval.
5. Variable units – generic solution - thm\_load\_spin, \_state, \_hsk, \_sst, \_esa, \_bau, \_fgm, \_fbk, \_fft, \_fit, \_scm, \_efi, \_trg, \_asi, \_gmag, \_ask, \_mom, \_esa\_pkt
6. If requesting 1 hour of data using timespan, then load data using one of our load data routines. Recommend if there is a fix at the load cdf level.
7. upgrade thm\_load to work with probe assignments
8. move functionality of thm\_load\_state2 into thm\_load\_state and delete thm\_load\_state2
9. Multiple enhancements concerning keywords, valid\_names and thm\_load routines

## Hithesh

1. Participate and learning the procedures for burning the eeprom on the s/c. Eta Probe 'A' – 9/8
2. FGM - 11hz noise - participate and watch in the analysis. Either there is no solution or sort out the FSW mod to fix the issue. Locate source of noise. Work with Dorothy at SSL first week of September.
3. ESA – investigate invalid configs from Survey to burst mode in IDPU scripts (see Jim L)
4. Sort out dialing in to the FSW Engineering Test Unit (ETU) at SSL from UCLA with Jim Lewis.  
Sort out any special computer needs.
5. SCW spikes analysis - understand what was done in loading the new burst configuration that caused the problem and recommend a solution (only when change of the burst configuration)
6. Run the CPT tests for the following four modules - in progress.  
a) SCI & SCI2 - 12 (3 done successfully)    c) CMP - 4    d) EEPROM - 18  
v5.0 can be uploaded to the S/C even if CPT tests not completed as per Peter.
7. Review FSW Specifications document for v5 changes. **Waiting review by Peter.**
8. Review FSW code of all 24 modules and the CPT tests for each (ongoing)
9. Learn how to create a stol procedure from Mission Ops.
10. Watch engineering is going along, tools for plotting (ongoing)
11. Review scripts and/or macros with Michael Ludlam (ongoing)

## Michael

1. The 1 Hz bug fix (noted by John Bonnell) is in progress thm\_efi\_despin. In progress
  - a. Periods selected for 30-40 periods for Probe 'C'.
  - b. Run the SDT Calibration. Must re review with John **events to be removed and then regenerate the plots. Send new plots to John, Forrest and Vassilis**
  - c. Steps #a-#b will need to be completed for the other four probes as well.
    - c1. Probe 'D' c2. Probe 'E' c3. Probe 'A' c4. Probe 'B'
1. The poor despinning bug fix in thm\_efi\_despin (awaiting completion of 1hz bug fix)
1. Make code read Time-dependent calibration files - awaiting John B.'s review and testing  
Send John new version of code and ask John to review and guidance. Awaiting **John to run test**.
1. Alter calibration formula in thm\_cal\_efi
1. Starting Sept. 8th Splash GUI
  - a. Markers b. Ancillary Data Display c. Graph Pull Down Menu
  - d. Update Test Suites e. v05 QA scripts and suites
2. FBK Frequencies
  - a. FBK Frequency Bin Definitions – assignment tbd
  - b. Per Vassilis, ask Chris Cully about constructing a "no gaps" version of the FBK frequencies.  
This would mitigate John Bonnell's concerns about the difficulties in plotting gapped data.  
Check specplot to determine bin boundaries – in progress
3. Photo Potential
4. Get EAC offsets from J.B. -- this \*cannot\* be done until AC-coupled data is taken.
5. EFI L2 cdf
5. EFI CAL Document
6. "Case-by-case" calibration parameters ("short-term" high accuracy corrections).  
involves generalizing some code from Chris C. as a tool for the general user. The tool will look at short time ranges, and pass out high-resolution calibration parameters in a structure. We envision that this structure will be passed into THM\_CAL\_EFI disabling those parameters that are normally gotten from the calibration files. LASP is working on this and when done would be incorporated in the tdas software.
7. deconvolution, any other tasks to have a working load and cal efi.
8. The EFI program headers should include what inputs are valid for each keyword.
9. thm\_load\_efi - allow multiple coord's to be entered. Do not overwrite plot variables.
10. efs data deleted when thm\_load\_fit run twice, second time only fgs data requested
10. Modify THM\_CAL\_FIT to treat efs datatype - Install E12/E34 conditional based on th?\_fit\_code TPLOT variable. If E12 switched to E34 software needs to be revised to handle (low priority).
11. Correlate to onboard spin fits using EFP data. Look at FGM. Talk to Jim L.
12. Add the DATATYPE kw to KYOTO\_AE\_LOAD , and load only AE data by default (low priority).
13. Get the downloader (KYOTO\_AE\_DOWNLOAD based on the new version of FILE\_HTTP\_COPY ) working (low priority).
14. Build an informational widget.
  - a) (From Jim M.) Break THM\_UI\_SHOW\_DLIM out of THM\_GUI to use as a stand-alone routine. - Make the name of the displayed sub-structure(s) a parameter. (low priority)

The following recommendations have been made by Jim McFadden and need to be reviewed and prioritized by John Bonnell:

1. The baseline offsets seem not to be sufficiently accurate, therefore spintone residuals remain in the data. It may be that only an on-the-fly calibration (a la SDT) will work, and that the EFI code would need to be modified from its current list-style calibration.
2. We should have code that duplicates the on-board spin fits in order to understand why the ground and on-board fits are different. I do not know if such code exists -- we should run this question by John Bonnell.



## Cindy

### 1. Develop functionality of Splash into Themis Gui (80%)

#### g. Development

- |  |  |
|--|--|
| g01. Design and Prep for 9/8 - Cindy (9/8)           | g02. Kickoff / Orientation Meeting - All (9/8) |
| g03. Themis Document - Bryan                         | g04. Edit Pull Down Menu - Pat                 |
| g05. Cursor Motion - Cindy                           | g06. Load Themis Data - Bryan                  |
| g07. Graph Pull Down Menu - Michael                  | g08. Keyboard - Cindy                          |
| g09. View Pull Down Menu - Pat                       | g10. Mgmt Data/Plots - Cindy                   |
| g11. Themes - Bryan                                  | g12. Window and Data Mgmt - Cindy              |
| g13. Markers - Cindy and Michael                     | g14. Export/Print - Bryan                      |
| g15. Status Bar, Msg Mgmt, Path and Tool bar - Cindy |  |
| g16. Analysis Pull Down Menu - Pat and Jim M         |  |
| g17. Ancillary Data Display - Michael                |  |

#### h. Update Test Suites - All

#### i. QA of v5.0 - All

#### j. Tweaks based upon Training and QA - All

#### k. Users Guide and Help Widget - All

#### l. Training Presentation Development - Cindy

#### m. Training (practice for Gem as well) for scientists, splash and other programmers - All (eta 12/8-12/10)

#### n. Presentation at GEM Conference - Dec 14, San Francisco - tbd

#### o. Release v5.0 and hold web training worldwide - tbd

#### p. Sort out Splash GUI Phase II - Cindy

### 1. ARTEMIS (20%)

#### a. Run examples from Sabine to see if same results (orientation as well)

#### b. Get Software from Vassilis to be run and analyzed

### 2. Routine to transform state data into RE in the gui. There is already a routine in the distribution that does this, but it is not currently part of the gui. Add a button, call to the transform routine, and put some checks into place. 2 days to implement.

### 3. Add an additional button and a call to IDL's save routine. A day at most to implement.

### 3. An IDL crib sheet has been provided that generates magnetic field and position data with the same resolution. Scientists very often like to have a set of dayfiles of magnetic field data and position. So the crib sheet could be called inside a loop and for each day an output ASCII file could be produced. An option could be all 5 spacecraft merged with only one time column. Additionally a desired resolution could be another option From Hannes.

### 4. Post Splash Gui Mods Part 1 - Mac (David Sibeck's machine from Ken)

#### a. when selecting data, L1 and L2 can be selected at the same time and the result was confusing. since the low-level commands can only load one or the other, the GUI interface should enforce the same restriction.

#### b. the script output does not match the standard crib sheets: e.g. you don't see thm\_load\_fgm anywhere in the script. so you need a new document to describe to people how to modify scripts made with the GUI...or you need to change the GUI to follow the crib sheets...or just live with it..

#### c. Label S/C Position button (GSE or GSN - default) (for UCLA)

### 5. Post Splash Gui Mods Part 2 - Mac (David Sibeck's machine from Ken)

See List on last page of task list.

#### Vladimir

1. Jonathan to review Outlier Removal code and Transformation to the boundary-normal coordinates.  
To be put into the distribution
2. Convolution – new module.

#### Kate

What's cooking?

#### Andreas

1. Awaiting review of Kyoto DST2plot code.
2. L2 File Definitions Document - awaiting L1 document to be completed to use as template.
3. Support VWO - Shing Fung with wave data.

#### UCLA

1. Clean-up the power ripples from the FGM data. (Krishan). Awaiting new programmer

1. It seems that particle are in course of reprocessing from your side. I guess that the calibration parameters have been changed and that the saturated sectors of SST have been managed in the processing. We have no time right now to check that, but we'll do it as soon as possible.

Concerning the study of the ESA/SST response, our student has performed a statistical analysis of quiet plasma sheet crossings based on L2-data with -preliminary- results. These ones need to be checked through more detailed analysis. It appeared clearly however that the particle pressure (including all contribution, i.e., ions and electrons from both ESA and SST) is underestimated. For now, we have not reliable enough results to state on the origin (SST versus ESA) of this underestimation.

2. L1 ESA CDF and thm\_load\_esa – awaiting feedback from the Project

#### Software Tasks To Be Discussed (TBD) / To Be Assigned (TBA)

1. TBA - Data contain engineering, deployment, maneuver, and science data are in the same stream.

From the data description, only maneuver flag state\_man is provided. Do you provide information about the time intervals when the data are on, say, engineering level? This data, though valuable in many respects, may be confusing if interpreted as science data. To provide such information, it is possible, for example, to add some bits to existing state\_man flag. (from Vladimir)

Quality flags (for each instrument to be added to L2 State cdf).

2. TBA - Tplot User's Guide (David and Vassilis to talk further)

3. TBD - print, dprint, msg continue, verbose options for a standard

4. TBD - Mini Language to operate on tplot variables

5. TBD - Tplot FAQ's (Amanda) Maybe replaced by #1

6. TBD - Mull over: Allow Tplot: overplot color spectra, multiple angles, variable angles.

7. Hold - Spin modeling during shadows (BugzID=43)

8. Hold - Separate E and B timestamps for spin fits (BugzID=45)

9. Hold - Refactor repeated CDF library code in CDF processing tools (BugzID=50)

10. Hold - Bugzilla enhancements: Graphical charts and graphs don't work (BugzID=7)

Extend Platform/OS options (BugzID=73)

11. Hold - str\_element does not add to embedded structures (BugzID=69)

12. Hold - SM coord transformation in thm\_cotrans does not work: fixing that would be too drastic a change for a patch release, because it might break a lot of existing code. The issue is: if the in\_coord parameter is not explicitly specified, and the dlimits structure also does not specify the coordinate system, do we want to try to figure it out from the "in\_suffix" argument (current behavior, doesn't work for SM coords), or just fail with a message that a coordinate system must be specified with either the in\_coord argument or dlimit structure (probably a better solution, but might break existing code).

#### Non GUI Future Release Mods

1. Many of the data processing routines that are tested here do not inherit the plotting options from the tplot variable that they take as input. For data processing routines that I've written Vassilis has had me modify them so that they inherit these options. It shouldn't be very hard to do this, but whether we do it or not depends on whether we think these data processing routines are useful only for the gui or for the command line user as well. (from Pat).

2. Load routines to all support keywords suffix and relpathnames\_all.

3. tplot does not fail gracefully after illegal margin set. In this case: tplot\_options,'xmargin',[100,100], tplot does not fail gracefully after illegal margin set. In this case: tplot\_options,'xmargin',[-1,-1]

-tplot does not fail gracefully after illegal margin set. In this case: tplot\_options,'ymargin',[100,100]

4. Errors 45 and 46 are the same in character. In the former, THM\_COTRANS is called with IN\_COORD set to something that does not match the metadata. The test script expects an error, but THM\_COTRANS just prints an informational message without stopping. In the latter, THM\_COTRANS is called with COORD set to 'dsl' whereas the data is in 'scs' (this transformation is invalid). Again the script expects an error, but none is generated. (Michael and Jim M have different opinions)

There are two easy fixes:

a. Remove /INFOMATIONAL from the call the MESSAGE, so execution stops and the command

line test script catches the error.

b. Remove tests 45, and 46.

#a will force the programmers to make sure that the initial coordinates are correctly predicted (or the metadata is up to date), to make sure that only valid transformations are requested, and it will make it harder to run scripts without stopping. #b will force the user to catch such "non-transformations" in the text output, and it will make it easier to run scripts without stopping.

6. fac\_matrix\_make: do a better job putting the inputs into the correct coordinate system.

7. minvar\_matrix\_make documentation is a little sparse, so it couldn't hurt to improve the function header.

8. With a pre-mission and future dates, thm\_gen\_overplot does not exit gracefully. The user sees a lot of "Remote file not found messages", but is not offered any indication that the date requested is before the mission began. It would also be useful to have a check for when DATE plus DUR is greater than the current date, and then ignore the requested days beyond the current.

9. There's a possible bug thm\_gen\_overplot when an illegal device is set with the DEVICE keyword. The code doesn't check to make sure if the graphics device is valid. It passes the test script because thm\_gen\_overplot has its own catch error statement embedded in the code. The catch statement does report, "Graphics device not available: a", but only after data have been loaded and tplot vars have been created. If a long time range is requested this could be a significant waste of time to the user.

10. Issue with thm\_load\_fgm, I'm not sure if this is intentional or what but...an old version of thm\_load\_fgm would return the fgm data is whatever coordinate system you requested. It would call cotrans if the data was not available in that system in the file, but now, it seems like it will no longer automatically perform the transformation for you.

12. NO\_DOWNLOAD keyword missing from thm\_load\_fbk.

13. The plots should not be blank, and they weren't before the QA started. Fortunately, the code is working correctly in that when data doesn't exist the code gracefully moves on to the next datatype. However, perhaps the code should be modified such that a blank tplot var isn't created when this happens. (thm\_part\_moments2 ).

14. a. When thm\_load\_fit is called requesting a single data type it will also return some auxiliary data types. For example: thm\_load\_fit,probe='b',datatype='fgs' returns:

1 thb\_fit\_code 2 thb\_fit\_npts 3 thb\_fgs (low priority load bug or test script bug)

b. The relpathnames all keyword is broken. (low priority bug)

16. THM\_LOAD\_MOM doesn't recognize the datatype keyword for L1 data. (It does for L2).

17. thm\_Load\_Mom Dpwrspec button gives no results -- due to a problem in SVDFIT routine. Linear fit routine needed.

### GUI Mods Post Splash Release

1. Issues with GUI State test suite: store\_data seems to be getting called twice for each variable loaded.

2. Issues with GUI State test suite: It sometimes loads more data than I asked for.

3. shift clicked to select probes A & B then I tried to shift click on the level 2 data types to select them and got error #80 (also #86).

4. When block\_average is called with a block length(in seconds) that is shorter than the cadence of the data it will create nans between the data points. For example if an input vector at a 30 second cadence is block\_averaged with a requested block length of 10 seconds it will perform a transformation like this:

Input Data: [1,2,3,NaN,5]

Output Data: [1,NaN,NaN,2,NaN,NaN,3,NaN,NaN,NaN,NaN,NaN,5,NaN,NaN]

The problem is that when this output is plotted, it draws nothing because there are NaNs between all data points.

This can be confusing and perhaps make the user think that the routine has a bug when it does not.

Pat proposes that only in the GUI we change the default so that the output from the input above is:

Output Data: [1,1,1,2,2,2,3,3,3,NaN,NaN,NaN,5,5,5]

This seems to be a reasonable expectation for how the block average should perform in this error situation. It will let the user know the routine worked, but also clue the user in to the fact that their requested block length is too short when they look at the shape of the output curve. Also, It is hard to detect the exact cadence of the data because it may change and may have gaps, but I would also have the GUI generate a popup error if the median cadence is longer than the requested block length. While this may not catch all instances of the problem, it will also ensure that the user is explicitly warned in most cases.

Vassilis: I think to first order we should leave `block_average` as it was. These are standard problems the user faces when dealing with data analysis. There is a `deflag` routine that is supposed to take care of the situation.

The option implemented in 4.0 now is confusing for data analysis. A better option for `block_average` would be to add two new features:

- a keyword `/noNaN` which would prevent adding NaNs (for blocks with zero points).
- an output array called `npoints` which contains an array with the number of points that went into the average (or median...) If zero then the average is presumably a NaN. The user can search and throw away data where confidence in statistical significance is low.

5. a. When `thm_load_fit` is called requesting a single data type it will also return some auxiliary data types. For example: `thm_load_fit,probe='b',datatype='fgs'` returns:

1 `thb_fit_code` 2 `thb_fit_npts` 3 `thb_fgs` (low priority load bug or test script bug)

b. The `relpathnames` all keyword is broken. (low priority bug)