Themis Software Task Priorities (In Play / In the Queue) - 6/20/08

To Be Discussed - Top of Meeting

1. Data and Misc Issues
    a. MOM variable names to include a catdesc - e.g. "use esa if available, this is density"
       e.g. "use this variable only if xxxxxxxxx is not avilable"
    b. discuss making the new spin model the default
    c. L1 ESA CDF and thm_load_esa feedback to Thomas (Jim McFadden and Davin)
2. Davin
    a. algorithm used for _magt3 processing - Vladimir's email
    b. check if changes to thm_load_state will affect thm_load_state2
3. John B.
    a. Document EFI caveats
4. Harald
    a. Process High Resolution data once Tim has put into the system (est. 6/13)
       Priority to 2/16, 2/26, 2/28. CDF's are done, keograms by 6/13.
    b. Validate Tsyganenko work from Pat (6/30)
    c. Send SPA Newsletter and Mosaics info and blurb for Vassilis to submit.
    d. Production Data Processing info for Tim (on hold)
5. Olivier
    a. Review reprocessed data with scw spikes removed
6. Web
    a. Beef up insturment web pages and include caveats for each.

Tim

1. Support Mirror Sites: a. Japan (ISAS) b. Austria c. France
   d. UCLA - UCLA will need to supply SSH key - RSYNC Key
1. Support gmag data remote sites: a. Augsburg b. Japan - made contact c. Alberta - **heard from?** d. APL
2. GMAG reprocessing.
2. 2hr plots: fitmoms, and overviews
3. RSYNC with high resolution data starting 7/2007 to fill in what we don't have. (etc 6/14)
4. 20 Themis scripts review to optimize processing. (40% complete)
5. ~~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
    b. spin model data (talk to Jim Lewis)
        1. ~~Send Jim updated master cdf with new variables~~
        2. Help verify reprocessed State cdf's in QA
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 - developed a technique for inside magnetosphere with high accuracy.
   next step? Paper to be published.

Jim L.

1. a) scw spike removal - **data for review by scientists provided and awaiting feedback from Olivier**
   b) L1 cdf reprocessing
2. "Add spin model data to state CDFs", format change, reprocessing will be needed - in progress
   a. Spin period and spin phase - double precision. Initial tests complete BugzID=91
   b. thm_cotrans changed (see Pat) to use spin model instead of current method of interpolating spin period. Code will be reviewed with Hannes before testing begins. Once Jim completes his testing, Hannes will be asked to QA new functionality. BugzID=100. - in testing
   ~~c. Sort out changes to thm_load_state (Bryan to make mods)~~
   d. Reprocess V00, V01, V02 and V03 State cdf's with the new master cdf from Hannes into QA.
   e. changes to tdas spin model routines to use spin phase offset provided by Hannes.
   f. Work with Hannes and independently to verify QA State cdf's
   g. Update QA State cdf's for entire mission and copy into production. Put new State master cdf into production and thm_cotrans and thm_load_state into trunk.
3. L1 File definitions Document. BugzID=xx.
3. GOES 12 Test data - create read to cdf routine, load cdf routine, master cdf, telecon with Howard Singer, pass in other coordinate systems.
4. Refactor repeated CDF library code in CDF processing tools BugZid=50
4. Bfield mid-packet jumps.
4. L0 to L1 processing: look ahead to the next packet before processing the current packet. BugzID=67
4. Repeated timestamps and gaps in spin fit data BugZid=113 (#67 may fix this one as well).
5. 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
5. L0->L1 processing scripts need better logging. BugzID=96,
6. FGS sample times and values, showing repeated timestamps. BugzID=113 (BugzID=67 must be done first)
6. FGM range changes in the mid packet. Post Proc maybe a solution to eliminate the spike. BugzID=44.
7. Non Monotonic timestamps. BugzID=72
8. Latest ESA modes not yet implemented (BugzID=4) (Hold until sent to Probes)
9. bau_sunpulse_met assumes x86 endiannes (BugzID=13)
10. 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)
11. "Phantom packets" cause non-monotonic distribution times. BugzID=25, low priority.
12. Evaluate CDF compression algorithms BugZid=81, low priority.
13. L0 to L1 processing scripts should allow partial processing BugZid=49, 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. tha fgm data in thb data - remove the wild cards from the spawned command
1. Check with Davin on thm_load_state2
1. Reviewed FBK labels as per SPDF, labels beefed up and reprocessing will occur at the same time as ESA reprocessing.
1. ESA L2 cdf reprocessing:
   a. ~~Ions back into the L2 esa cdf's with s/c potential zero. First analyze what s/c potential would be generated.~~
   b. add source flag for s/c potential as a variable not attribute and run test
   c. Change for pressure tensor from Jim McFadden - has been committed
   d. Reprocess esa L2 cdf's as needed
1. Possibly update catdesc of MOM variables and then reprocess MOM L2 cdf as per SPDF
1. Once Jim McFadden completes his mods for removing lowest bins for pressure & density (flux alreay written) Reprocess L2 cdf's - entire mission.
2. 2hr plots: fitmoms, and overviews committed and will go into production the week of 5/27-5/30. Making changes from Tai and Vassilis. **Coordinate with Tim 6/24-6/27.**
3. FFT (onboard) L2 cdf
4 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)
4 Decouple display variable types in the 'Choose Data widget' from the valid data types in thm_load_*.
   - Partially done.
4. SCM L2 cdf
5 Variable units – generic solution
   thm_load_spin.pro, thm_load_state.pro, thm_load_hsk.pro, thm_load_sst.pro
   thm_load_esa.pro, thm_load_bau.pro, thm_load_fgm.pro, thm_load_fbk.pro
   thm_load_fft.pro, thm_load_fit.pro, thm_load_scm.pro, thm_load_efi.pro
   thm_load_trg.pro, thm_load_asi.pro, thm_load_gmag.pro, thm_load_ask.pro
   thm_load_mom, thm_load_esa_pkt
5 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.
6 Themis SCM CAL File Processing - produce table of contents and assign sections with Patrick R.
   Turnover from Ken
7 Administrator's Guide
8 Themis Developers Guide
9 thm_load_mom changes
   a. 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
10. Overview plot change: mode bar seems thick (nothing we can do easily - low priority)
10. Extraneous scmcal directory under L1 products (from Jim L.) BugzID=98.
10. Mosaic Processing - permanent script needed (very low priority)

L2 Product Status:
Completed: ESA, MOM, FIT (onboard), FBK, FGM, SST (needs upgrades), GMAG
Yet to be done: FFT (onboard), SCM, EFI (Michael), ASI (Harald)

Pat

1. Plots for Vassilis using the plotxyz routine. In Progress
1. High pass filter issues
2. executable crib for standardized Themis mapping ala plot below. thm_map_crib.pro
   Keywords[default]:trange[timespan],centerMLT[6:30],centerLAT[65deg], equatorial[0],neutral[0],
   probe['all'],gmags['all'],model['t89'],input=[2(kp=2)],fieldlines[1]
   Note: equatorial also shows equatorial trace, neutral also finds and plots neutral sheet. In progress.
2. fix "makeps". Attached is a "fixed" version which plots what user sees on screen without much reshaping.
   This is good for publications. **... Davin's tprint???? can we delete?**
   Also, plotxy and plotxyz bug fixed for postscripts yet postscript issues with plotxyz.
3. wavepol.pro and twavepol.pro - Put Olivier's into the distribution, test
3. Training on the day to day operations of the Summary Plots and Mosaics
3. VMO Deliverables: data product description files (only L2 data goes to VMO)
   ~~a. Corrections/Enhancements for FGM data Instrument and Numerical Data Files.~~
   ~~b. Generate EFI Instrument File & Update Person Files for EFI PI's (Forrest Mozer & John Bonnell)~~
   ~~Jon reviewing Draft~~
   c. Write FIT Numerical Data description - next up
   d. Review Ephemeris SPASE numerical data, instrument files. This includes making improvements in the description of support quantities, particularly the mode descriptions.
   ~~e. Review Observatory files for all probes and the person file for Themis.~~
   ~~f Generate an instrument file for Thermal Plasma measurements(Moment Temperature) then numerical data files for this quantity for each probe, repeat this process for other moments.~~
3. VMO updates to completed products due to other Software changes
   a. ESA - L2 cdf changes
   b. State - V00, V01, V02 and V03 changes
3. Mini language to operate on tplot variables - first provide concept write up
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 it's structure. 4 vectors, colors=BGRB.

VMO Product Status:

Completed: FGM, State (mods maybe needed), ESA (mods maybe needed), FIT (onboard) - in progress

Yet to be done: MOM, FBK, SST, GMAG, FFT (onboard), SCM, EFI, ASI

Bryan

1. Overplotting of not just lines and spectra, but also spectra over spectra. This means that the gap would be filled if another plot is below it. This way the data would not have to be merged, just tplot has to account for gaps and plot them as true gaps. (Submitted by Vladimir)
   ~~a. plotting multiple variables~~
   b. create crib (in progress) and send to Vladimir, Davin and Vassilis
2. thm_load_state - phase I
   a. hardcode (units = "km/s" or "km", or "deg") b. finish "no_update" loading option (consult with Davin)
   c. minor bug found by Pat (email of 2/15/08)
3. thm_load_state (for new State cdf's - coordinate with Jim Lewis)
   a. Add the spin model variables to d_names. They are all considered "support_data".
   b. Ensure that the get_support_data, no_spin, and keep_spin_data keywords are passed to thm_load_state_post, the post-processing routine for thm_load_state.
   c. Move the code block that calls thm_load_spin from thm_load_state into thm_load_state_post.
   d. Replace the call to thm_load_spin with a call to spinmodel_post_process.
4. Think about making 2D slices through distribution. See medical imaging code in IDL demo."
5. 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)
6. 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 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.
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

Michael

1. Kyoto - Andreas email items #1 and #1 checked-in?
1. TDAS routines hardwired for 16-bin case - talk to Jim Lewis
1. FBK Frequencies - sort out with John Bonnell
1. EFI bug fixes
1. Make code read Time-dependent calibration files - awaiting John B.'s review and testing
2. Training on the day to day processing of the L2 cdf's - **write-up notes**
3. Make calibration files time-dependent. I will need these numbers from J. B., or instructions/code for producing them. (needed to allow user to use #3). Sort out with John (6/2-6/6)
4. Get voltage offsets from J. B. (he has to pull bench-testing data).
5. Get EAC offsets from J.B. -- this *cannot* be done until AC-coupled data is taken.
6. deconvolution, any other tasks to have a working load and cal efi.
7. "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.
8. EFI L2 cdf
9. EFI CAL Document
10. Modify THM_CAL_FIT.PRO 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. Kyoto - tasks for Andreas - a) ~~AE2tplot complete~~ b) DST2tplot in progress
12. Add the DATATYPE kw to KYOTO_AE_LOAD.PRO, and load only AE data by default (low priority).
13. Get the downloader (KYOTO_AE_DOWNLOAD.PRO based on the new version of FILE_HTTP_COPY.PRO) working (low priority).
14. Build an informational widget.
    a) (From Jim M.) Break THM_UI_SHOW_DLIM.PRO out of THM_GUI.PRO to use as a stand-alone routine. - Make the name of the displayed sub-structure(s) a parameter. (low priority)

Hithesh

1. Code for v5 of the FSW for the patches below is complete with testing in progress and doc to follow (etc 6/20):
   - ~~patch 4a - new compression algorithms 441,443,453 (pfr-820)~~
     ~~new sst attenuator calculation (prf-819)~~
   - ~~patch 4b - Elimination of False Density Triggers (PFR-819)~~
   - ~~patch 42 - patch bkg module for fgm sample timing change~~
   - ~~patch 43 - add etckicker to the code~~
   - ~~patch 44 - software to fix huffman compressor (256-byte was compressed not raw)~~
   - ~~patch 45 - patches version 4.5 software to correct moment tracking software.~~
   - ~~patch 46 - modify the ion density trigger function~~
   - patch 47 - improve command clock transfer timing - in progress
     improve command responsiveness in compression - in progress
     ~~improve sc potential calculation timing~~
   - ~~patch 48 - improve sc potential calculation timing (pfr-810)~~
     ~~remove false triggers (pfr-812)~~
     ~~remove orphan wave bursts (pfr-815)~~
   - ~~patch 49 - improve 1m bps telemetry (pfr-818)~~
2. Coordinate with Mission Ops controllers to run FSW v5.0 tests on flatsat starting 6/23-6/27
2. In parallel to the Flatsat v5.0 tests, run the CPT tests for the following four modules starting 6/23-6/27:
   a) SCI b) SCI2 c) CMP d) EEPROM
3. Participate and learning the procedures for burning the eprom on the etu, flatsat and on the s/c.
4. FGM - 11hz noise - participate and watch in the analysis. Either there is no solution or sort out the FSW mod to fix the issue.
5. Sort out dialing in to the FSW Engineering Test Unit (ETU) at SSL from UCLA with Jim Lewis. Sort out any special computer needs by 6/18. Implement by 7/31.
6. 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)
7. Review FSW code of all 24 modules and the CPT tests for each (ongoing)
8. Learn how to create a stol procedure from Mission Ops.
9. Watch engineering is going along, tools for plotting (ongoing)
10. Review scripts and/or macros with Michael Ludlam (ongoing)

Cindy

1. Develop functionality of Splash into Themis Gui
    a. ~~Define List of functionality to be included~~
    b. ~~Define Table of Contents for Design Document~~
    c. Prototype GUI Main Window to verify IDL can handle the functionality to be added - in progress, 6/27
    d. Complete Design Document - in progress, etc 6/27
    e. Hold Design Review with scientists, splash and Themis programmers
    f. Outline coding and testing tasks and begin development
    g. User's Guide Updates
    h. Hold demo/training for scientists, splash and other programmers
    i. Tweaks based upon demo
    j. Release and hold web training - worldwide
2. tplot_ascii - 3 dimension functionality
2. thm_ui modules in separate directory (from Pat)
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. Gui Mods - Mac (David Sibeck's machine from Ken) - Phase I
    a. The time span entered on the main window should be the default time span for tplotting. Specifically, if you change the timespan on the main window, the tplot timespan is unchanged.
    b. tlimits does not work from the cursor when run from the GUI.. tlimits with the cursor works from the command line.
    c. 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.
    d. 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..
    e. Sometimes hitting 'X' in top right corner of main widget causing help form to be displayed.
5. Additional GUI Mods - Phase II
    a. See email with history file ...231920 abort.
    b. Upper flatfile button (for Vassilis, work with Kate / UCLA Splash)
    c. Add new coord transf options to SM, GSM and GEO into GUI
    d. Modify tplot_save and tplot_restore to save tplot variable plot settings. Settings include: window size (x and y values), time limits, ylimits, and zlimits. (from Sheng-Hsien) Window size now saved in tplot (Davin's mod) separate mod.
6. Additional GUI Mods - Phase III
    a. current plot window - tell you which one (for UCLA)
    b. Lower flatfile button (for Vassilis / Chris Russell)
    c. Label S/C Position button (GSE or GSN - default) (for UCLA)
    d. Long Variable Names truncated in IDL-D

Vladimir

1. Solar Wind code to be reviewed by Jonathan Eastwood
2. Larry Kepko asked to review Outlier Removal code and Transformation to the boundary-normal coordinates.

Kate

What's cooking?

Andreas

1. L2 File Definitions Document - awaiting L1 document to be completed to use as template.

UCLA

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

Christian Jacquey and Thomas Moreau **(updated 4/29/8)**

1. Converging toward our primary goal, i.e., to interface the THEMIS data with the CL software. It is almost finish for the ESA data, some details are now being fixed and then we will go to the SST data.
    a. Compliance tests and primary data studies have shown matching data quantity values and plots between data processed and plotted with tdas and CL software. Subsequent data studies will normally validate CL reliability. At the time, and based on the successful primary tests that have been accomplished, we could obviously close this task.
    b. We've have implemented the corrections for effective spacecraft potential, and obtained same derived products as computed tdas. Previous data studies have raised no anomalous features on this point. **Done.**
    c. With the help of a young student (bachelor) , we have started a study of the response of the particle instruments.
        - As a first step, we are performing the statistical analysis of the perpendicular pressure (ESA i+ and e-, and SST i+) versus magnetic pressure observed during crossing or penetration of the spacecraft inside the plasma sheet during quite interplanetary conditions (BZ>0, Pd~ct). Assuming 1D current sheet balance, the goal is to infer if there is under/over-estimation of the plasma pressure and to characterize it if necessary.
        - Then, we will study the ESA versus SST spectra and then see what can be done for adjusting them.
2. L1 ESA CDF and thm_load_esa
    a) define and write a new skeleton cdf file that would be use as a data model for producing the new CDF ESA L1 files. This task needs to reconstruct entirely the skeleton of the CDF ESA L1 data file based on the IDL structure's content of the Jim's L0 code. Following the last suggestions from Jim L., data model will consist of 2 separated L1 ESA CDF files, one containing time varying quantities (as counts..), the other one storing calibrations stuff that have no time dependence and that may be so refined without the need to reprocess all the ESA L1 CDFs. I attached those new skeleton cdf files and wait for Jim L. analysis and comments.
    b) submit skeleton together with a text file listing all items contained within the new model to Jim Lewis for feedback and validation. **Done.**
    c) Develop the code assigned to create and read L1 ESA cdf files. 3-4 weeks should be sufficient. The reading code is almost finished. Particular but minimal developments have still to be done for incorporating returns of the L1 ESA CDF files exams. Detailed information about ESA L1 CDF related routines that compose the code, together with a list of all CDF data quantities contained within CDF files, are explained within the delivered guide titled guide_readCDF_ESAL1.doc. Hope to get feedbacks and corrections about it. Task still open
    d) From Jim L. ESA packet loading routines use depreciated spinmodel.txt BugzID=101
    Not sure to be concerned by this part. Let me know

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 - TDAS does not use L1 spin model cdf by default, yet available via thm_load_state (BugzID=99)

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 and 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.pro).
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 Phase I Release or Later
1. Modify Time Range so user typed in inputs can be edited.
2. Modify the way messages a re handling to correct messages appearing on incorrect widgets.
3. Issues with GUI State test suite: store_data seems to be getting called twice for each variable loaded.
4. Issues with GUI State test suite: It sometimes loads more data than I asked for.
5. The Active Data Window does not always contain the data that was requested at load time. This happens when some or all of the data was already loaded.
6. If one of the submenus like dproc or options is already open, that if you click the button to open the submenus that it should bring those menus to the foreground.
7. 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).
8. 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.

9. Issues with active data type in gui. While I'm sure we can use some tricky logic in the gui to figure out which data types actually get loaded, I think there are some reasons to prefer adding a flag to the tplot dlimits structure.

a. It would make the gui logic simpler.

b. If data is requested, but does not exist(but a previous version does under that same name) that data would still be made active by any logic that is only in the gui.

c. I've heard some criticisms from users that they are often confused about which data is actually loaded when they use a load routine.

Adding the flag might give us a better way to provide this information to users on the command line.

10. add a button that applies the 'split_vec' routine to the active data to GUI.

11.Create a Title Widget.

12. FGM and EFI GUI Test Suite (Error report #91):

% Attempt to subscript TV_NAMES with <LONG (-1)> is out of range.
% Execution halted at: THM_GUI_EVENT 226
/Users/michf/Documents/THEMIS/software/tdas_4_00/idl/themis/common/thm_gui.pro
% $MAIN$
% Compiled module: THM_UI_ERROR.

Clicking in the "Loaded Data" window, just looking for something during Test 1, step 8.

13. 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)

14. It would be nicer if you can put an option in the Ylimit widget to allow user to choose whether this will be applied to just the current panel or all the panels. Otherwise by selecting items in the "Loaded Data" column I am regenerating data items in the "Active Data" column for plotting every time I want to modify the "Ylimit" for each panel, since the modification of Ylimit is usually done after I have made at least one drawing of the already selected data items