Themis Software Task Priorities (In Play / In the Queue) - 4/25/08

To Be Discussed - Top of Meeting

1. Email from David Sibeck/ Bob McQuire
   a. CDAWeb is supplying electric field observations from THEMIS-A for November 7, 2007. This is a bad idea: the instrument was not deployed and the observations are meaningless. ==> If THEMIS wants to produce these anyway, maybe CDAWeb should not publicly show this tha_l2_fit product.
   b. In the absence of electric field measurements, the automated routine is not removing photoelectrons from the electron moment calculations. All of the electron densities whether from MOM or ESA are WRONG. Either in your CDFs or in our master CDFs, we could as an interim step set all of the "bad" electron density variables in effected datasets to a data_type of "ignore_data." They would then not show as selectable variables for plotting, listing or CDF creation. Values would still be accessible for users downloading the CDFs as you've sent them to us.
   c. Probes D and E do have electric field measurements. As noted by Bonnell, there is a LARGE offset in Ex. Users must not suppose they can just take these values and present them in scientific papers. The offset must be analyzed and removed- not an easy job for the researcher. Dave Sibeck and I are not clear in which coordinate system(s) the offset is only in X direction. And we could not fully understand all the ways in which the offset in Ex might effect other component values using the Ez=0 and E dot B = 0 algorithms. If we had this information, there might be some combination of special labeling and setting some variables to "ignore_data" that would make some of the FIT appropriate for public use.
   d. Because electric field observations are available, the associated potential can be calculated and photoelectrons removed from the ESA observations on THEMIS -D and E. They look pretty good. Nevertheless, one can see problems on THEMIS-E electron densities from 1000-1100 UT, significantly different variations from 1000-1100 UT for example. It is not a good idea for us to provide the density twice without information about possible problems (e.g. this one). One or more good "caveats" pages to which we can link is important for all THEMIS datasets. I hope to have more information for you about absolute magnitudes of the pressures (which in the previous version were bad) sometime next week from Galina.
2. NOAA GOES Data - test data recieved, **next step?** Proposal from Jim Lewis:
   1.0 Data format tasks
   2.0 Ephemeris and coordinate transform tasks
   3.0 SOC tasks
   4.0 TDAS programming tasks
3. thm_load_ace_ascii - Cindy's email
4. FILE_HTTP_COPY
5. We are putting out L1 CDFs at the moment. A L2 state format is under development. So, does the spin model info go into the current L1, the future L2, or both? Will the L2 state file *replace* L1, or will we continue to produce both?
6. SST Attenuator issues (issues to be named later, maybe) - Davin

Tim

1. ~~a) Show mosaics with a fourth web button.~~
   b) Clearly identify that "hour" click brings out mosaic.
   c) Add "5minute" feature to advance backward/forward.
   d) Fix buttons so that they are clear and not jumbled.

1. Support Mirror Sites
   a. DARTS/ISAS b. UCLA - UCLA will need to supply SSH key - RSYNC Key
   ~~c. Augsburg - Sent master cdfs format, example of idl code that writes cdf's and directory structure~~

2. 2hr plots: fitmoms, and overviews [Note: people are using the DARTs site because of this feature; this small fix will make the main site more friendly]. **Once Jim M is completed**

3. ~~12 ASI drives, 10 off-loaded, 2 still to be done~~. **Create list of Inventory.**

~~3. Inventory of Products, monitoring and building new alarms for Production Data Processing.~~
~~Draft document produced.~~ Next version with Harald's info as well. **Info from Harald available?**
Send latest copy to David

4. Mozaics - Movies

4. 20 Themis scripts review to optimize processing. (10% complete)

4. Order 20 Tbytes additional disk storage

Hannes

1. V03 - L2 State cdf.
   a. definitive attitude info - in progress

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   b. See email concerning parms ("thx_sci_mode", "thx_hsk_issr_mode")
   c. quality flag for FGM data
   d. spin model data (talk to Jim Lewis)

Jim L.

1. Processing Flatsat data for triggers
1. Perform v4.0 QA testing.

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2. Compress and Decompress routines for MOMs. BugzID=81, for Fields. BugzID=81.
   More extensive test awaiting completion of the tail season.
3. L1 File definitions Document. BugzID=xx. **Awaiting word doc from Amanda/David.**
3. "Add spin model data to state CDFs"
4. thm_cotrans changed 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.
5. Bfield mid-packet jumps.
5. L0 to L1 processing: look ahead to the next packet before processing the current packet. BugzID=67
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. FGS sample times and values, showing repeated timestamps. BugzID=113 (BugzID=67 must be done first)
5. FGM range changes in the mid packet. Post Proc maybe a solution to eliminate the spike. BugzID=44.
6. Provide Higher Cadence State Files - Spin period and spin phase - double precision. BugzID=91
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)

Jim M.

1. Mozaic Processing stopped at 4/21. Analysis needed. Script to be rewritten to only process new files.
1. Send Rapid mag folks sample mag cdf.
1. L2 Fit re-reprocessing (Bob McQuire email)
1. QA Prep: L2 cdf's reprocessing
1. **QA Prep**, IDL Geopack in V4.0
1. QA Testing
2. GMAG Stack Plots - In progress, reprocess. Add gmag 20 stations. BugzID=86.
2. 2hr plots: fitmoms, and overviews [Note: people are using the DARTs site because of this feature; this small fix will make the main site more friendly]. **Coordinate with Tim**

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3. A separate paragraph or couple sentences on each L2 cdf's that are available to the public.
3. Extraneous scmcal directory under L1 products (from Jim L.) BugzID=98.
3. FFT (onboard) L2 cdf
3. AE Indexes Issue Jan 8-12, keyograms Jan 12-13, Stripes- Vassilis: minor nuissance - low priority
3. Decouple display variable types in the 'Choose Data widget' from the valid data types in thm_load_*.
   - Partially done.
4. 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
4. 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.
4. Themis SCM CAL File Processing - produce table of contents and assign sections with Patrick R.
   Turnover from Ken
5. Administrator's Guide
5. Themis Developers Guide
6. thm_load_mom changes
   a. reconcile mods with Davin at an appropriate time.
6. SST L2 cdf upgrades - coordinate with Jim L. (L1 cdf changes)
6. Overview plot change: mode bar seems thick (nothing we can do easily - low priority)
7. Extraneous scmcal directory under L1 products

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

Pat

1. Plots for Vassilis using the plotxyz routine.
    a. Generate SST pressure scatter plots b. Generate scatter plots of dynamic solar wind pressure vs measured pressure from themis spacecraft using omni data.
1. Probe = 'f' testing some bugs with Andreas. Mod made the thm_load_mom (On hold)
1. v4.0 QA testing
2. IDL v7.0 - April when Release 4.0 of the Themis Software is QA'd.
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. Sorted out with Vassilis.
2. fix "makeps". Attached is a "fixed" version which plots what user sees on screen without much reshaping. This is good for publications. **Ask for feedback from Scientists**
   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. add a function to the distribution called tdexists(varname(s),startime,endtime) It would return true if there was data on the interval and false if not.
3. VMO Deliverables: data product description files (only L2 data goes to VMO)
   a. Review FGM SPASE numerical data and instrument files for all probes - Initial review completed. Will revisit to confirm correctness.
   b. Review Ephemeris SPASE numerical data instrument files for all probes - Initial review completed. Will revisit to confirm correctness.
   c. Draft of the esa numerical data file, ~~the esa instrument file, and a person file for James McFadden.~~ The two esa files are for Themis A, but I think because the other spacecraft data types are very similar it will be easy to generate the other spacecraft after the first. Mods to be made to data file based upon VMO feedback.. Jan okays to propergate to other probes.

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   d. Review Observatory files for all probes and the person file for Themis.
   e 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.
   f Generate an instrument file for EFI or SCM and corresponding numerical data files for each probe.
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.
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, ESA (second draft - one probe)
Yet to be done: MOM, FIT (onboard), FBK, SST, GMAG, FFT (onboard), SCM, EFI, ASI

Bryan

1. Check in Xushi's programs into the distribution.
1. Incorporate Vassilis's mods to thm_fac_matrix_make into fac_matrix_make 4/25
2. Updates to QA Test Scripts and Test Suites. a) Updates to thm_part_getspec test script 4/25
   b). Modify test scripts to test use of tdegap in (thm_)fac_matrix_make. 4/25
2. v4.0 QA Testing

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2. Tplot issue with angle mode changes. Since tplot only works with square arrays, it can't plot a time range that contains an angle mode change in which the number and distribution of the angles (y-axis) changes. The user is forced to limit the timerange that contains only the angle mode in which they're most interested. 4/3
3. 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) **Due date tbd after consult with Vassilis.**
4. thm_load_state - phase I
   a. hardcode (units = "km/s" or "km", or "deg") b. finish "no_update" loading option (consult with Davin)
   b. 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)
   c. minor bug found by Pat (email of 2/15/08)
5. 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
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. Updates to QA Test Scripts and Test Suites.
1. v4.0 QA Testing
2. Modify THM_CAL_FIT.PRO to treat efs datatype:
   a. Call THM_GET_EFI_CAL_PARS.PRO to get EFI calibration parameters.
   b. Apply spin-independent calibrations (from the E12, i.e. dawn-dusk, axis params) to scale the Ex and Ey data.
   c. Obviously, do not despin (as is usual with the waveform datatypes).
   d. Apply spin-dependent (despun spacecraft) calibrations.
   e. Install E12/E34 conditional based on th?_fit_code TPLOT variable (possibly needed in the future).
3. Make code read Time-dependent calibration files - started yet on hold
4. 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)
5. Get voltage offsets from J. B. (he has to pull bench-testing data).
6. Get EAC offsets from J.B. -- this *cannot* be done until AC-coupled data is taken.
7. deconvolution, any other tasks to have a working load and cal efi.
8. "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.
9. Kyoto - AE Tasks for Andreas
9. Currently the GUI has the load SCM routine applied with the option without cleanup. As a first step we need to perform the calibration as default at the time of introducing the data, with the command thm_load_scm, such that the default output will be in dsl, calibrated data, with full cleanup. The defaults are provided.
   This would make it compatible with FGM.

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10. Add the DATATYPE kw to KYOTO_AE_LOAD.PRO, and load only AE data by default (low priority).
11. Get the downloader (KYOTO_AE_DOWNLOAD.PRO based on the new version of FILE_HTTP_COPY.PRO) working (low priority).
12. EFI CAL Document
13. 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. Moments triggering off of the density and pressure for the day side. - the following tests have been run (will be patch v4b):
    a. Review actual Probe 'A" data for after patch is uploaded. due 4/23 check density and pressure.
2. Setup for v5 of the FSW with the following patches to date and test on Flatsat and document:
    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
        improve command responsiveness in compression
        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)
    patch 4a - new compression algorithms 441,443,453 (pfr-820)
        new sst attenuator calculation (prf-819)

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3. Watch engineering is going along, tools for plotting
4. Review scripts and/or macros with Michael Ludlam

Cindy

1. Updates to QA Test Scripts and Test Suites, GUI Help Tutorial, Themis Users Guide
2. v4.0 QA Testing
3. thm_load_ace_ascii - naming converntions, data structures

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4. Button for Multi-Probe B field panels - implemented GUI part, tplot analysis in progress
4. Currently the GUI has the load SCM routine applied with the option without cleanup. As a second step we need to fix the GUI to allow the user to tweak the calibration options. Before introducing the SCM data a window should pop up, that has all the options below listed, with their defaults inserted. The user would then either click OK, or modify the calibration options before clicking OK. Then the user can click the button to introduce the data. - in progress
5. Develop functionality of Splash into Themis Gui
6. 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 a 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.
6. Gui Mods - Mac (David Sibeck's machine from Ken)
    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..
7. 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. buttons on overview plot sub widget for fgm, esa and sst Tohban plots
8. 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. De-Gap widget add units
    e. DP - Delete or Overview Plot or Clear History - warning message
    f. Long Variable Names truncated in IDL-D

Vladimir

~~1. Solar Wind IDL. Make modular.~~

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2. Tony Lui asked to review Solar Wind code.
3. Larry Kepko asked to review Outlier Removal code and Transformation to the boundary-normal coordinates.

Kate

What's cooking?

Davin
1. SST actuation: Overview Processing issue from Vassilis
2. Pressure calibration issue - factor of 100 difference between ps?f_density and ps_m_density for all probes.
3. Sun Pulse Contamination not removed. Low Priority

Scientist IDL Code Review
1. get_sw_data.pro (Vladimir) - Jennifer reviewed?

Harald
1. Validate Tsygenko work from Pat (April 2008)
2. Send SPA Newsletter and Mozaics info and blurb for Vassilis to submit.

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
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. Themis data are correctly interfaced with the CL software which is now performing similar plots as tdas products, for both ESA and SST sensors. We're currently analyzing different data collection period and cross-checking with the tdas results in order to fully validate CL reliability.
   b. We're also analyzing the pertinence of the particle measurements together with the spacecraft potential that is done within the L2 CDF files. We'll let you know about these exams.
   c. In middle terms, we plan to study the combination of both SST and ESA data for -maybe- producing data or visualization products using both instrument. Vassilis made us aware that similar effort is underway on your side. We will communicate with you when it will be started.
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.
   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. 2-c. This task is in wait of the validation of the skeleton. Reading code will be written right after getting confirmation of the content of the skeleton. We hope to clear up some of these tasks status.
   d) From Jim L. ESA packet loading routines use depreciated spinmodel.txt BugzID=101

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)