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| Investigation: FIELDS |
| Progress accomplished this period: | March 2015 Reporting Period |
| 1. | Project Management |
|  | a. | Project Management* Attended the FIELDS team data processing meeting and the **MMS launch!**
* Responded to questions regarding the PPBE and the Phase D cost to complete proposal that were submitted in February.
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| 2. | FIELDS Testing and Commissioning (Rau, Needell) |
|  |  | Observatory Testing and Commissioning Planning Support (FIELDS)* Performed final VIF testing on all Observatories prior to launch
* Attended pre-launch FIELDS team meeting and SWT
* Supported final launch preps of MMS including purge outage discussions
* Attended MMS Launch!!!!
* Implemented flight GSEOS display screens
* Began FIELDS early orbit operations and FIELDS commissioning with FIELDS power on, ADP RE deployment and magnetometer boom deployments
* Began data review of FIELDS data
* Supported on-orbit EDI low voltage and FSW uploads
* Supported final S/C SDP spin rate and thin wire tension walk thru
* Continued support of daily commissioning planning meetings with SOC/MOC

FIELDS Commissioning Status * OBS-1: FIELDS powered, Magnetometers deployed, ADP RE's deployed, SDP doors open and wire booms at 17m awaiting thin wire deploy on 4/7/15
* OBS-2: FIELDS powered, Magnetometers deployed, ADP RE's deployed, SDP doors open and wire booms at 17m awaiting thin wire deploy on 4/8/15
* OBS-3: FIELDS powered, Magnetometers deployed, ADP RE's deployed, SDP deployment to 17m on 4/7/15
* OBS-4: FIELDS powered, Magnetometers deployed, ADP RE's deployed, SDP doors open and wire booms at 17m awaiting thin wire deploy on 4/8/15
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| 3. | EDI Commissioning (Dors) |
|  |  | General* Generated, tested and delivered the scripts required for commissioning activities up to and including EDI007.
* Supported all commissioning activities & processes related to EDI.
* Supported meetings including
	+ Observatory Tactical Planning Meetings
	+ Observatory Strategic Planning Meetings
	+ IS Planning Meetings
	+ Activity Walk-Throughs

MMS1 Status* EDI Controller powered successfully (FLD001).
* EDI001 (EDI Checkout and GDU LV Power On) completed.
* EDI002 (EDI Parameter Table and FSW Load) completed.
* EDI003 (HV1 - Extreme MCP Voltages and Optics & Gun Checkout) not successfully run after 3 attempts.
	+ First attempt aborted following autonomous safing triggered by over-current condition in GDU2 (SN 6).  Issue determined to be caused by gun energy reference settings during the turn-on of secondary power in conjunction with a circuit modification unique to this unit's gun.  (MMSATS-919)
	+ Second attempt aborted following GDU1 (SN 3) entering into the communication lockout (COMM\_LOCK) state.  This condition is well-known from I&T to be harmless and simply requiring a restart of the activity.  (MMSATS-941)
	+ Third attempt was scrubbed due to DSN tracking issues making the  contact window too short in duration to be usable for this activity.
	+ Forth attempt scheduled for 1 April 2015 12:15UT.

MMS2 Status* EDI Controller powered successfully (FLD001).
* EDI001 completed.
* EDI002 completed.
* EDI003 (HV1) completed.
* EDI004 (HV2 - Sensor and Ambient Mode Test) completed.

MMS3 & MMS4 Status* EDI Controller powered successfully (FLD001).
* EDI001 completed.
* EDI002 completed.
* EDI003 (HV1) completed.
* EDI004 (HV2) completed.
* EDI005 (HV3 - Extreme Optics & Gun Voltages and Beam Pointing Tests) completed.
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| 4. | Science and Science Data Processing  |
|  |  | SWT and SWG (Torbert)* Participation in all science planning discussions.
* Participation at the FIELDS data meeting and SWT, SWG meetings in March
* Post launch on-site participation at SOC in FIELDS and MMS commissioning and data processing activities

Science data processing activities* ALL
	+ Looking at first data
	+ Supported FIELDS meeting in Florida
* UNH
	+ Working on sample timing – using evenly spaced samples
	+ Dealt with many surprises in actual data
	+ Automated processing now running at SDC
	+ FIELDS real time displays performed very well for deployments
	+ Worked on EDI E field software
	+ Worked on combined E product software (with Cluster data)
* LPP
	+ Started analyzing commissioning data and comparing with AFG and DFG data.
	+ Commissioning modes (32, 128 and 256S/s) have been implemented.
	+ Burst tail and subsolar modes have been implemented.
* UCLA
	+ Started weekly mag team telecons to develop calibration data flow, and magnetic conference procedures
	+ Developing inflight calibration procedures
	+ Work continues on inflight calibration and procedures
* GSFC
	+ Released version 0.3.0 of the MMS Magnetometer Data Processing software and installed at SDC.
		- Updated Survey processing software to handle 128 S/s commissioning modes, in addition to fast and slow survey. 128 S/s data is downsampled to 16 S/s for srvy output.
		- New interface does not require HK filenames in the argument list. Software searches for necessary files, given a time, observatory, instrument, and mode.
		- Fixed issue with sun pulse orientation relative to zero spin phase.
	+ Tested the orthogonalizeFFT process with Cluster data (found that I was able to calibrate it on short intervals, but something causes instability over large intervals). Also did testing with simulated MMS data (found no instability when using the rigid body motion sample attitude). Fixed the MMS sample file generation tool to write properly formatted L1A files.
	+ Worked on data selection tool for Orthogonalization process.
	+ Visited UCLA for MMS Magnetometer turn on and deployments
		- Calibrated MMS data: orthogonalizeFFT works fine, but not when Kp=8
		- Manually processed data from L1A to L1B and QL. Set up rsync.
		- Verified proper application of ground calibrations.
	+ Worked on software to update calibration files with latest calibration results.
* IRFU
	+ Added software to plot I vs V from sweeps
	+ Worked on unit dependent offsets
	+ Implemented a check for non-nominal bias settings (from HK\_10E).
	+ Implemented phase in L2/L2pre from defatt files instead of HK\_101.
* LASP
	+ Working on ADP software
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| 4. | Mag Team Activities (Reported by UCLA) |
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|  |  |  | Pre-launch Preparations* Louise Lee continues to improve Python software (MagPy).
* Attended Science Working Team Meeting in Florida: Activities include: Review of magnetometer data analysis software and data visualization software for FIELDS meeting; Detailed discussion of magnetometer status and pre-launch preparations in magnetometer team meeting, demonstrated MagPy; Review of RFAs from the October Mag team meeting. UCLA attendees included C. T. Russell, H. Leinweber, and R. J. Strangeway.

Post-launch Activities* Werner Magnes, Ferdinand Plaschke, David Fischer, Guan Le, Ken Bromund, Hannes Leinweber, Robert Strangeway, and Kathryn Rowe at UCLA for initial magnetometer turn on and boom deployment. Magnetometer data are excellent.
* Used software from UNH to view real-time data. Began importing L1A and quicklook CDFs into end user software (e.g., IDL/tplot, Matlab).
* Continued development of calibration software by Hannes Leinweber, including analysis of post-deployment magnetometer data as a preliminary stage in updating the calibration files.
* Started weekly Magnetometer Conference (MagCon) Webex, every Wednesday, 8:00 AM Pacific Time.
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|  | c. | SCM | * Continued science data processing preparation activities
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| 5. | EDI Flight Software |
|  |  | * Generated, tested and delivered load scripts for update of POST, RTEMS and TABLES sections
* Loaded POST update (build 007) on all four observatories
* Loaded FSW RTEMS build 007 on all four observatories
* Loaded Tables build 007 on all four observatories
* Continued development and testing of Electric Field Mode
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| 7. | SDP (KTH, UNH) |

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|  |  | * Supporting commissioning activities.
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| 10. Problems encountered and updates this period |

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| 11. Issues and Concerns |
|  |  | * Recurrent EDI COMM Locks on MMS1 GDU1. Repeat of the restart activity is planned. See EDI Commissioning section above.
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| Activities planned for next reporting period |
|  |  | Management |
|  |  |  | * Continue weekly FIELDS Team meetings. Weekly forum remains useful for team tag-up. Agenda now focuses on commissioning and data processing activities.
* Support FIELDS commissioning and data processing teams as needed.
* Support continued review of the FIELDS Phase D proposal submitted in Feb
* Begin preparation of Phase E augmentation proposal due 8 May. Extend RFP to subcontractors.
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| 1 |  | FIELDS Commissioning |
|  |  |  | * Continue improvements on flight GSEOS display screens for commissioning
* Continue FIELDS commissioning activities with SDP door and wire boom deployments, bias optimizations and ADP boom deployments
* Continue supporting daily commissioning planning discussions with SOC
* Continue FIELDS data review
* Continue general FIELDS systems engineering support
* Continue EDI support as needed
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| 2 |  | EDI Commissioning |
|  |  |  | * Complete all activities up to HV5 to conclude Sensor Test and Ambient Mode checkouts on all observatories.
* Perform Build 8 FSW loads on all observatories.
* Complete HV6-HV11 focusing on Electric Field Mode checkouts on all observatories using Build 8 FSW.
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| 3 |  | Science |
|  |  |  | SWT and SWG(Torbert)* Continue on site participation in FIELDS and MMS commissioning and data processing activity at SOC

Science data processing plans * ALL
	+ Support SODAWG
* UNH
	+ Continue working on EDI E Field interfaces
	+ Work on RunEst software (for E Field and mag spin axis calibration)
	+ Continue work on scripting to control processing
	+ Continue L0 to L1 software updates as necessary
	+ Continue working on combined E and B products
	+ Work on error and warning management
* LPP
	+ [in progress] Analyze the results of the MRT9 data test and correct the software where needed.
	+ [in progress] Test further the SCM calibration software with the new SCM L1A CDF files provided by M. Chutter in Mag123 system (see MRT9 data test).
	+ [in progress] Include CDF version number computation (vX.Y.Z) - SDC provided us with the software/procedure to inquire MMS database in order to know which version of the same data in the latest. This has to be implemented in SCM software.
	+ L1B data will be delivered in both SCM123 and OMB reference frames as decided on the data processing group meeting, Iowa, March 2014
	+ Include coordinate transformation from mechanical frame OMB to GSE in L1BtoL2
	+ [in progress] Include quality factor in SCM L1B and L2 products
	+ [in progress]Test DSP spectra calibration.
* UCLA
	+ Continue developing in-flight calibration procedures
	+ Continue working on timing corrections
	+ Complete end-to-end data flow from SDC to Mag team home institutions and back to SDC.
* GSFC
	+ Finalize method to update calibration files with results from the Orthogonalization process. Refine the format of the intermediate files that record the deltas.
	+ Augment L2pre software to handle data overlap, fine timing corrections and/or filtering, temperature correction.
	+ Look into potential problems with sun pulse phase algorithm (pointed out by Tomas Nilsson). Find out if I can use sunpulse\_uniq.
	+ Implement versioning scheme for the L1B, QL, and L2pre data products: still requires inputs from SDC.
	+ Update appropriate documentation regarding more solidified decisions RE timing corrections, uncertainties and temperature correction coefficients.
	+ Investigate how to smooth attitude data, with LANL and FDOA.
* IRFU
	+ Implement initial version of offset correction.
* LASP
	+ Continue improving DCE software
	+ Write the software that gives the calibration factor for a given bandwidth in order that Mark Chutter can calibrate E spectra.
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|  |  | Mag Team (Compiled by UCLA) |
|  |  |  | * Continue developing inflight calibration procedures, document same.
* Continue data analysis software activities.
* Complete end-to-end data flow from SDC to Mag team home institutions and back to SDC.
* Complete installation of dedicated computer and disks for MMS magnetometer data processing.
* Develop CDF to flatfile utility for MagPy program.
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|  |  | EDI Flight Software |
|  |  |  | * Update HK limit tables to allow higher LED currents on Gun deflectors
* Update correlator table for determination of code clock dividers from magnetic field strength
* Refinement to Ambient Mode telemetry based on first results from Ambient Mode execution on all four observatories
* Generate load scripts for update of RTEMS and TABLES to build 008
* Load RTEMS and TABLES on all four observatories
* Execute Electric Field Mode on the observatories
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