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| Investigation: FIELDS |
| Progress accomplished this period: | July 2015 Reporting Period |
| 1. | Project Management |
|  | a. | Project Management* Continuing weekly FIELDS team meetings with focus on commissioning, operations and data processing activity.
* Supporting ops team as necessary
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| 2. | FIELDS SE, Commissioning and Operations (Rau) |
|  |  | Observatory Commissioning Support (FIELDS)* Supported investigation into SDP BEB current surges at 3Re inbound
* Updated SDP BEB current limits and trip points to account for current surges
* Supported magnetometer range testing from ATS
* Supported SCM high rate data during several eclipses
* Supported for ASPOC009 EDI testing
* Uploaded updated magnetometer calibration tables
* Increased SCM sampling rate in slow survey to 32Hz
* Supported GDU gun heater thermal telecoms for change in preheating time
* Supported ADP bias optimization activity
* Changed SDP bias settings to account for changes in photoemission
* Incorporated changes into V2.1 of CDPU FSW
* Continued weekly FIELDS operations planning meetings at UNH
* Continued data review of FIELDS data
* Continued support of daily commissioning planning meetings with SOC/MOC

FIELDS Status * FIELDS is fully operational on all Observatories
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| 3. | EDI Commissioning (Dors) |
|  |  | * Participated in FPI.010.2s on all s/c.
* Participated in pseudo-nominal operation activities.
* Implemented new command sequences for mode changes made via ATS.
* Implemented new ATS operations, which included EFIELD mode between 4&9Re.
* Completed Electric Field mode burst data collection activity.
* Continued review of EDI data.
* Supported extended ROI interference and cross-calibration preparations.
* Supported the EDI gun heater set-point study and resultant change.
* Supported daily commissioning and operations planning with SOC & MOC.
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| 4. | Science and Science Data Processing  |
|  |  | SWT and SWG (Torbert)* Participated in all science planning discussions.
* Continued participation in FIELDS and MMS commissioning and data processing activities

Science data processing activities* ALL
	+ Looking at data
* UNH
	+ Adjusted processing for transition from commissioning to fast/slow survey
	+ Continued working on sample timing
	+ Several tests of SITL
	+ More scripts …
	+ Bug fixes/enhancements …
	+ Working software to produce EDI E field data using convergence method
	+ Merged magnetic field software runs, but is not automated
* LPP
	+ Commissioning data analysis in progress: bug fixes, interferences investigation, SCM gain study.
	+ Minimize calibration window edge effects by mirroring missing data in L1B data files.
	+ Remove data affected by calibration window edge effects in L2 data files.
	+ L2 frequency filtering done and successfully tested on commissioning data.
	+ L2 coordinate transformation from SCM123 to GSE successfully tested on commissioning data.
	+ Other sample rates than current nominal values are now allowed in the process to anticipate possible upcoming changes.
* UCLA
	+ Additional analysis of interference campaign data indicates that 128-Hz harmonics observed by SCM (fundamental often below SCM noise floor) appear at AFG turn-on. Some discussion of whether or not additional tests should be performed
	+ Saturn.igpp.ucla.edu now primary server at UCLA for MMS files and data
* GSFC
	+ Incremental releases of MMS Magnetometer Data Processing software
	+ Fixed some issues with handling of attitude and ephemeris
	+ Evaluated a new approach to the orthogonalization process
* IRFU
	+ Updated DCE and Potential code to work in fast and slow survey
	+ Analyzing bias sweeps
* LASP
	+ Working on ADP software
	+ Analyzing bias sweeps
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| 5. | EDI Flight Software |
|  |  | * Implemented re-sampling of analog HK channel in case of timeout (UNH bug #327)
* Using Wehnelt/Focus/BeamCurrent Tables from SRAM to support parameter tweaks without need for FSW change
* Implemented read of FIELDS time from ASPOC register to prevent false detection of 4-sec boundaries caused by a CDPU FPGA bug (in accordance with a supporting change in CDPU FSW)
* Implemented support for DFG DEC64 decimation option
* Updated lookup tables with DFG despin coefficients for DEC64
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| 6. Problems encountered and updates this period |

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| 7. Issues and Concerns |
|  |  | Science Data Processing Issues* LPP
	+ Wrong sign on SCM L1A data: still under investigation. The software corrects this, even if the reason of this sign inversion is not yet known.
	+ SCM data seems to be 10% lower/higher than AFG/DFG data: still under investigation
	+ Working with UNH and LASP to try to understand these two features. Currently looking into both at the DSP/SCM hardware level.
* GSFC
	+ Update: need to follow up with FDOA to see if they are done with commissioning and ready to discuss issues with definitive attitude (jitter and uneven sampling rate).
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| Activities planned for next reporting period |
| 1 |  | Management |
|  |  |  | * Prepare and submit the GFY16 FIELDS spending plan
* Continue weekly FIELDS Team meetings. Weekly forum remains useful for team tag-up. Agenda now focuses on operations, data processing and Mag and E-Field Conference activities.
* Support FIELDS operations and data processing teams as needed.
* Compile list of FIELDS team lessons learned (2nd round)
* Begin selection and hiring process for a post-doc to support Phase E science activities at UNH.
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| 2 |  | FIELDS SE, Commissioning and Operations (Rau) |
|  |  |  | * Ground test CDPU FSW update
* Support CDPU FSW loads
* Perform FIELDS reboot after CDPU FSW updates
* Continue investigation of FIELDS interference and noise signatures
* Upload updated magnetometer calibration tables
* Support EDI FSW loads
* Support 5 day extended ROI testing including EDI mode toggling, ASPOC current emissions during E-field mode and HPCA RF sweeping
* Support 7 day SITL test period
* Prepare for Sept 1 Phase 1A nominal operations
* Submit FIELDS information to ISSE as input to MMS PLAR
* Continue daily commissioning and operations planning discussions with SOC
* Continue FIELDS data review
* Continue general FIELDS SE and operations support
* Continue EDI support as needed
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| 3 |  | EDI Commissioning |
|  |  |  | * Monitor extended ROI operations.
* Participate in interference campaigns with ASPOC, EIS and FPI.
* Review results of extended ROI operations against objectives.
* Support SITL test operations.
* Support CDPU FSW load and reboot activities.
* Perform EDI FSW load and post-load test.
* Prepare for Phase 1A nominal operations.
* Support daily commissioning and operations planning with SOC & MOC.
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| 4 |  | Science |
|  |  |  | SWT and SWG (Torbert)* Continue support of FIELDS and MMS commissioning and data processing activity
* Participate in all science meetings
* Continue preparation of abstracts and papers for upcoming conferences

Science data processing plans (Chutter)* ALL
	+ Support SODAWG
* UNH
	+ Automate SCM L2 data production at SDC
	+ Continue working on timing
	+ Continue to explore interference issues and yet to be explained glitches
	+ Continue working on EDI E ground software – improve algorithm for assigning quality, combine fast and slow survey files into a single survey file, check outputs
	+ Work on RunEst software (for E Field and mag spin axis calibration)
	+ Update scripting as necessary
	+ Continue L0 to L1 software updates as necessary
	+ Continue working on combined E product
	+ Continue working on combined B product: need to check calibration process, check phase, automate
	+ Continue working on error and warning management
* LPP
	+ [done] Test and refine L2 frequency filtering (remove edge effects).
	+ [in progress] Analyze commissioning data:
		- [in progress, to be done prior to 01 Sep] correct bugs
		- [in progress] interferences identification
		- [new] write cleaning software to correct/remove interferences if relevant/needed/possible?
		- [done] coordinate transformation tests.
	+ [in progress] Study of how to include interference information (quality factor? caveats? separate file?)
	+ [reminder] L1B reference frames: At first, L1B will be delivered in SCM123 frame only. In case of misalignment, the transformation matrix from SCM123 to OMB will be used and data will then be delivered in OMB only in order to provide less disk space consuming files. So far, this matrix is set to identity: SCM123 and OMB are supposed to be the same reference frames
* UCLA
	+ Meeting of primary personnel involved with the on-orbit calibration process at APL Aug 3-5 (Ken Bromund, Hannes Leinweber, Ferdinand Plaschke, Brian Anderson). Meeting goal is to finalize on-orbit calibration procedures and processes, and dry run the process
	+ Release further updates to the calibration files
	+ Continue data analysis software activities, with emphasis on MagPy program
	+ Complete end-to-end data flow from SDC to Mag team home institutions and back to SDC
	+ To be completed prior to start of Phase E: l2pre data production
* GSFC
	+ Release V0.4.0 of MMS Magnetometer Data Processing software.
	+ Calibrate more data!
	+ Augment L2pre software to handle data overlap, temperature correction, new interface, and release that, too.
	+ Implement versioning scheme for L1B, QL, L2pre that is aware of changes in the calibration file input, in order to roll the ‘Y’ version number.
	+ Investigate how to smooth attitude data, with LANL and FDOA.
* IRFU
	+ Implement correction for the disturbance caused by the ADPs shadowing SDP probes.
* LASP
	+ Continue improving DCE software
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| 5 |  | EDI Flight Software (Vaith) |
|  |  |  | * Investigate effects seen in data from the observatories
	+ - ratio of quality 0 to quality 1 data in Electric Field Mode
		- initial time-of-flight variability after Electric Field Mode startup
* Give Trigger Data Message priority over autonomous PGA2 reconfiguration to prevent late sending of EDI trigger data
* Prepare load scripts for FSW build 010 and Tables build 009
* FSW Acceptance Test
* Load EDI FSW and Tables on all four observatories
* Update User Manual
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| 6 |  | UCLA |
|  |  |  | * Establish Phase E subcontract with APL
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