

# Helioseismic and Magnetic Imager

## Stanford University

Contract NAS5-02139  
Progress Report for July 2005

### Introduction

The Helioseismic and Magnetic Imager (HMI) investigation proposal was submitted to NASA on 24 April 2002 in response to the Solar Dynamics Observatory Announcement of Opportunity AO 02-OSS-01, and this investigation was selected by NASA on 15 August 2002. The contract (NAS5-02139) between NASA and Stanford University was in place as of 27 September 2002. That contract has been modified (via Modification #13) to extend through Phase-E at launch plus 30 days plus six years with the launch expected in 31 August 2007. To date the contract has been modified 23 times.

We have re-costed the original launch delay proposal and developing the details for costing the new 4-month delay and the support of AIA data processing and EPO. We reviewed the AIA requirements for level-1 processing and clarified estimates of data volumes and data flow rates between SU and LMSAL. Our goal is to be finished with the JSOC and launch slips proposal by late TBD weeks after we receive the RFP.

We are proceeding with development of the JSOC and support of AIA development under the verbal assurance that NASA approves of the plan.

The development of the HMI flight instrument is subcontracted to the Lockheed Martin Space System Company at its Lockheed-Martin Solar and Astrophysics Laboratory (LMSAL) in Palo Alto California. The monthly progress of the LMSAL subcontract is reported in parallel with this report and is considered to be an attachment to this report. The monthly report for E/PO activities is also attached to this report. All monthly reports are available at [http://hmi.stanford.edu/Status\\_Reports/](http://hmi.stanford.edu/Status_Reports/).

### Status and Activities during July.

Both Stanford and Lockheed personnel have participated in weekly SDO instrument interface, ground system, and individual instrument team teleconferences.

The SU team supported regular Weekly HMI meetings at the LMSAL facilities including the regular weekly status meeting and topical design meetings in areas including mechanical, optics, thermal, electrical, software, CCD cameras, and others as needed. R. Bush joined the LM team on a visit to the UK to discuss CCD camera development issues. (Details in LMSAL reports).

The Stanford personnel responsible for the HMI instrument performance (R. Bush and J. Schou) continued work on understanding the optical, thermal, and filter performance for the HMI filter oven and front window filter to assist LMSAL. Work is now shifting to detailed preparations for the first optical tests of the complete HMI Optics Package

expected to begin on October/November 2005. J. Schou is leading an effort to develop calibration sequences to be used in these stimulus telescope and sunlight tests. S. Couvidat is continuing work preparing for calibration activities. Calibration planning meetings continue on a semi-regular weekly schedule (most Fridays at 4 PM). Additional work continued in the form of discussions and management activities on the CCD camera systems for both the development and flight camera systems for both HMI and AIA in support of the LMSAL activities.

The parts for the polarization test equipment have arrived at HAO and are being assembled. This instrumentation will be available for calibration activities as scheduled.

Progress on the SUMS component of the JSOC has slowed due to SCSI incompatibilities that SGI OS upgrades have not corrected. We are in the process of moving the SUMS development activity to 64-bit X-86 heritage machines vs the Itanium based SGI system in use up to now. While we had expected to make this move before proceeding to the full production system we had believed we could complete the development on the prototype file server system borrowed from prior programs. Since this has proven intractable we are proceeding with the move now. These problems have delayed the further SUMS development by 2-3 weeks. The DRMS system development continues with the data naming to SQL conversion nearing completion. As a result of the SUMS hardware problems intense testing will move to September or October but will be scheduled to not conflict with the optics box testing.

We have made good progress on adding housekeeping handling to the EGSE data system software. This will allow capture of the image status packets from the high speed channel during ground testing. The same code will be used in the flight level-0 processing for HK data in the high rate stream.

The flight unit data EGSE (HMI-2, AIA-2) machines have all arrived, along with the 64-bit replacements for HMI-0 and AIA/HMI-1. The HMI/AIA-2 machines are awaiting the tape managing software and will be delivered to LMSAL prior to the arrival of the final sets of spacecraft simulators.

The construction of the new Varian-II Physics building (now called the Physics and Astrophysics Building) is progressing. We have initial space allocations in this building sufficient for about 1/3 of our office needs. Work is continuing on identifying the additional space we need. We have lost ground on this effort. There was no visible progress on this effort in July. The window of opportunity to construct a new building has passed so now if space at Stanford that can be reconfigured for our needs is not found in the next few months we will be forced to begin a search for off-campus space. We must occupy our new offices and data center space by January 2007 to avoid delays in end-to-end testing and procurement of the JSOC processing and storage hardware.

We have selected the date and venue for the joint HMI and AIA science team meeting for February 2006. We will meet in Monterey, CA, during the week of 13 Feb.

## **Planned Activities for August**

We will continue detailed work on the combined proposal to cover the original 8-month launch delay, the JSOC, the 2-month flight phase extension, and the new 4-month delay in launch with funding limits for FY05 and FY06. The goal is a draft proposal by mid September with submission to NASA before October.

We expect the SUMS/DRMS initial system including tape support to be tested on the JSOC prototype hardware (with the tape system on borrowed hardware for the moment).

We expect significant progress on including the housekeeping packet simulation and unpacking in the EGSE system. Completion of this effort is scheduled for August.

The planning for HMI optical calibration will continue, as well as a detailed analysis at the module level of software needed to accomplish the HMI standard high level data products. Several team members will be out of town on vacations or conferences during July so work (and spending) will be low as required to match NASA funding levels.

## Near-term Milestones

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| 1 January 2005 | Decision on space location within Stanford for the JSOC and Stanford HMI team facilities. <i>This is finally beginning to happen.</i> |
| 31 August 2005 | JSOC SUMS and DRMS testing of record management well along.   |
| 31 August 2005 | Deliver updated EGSE HMI-2 (AIA-2 moved to match later SSIM delivery)   |

## Attachments

Lockheed Martin Solar and Astrophysics Laboratory HMI progress report and the HMI/AIA EPO progress report for July are attached. This report, the LMSAL report, and EPO reports are also available at [http://hmi.stanford.edu/Status\\_Reports](http://hmi.stanford.edu/Status_Reports) for convenience.