

Helioseismic and Magnetic Imager

Stanford University

Contract NAS5-02139

Progress Report for June 2004

Introduction

The Helioseismic and Magnetic Imager (HMI) 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 accepted by NASA on 15 August 2002. The contract to NAS5-02139 between NASA and Stanford University was in place as of 27 September 2002. That contract has now 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. We have submitted a proposal for the additional effort needed to extend the launch date to 30 April 2008. We expect the launch delay modification to be negotiated in the next few months. We have submitted a proposal to provide the electronic parts including CCDs for AIA. This proposal has been accepted by NASA and will be modification #15. We expect to submit a proposal to include capture and analysis of AIA data to form the Joint SOC.

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/.

Status and Activities during June.

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

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.

The Stanford personnel responsible for the HMI instrument performance continued work on understanding the optical, thermal, and filter performance specifications for the HMI filter oven and front window and blocking filters to assist LMSAL. Additional work continued in the form of technical discussions of the Michelson Interferometer development with LMSAL personnel to support the subcontract (from LMSAL) with Light Machinery in Canada. 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 Stanford personnel responsible for the design and development of the HMI-AIA Joint Science Operations Center (JSOC) and science data processing participated in several SDO ground data system telecons. The efforts of this SU team were focused on development of the EGSE system that will handle the science data flow from the SDO Spacecraft Simulator, work on verifying estimates of computer I/O bandwidth requirements and performance for the HMI Science Operations Center (SOC) data capture component, and work on testing performance of algorithms for level-1 calibrations and spatial remapping.

The data EGSE for HMI&AIA work continued. The basic functionality is complete with attention on error detection, reporting, and recovery. The package is ready for initial tests with the spacecraft simulator expected to be delivered by NASA now in mid July. Work is continuing on the level-0 image display and quick analysis functions that will be done in an analysis workstation.

One of the key modifications needed to the SOHO/MDI data handling system to enable efficient processing of HMI and AIA data is the separate handling of data metadata and the image data. We expect to implement this by placing the image header information into a relational database. Further tests were performed this month on programming interfaces and processing speed using Oracle and MySQL database systems. A decision on the basic structure and system will likely be made in July or early August.

When the NASA-Stanford contract was finalized in February the LMSAL subcontract period of performance was extended to give enough time to extend the full terms of the Mod 13 contract changes. We are still negotiating the final terms of the Lockheed Phase C-D contract and should have it in place by “any day now”.

Stanford University planning for the new Varian-II Physics building is progressing and we have initial space allocations sufficient for about 40% of our needs. Work is continuing on this issue. At present we have an allocation sufficient for the JSOC data center and 1/3 of our needed office space. A request has been made to the Dean of Research for approval for a detailed study of the costs and feasibility of constructing a temporary building on the Stanford campus to house the remainder of our program. We expect to have a resolution of our future space needs before the HMI CDR in November 2004.

Planned Activities during July

Data EGSE work will continue development for processing the instrument housekeeping stream that will be merged into the high speed bus data stream.

The draft of the IT security plan will be complete and delivered to SDO. Some details will need to be modified after the referenced documents are available.

We will continue work on the LMSAL subcontract terms and conditions.

We expect to complete negotiations with first NASA then LMSAL on the CCD and parts contract modification.

A job description has been completed and finally approved by the Stanford HR office for a software system engineer to support the JSOC development. Newspaper advertisement is scheduled for July.

We (the entire Stanford HMI helioseismology science team) will attend the SOHO #14/GONG Workshop at Yale University in mid month and the COSPAR meeting the following week (Scherrer only). We will hold a "SDO" helioseismology science team meeting in one evening during the Yale meeting to continue the development of broad community involvement in HMI helioseismic data analysis.

Kosovichev will participate the Center for Turbulence Research Summer Research program on modeling the solar convection zone. This effort in collaboration with HMI Co-I Mansour is essential to develop more robust test datasets for local-seismology method verification.

Near-term Milestones

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| 15 July 2004 | Test of basic data EGSE functioning to Level-0 with spacecraft simulator. The EGSE was ready in June but the simulator now scheduled to be delivered in early July. |
| 31 July 2004 | Decision on database system to use for image header metadata. This decision may be delayed depending on the time needed to support the simulator testing. |
| 31 August 2004 | Data EGSE ready to accept data from spacecraft simulator and make it available for analysis. |
| 1 November 2004 | Decision on space allocation within Stanford for the JSOC and Stanford HMI team facilities. |

Attachments

Lockheed Martin Solar and Astrophysics Laboratory HMI progress report for June 2004 is attached by reference. It is forwarded to GSFC separately by LMSAL and is also available at http://hmi.stanford.edu/Status_Reports for convenience. Also the HMI EPO progress report for March is attached and available online.