

Helioseismic and Magnetic Imager

Stanford University

Contract NAS5-02139

Progress Report for September 2004

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 proposed 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. 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 possibly with an additional two months effort just after launch to bring our contract into alignment with the 90-day checkout time planned for the mission. Modification #17 to provide funding through October was signed on 1 October. We expect additional funding by the end of October. We are developing a proposal to support the additional tasks to incorporate AIA data capture and level-0 processing.

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 September.

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.

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 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. R. Bush attended working meetings for the CCD development in the U.K. and to examine progress on the Michelson's in Canada.

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 teleconferences.

As planned, very little work on the data EGSE for HMI&AIA was done in September. The package was used for initial tests with the spacecraft simulator in mid July. The data EGSE units 1 and 2 have been procured and now have the base software installed. These will be ready to move to LMSAL as needed to support HSB testing in late fall. Work is continuing on the level-0 image display and quick analysis functions that will be done in an analysis workstation.

Work on the top level design of the keyword database for image and dataset headers continued with many discussions. The designs for the analysis program environment have also been discussed with the details of what needs to be changed from the MDI system being clarified.

Hardware configuration studies for the data system, led by K. Chu, continued with detailed studies of NAS vs. SAN architectures. We have come to the conclusion that a NAS based system will likely function satisfactorily so long as attention is paid to the network configuration. We had discussions with AIA and have clarified the method of interaction in pipeline processing. Initial cost estimates for a commercial HSM (hierarchical storage system) suggest that it will be too costly for our > 500TB needs as compared to modifications to the existing MDI system to enable management of large near-line tape systems to support the AIA level-0 data requirements. We have clarified the "top level" architecture of our intended system as based on the MDI DSDS core system. The existing MDI processing system should be able to continue "on top of" the planned JSOC system with little change while allowing the additional flexibility needed to support HMI and AIA needs and the changing balance of on-line – near line – offline storage. We have progressed on the plan for the JSOC prototype system which will be used to verify the design assumptions for the science data processing system implementation. We have started the procurement process for the prototype system and are waiting approval from GSFC.

Our JSOC Software System Engineer, Carl Cimilluca began work at Stanford on 20 September.

Stanford University planning for the new Varian-II Physics building is progressing and we have initial space allocations sufficient for almost 40% of our needs. Work is continuing on this issue. The Dean of Research has identified Stanford funds to ensure the necessary on-campus facilities can be provided. Full approval from the Provost office is anticipated soon. The options for the location of the new facility will be studied with a definite plan expected by the end of 2004. This effort will move to a high priority since

Stanford has removed a year from the planned demolition schedule for our present building with the new date set for December 2006.

Planned Activities for October

Preparations for the HMI CDR will occupy much of October and early November. There are several documents which need to be updated to reflect the present state of the design for the JSOC and planned science data processing. The lead authors of these documents are Kosovichev, Schou, Schou, Bush, Scherrer, Aloise, and Larsen for CDRL items SD301, SD302, SD306, SD309(part), SD326a, SD326b, and SD326c respectively. Also work will be required to support the instrument portion of the deliverable documents and CDR led by LMSAL with contributions from Bush and Schou.

We will support the Operations Working Group (SOWG) meeting on 21-22 October. Shortly after the flight software peer review on 19 Oct and the SOWG meeting we will begin collaborative work with the LMSAL group to include the housekeeping processing in the DATA EGSE system. The Data EGSE units HMI-1 and AIA-1 will have the remaining existing software installed. Work will resume on the support of housekeeping data and image display.

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

Near-term Milestones

10 November 2004 Release of updated documents to support CDR.

16-17 November 2004 HMI CDR

1 January 2005 Decision on space location within Stanford for the JSOC and Stanford HMI team facilities.

January 2005 HMI Science Team meeting at Stanford.

Attachments

Lockheed Martin Solar and Astrophysics Laboratory HMI progress report for July 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 July is attached and available online.