

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GEORGE C. MARSHALL SPACE FLIGHT CENTER

JUSTIFICATION FOR OTHER THAN FULL AND OPEN COMPETITION (JOFOC)
PURSUANT TO TITLE 10 U.S.C. 2304 (C) (1) AS IMPLEMENTED BY FAR 6.302-1 "Only one responsible source and no other supplies or services will satisfy agency requirements."

1. This document is a Justification for Other Than Full and Open Competition (JOFOC) prepared by the NASA Marshall Space Flight Center (MSFC) in accordance with Federal Acquisition Regulation (FAR) Part 6.3, Other Than Full and Open Competition, and NASA FAR Supplement (NFS) Part 1806.3, Other Than Full and Open Competition.
2. Nature and/or description of the action being approved: This JOFOC authorizes and approves the issuance of a cost reimbursable contract to Smithsonian Astrophysical Observatory (SAO) supporting Marshall Grazing Incident X-ray Spectrometer (MaGIXS) sounding rocket flight.
3. Description of the supplies or services required to meet the agency's need, including estimated value: Under this contract, NASA will allow for the engineering design, manufacturing, integration, alignment and test of the combined optical elements, integration and test of the final assembly, flight support and post flight scientific analysis for MaGIXS. SAO will support MaGIXS as follows: 1) provide engineering concepts and trade studies for the optical configuration; 2) manufacture optical assemblies; 3) align optical assemblies to measure the Sun in the 6-24 Angstrom wavelength; 4) support integration and test activities at MSFC; and 5) support launch and data collection to allow for the frequency determination of heating in the solar corona and the First Ionization Potential (FIP) bias in different hot coronal structures using the data from the MaGIXS instrument. The total estimated cost of this effort is \$1.6M and the estimated period of performance is 48 months from contract award.
4. Statutory authority permitting other than full and open competition: The statutory authority permitting other than full and open competition is title 10, U.S.C. 2304(c)(1), as implemented by the Federal Acquisition Regulation (FAR) 6.302-1, "Only one responsible source and no other supplies or services will satisfy agency requirements."
5. A demonstration that the proposed contractor's unique qualifications or the nature of the acquisition requires the authority cited:
 - a. SAO has the uniquely specialized personnel and equipment to align spectrometer optics necessary for this effort that cannot be found by any other source. No other source has the highly specialized equipment, existing jigs, procedures, and expertise required to handle the existing MaGIXS instrument and achieve the required performance. SAO has developed a comprehensive alignment capability while building the telescopes for Transition Region And Coronal Explorer (TRACE), Hinode X-Ray Telescope (XRT), Solar Dynamics Observatory Atmospheric Imaging

Assembly (SDO-AIA), Interface Region Imaging Spectrograph (IRIS), and Hi-C, as well as numerous ground-based optical instruments. In addition, they have unique skills and equipment for the alignment and performance measurement of high resolution, high precision optical instruments including telescopes and spectrometers that will be utilized in this effort. Currently, SAO operates and maintains tools that will be utilized in this contract such as: a Centroid Detector Assembly (CDA) (only 1 exists in private industry) developed to align Chandra X-ray Observatory (CXO) (another grazing incidence optical system), a 4-D high precision interferometer, two 20m floated optical elements, and other specialized alignment equipment all housed in a Class 1000 cleanroom.

- b. SAO was key to the completion and successful flight of the High Resolution Coronal Imager (Hi-C) 2012 mission. SAO will complete similar tasks with the MaGIXS instrument that were developed and used with the Hi-C instrument. Specifically, SAO will design, analyze, assemble and align the MaGIXS telescope and spectrometer. The equipment used to complete this alignment is called the CDA and is a product of CXO and is the only “real” alignment tool for this type of optical alignment.
- c. This MaGIXS effort is a continuation of captured knowledge and x-ray optics development that MSFC initiated in May 2013 via SAO to support the MaGIXS Instrument Development (MID) (NNM13AA40C). The MID focused on combined optical elements integration and test. The MID contract developed techniques with highly specific equipment to align the combined optical components that will be utilized in this current effort. SAO provides unique technical support and highly specialized experience developed over many years related to the design and manufacture of the x-ray telescope and spectrometer optical alignment interfaces that is critical to MaGIXS design, manufacturing and alignment. SAO developed equipment and processes to accurately align the optics to obtain high resolution images that can withstand high G-loads associated with sounding rocket flights.
- d. The MaGIXS effort requires SAO to oversee the manufacturing of x-ray blaze grating, mount design and integration. The manufacturing process of the modified blaze grating requires the use of SAO’s unique processes not readily available in the market place. SAO previously determined the extremely tight performance requirements for the MaGIXS grating, developed the process necessary to meet those tight requirements, worked with a subcontractor to perfect the modified grating fabrication and mounting process that will meet or exceed the design requirements of this MaGIXS effort. Additionally, SAO is in the process of developing systems for other x-ray missions that will benefit MaGIXS.
- e. SAO has developed the unique processes to mount all optics and to accurately align the spectrometer optics that will be utilized as part of MaGIXS. These processes are critical to accurately align the hardware and ultimately mission success.
- f. Replication of the requisite intellectual knowledge and physical equipment from another source is cost prohibitive within the budget and effort required by the Science

Mission Directorate's (SMD's) MaGIXS sounding rocket flight selection for reasons as stated above. Over the past decade, NASA has invested approximately \$1.5M in x-ray optics development to look at the sun. Utilization of another source would cause excessive burden and unacceptable hardware development risk. The specialized alignment equipment alone (interferometer, CDA, etc.), separate from the facility housing it, would require an investment of over \$250,000. Key SAO personnel have decades of experience successfully building and aligning cutting edge x-ray instruments of precisely this type. It is not anticipated that other sources are available that can satisfy the requirements, especially given that the probability of key personnel, processes and equipment would not transition to a successor.

6. Description of the efforts made to ensure that offers are solicited from as many potential sources as practicable: Pursuant to NFS 1804.570, this proposed contract action will be published on the NASA Acquisition Internet Service (NAIS) and pursuant to FAR 5.201, this proposed contract action will be synopsisized in the Commerce Business Daily to ensure that offers are solicited from as many potential sources as practicable. The results received in writing will be added to this document by addendum.
7. A determination by the contracting officer that the anticipated cost to the Government will be fair and reasonable: The negotiation and establishment of a fair and reasonable price will be done in accordance with FAR Part 15. Proposed costs will be reviewed by experienced Government auditors, technical analysts, and contract specialists to ensure negotiation and determination of a fair and reasonable price.
8. Description of the market survey conducted, and the results, or a statement of the reasons a market survey was not conducted: No market survey was conducted since this development effort has been occurring for approximately half a decade. Efforts to identify other potential sources are not deemed viable because of the Contractors' unique capabilities described in paragraph 5 above. Additionally, no other source has the inherent knowledge and existing equipment or technology surrounding MaGIXS sounding rocket and optical integration and alignment capabilities.
9. Other facts supporting the use of other than full and open competition: Technical data packages, specifications, engineering descriptions, or purchase descriptions suitable for full and open competition is not available. It is estimated that to develop the methods and equipment required to duplicate the optical assembly techniques and to support optical integration and instrument alignment will cost a minimum of \$1.75M based on the original HI-C and MaGIXS cost. This does not include the costs originally incurred by SAO to develop the expertise prior to the selection of the 2013 MaGIXS mission. In addition, the period of time necessary to produce such a set of data is prohibitive and would require obtaining appropriate data rights from the incumbent contractor.
10. Sources, if any, that expressed an interest in writing in the acquisition: Pursuant to NFS 1804.570, this proposed contract action will be published on the NASA Acquisition Internet Service (NAIS) and pursuant to FAR 5.201, this proposed contract action will be synopsisized in

the Commerce Business Daily. The results received in writing will be added to this document by addendum.

11. The actions, if any, the Agency may take to remove or overcome barriers to competition before any subsequent acquisition for the supplies or services required: There are no known actions which the agency may take to remove or overcome barriers to competition before any subsequent acquisition for the services required.

For the above reasons, full and open competition is not feasible. Therefore, purchase of the supplies or services from Smithsonian Astrophysical Observatory is the only practical approach.

I hereby certify the facts in this justification and any supporting data used for this justification are accurate and complete to the best of my knowledge.



Jeff E. McCracken
Acting Project Manager
ZP21

8/19/2015

Date

I hereby certify that the above justification is complete and accurate to the best of my knowledge and belief. In addition, I hereby determine that the anticipated cost to the Government will be fair and reasonable.



Melinda E. Swenson
Contracting Officer
Office Manager, Science and Space Systems Support Office

8/19/2015

Date

Concurrence:



Kim E. Whitson
MSFC Procurement Officer

Aug 24, 2015

Date

Approved:



Paul K. McConaughy
MSFC Competition Advocate

Aug 25, 2015

Date