

Earth Science Data and Information System Project

Earth Observing System Data and Information System (EOSDIS) Evolution and Development 2 (EED2) Statement of Work for Enabling EOSDIS Data Usage

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Section 1. Introduction

1.1 Project Overview

The Earth Science Data and Information System (ESDIS) Project manages the science systems of the Earth Observing System Data and Information System (EOSDIS). EOSDIS provides science data to a wide community of users for NASA's Science Mission Directorate. In order to maximize the investment in making data available, ESDIS also sponsors a number of activities to ensure that the users are able to access the data easily and correctly.

The data usage enablement falls into two main categories:

1. Maintaining, enhancing and providing support for the Hierarchical Data Format (HDF).
HDF is one of the main standard formats approved for EOSDIS and also underlies one of the other formats, netCDF (network Common Data Form).
2. Maintaining, enhancing and providing support for the Open-Source Network Data Access Protocol (OPeNDAP) Hyrax server.

1.2 Applicable and Reference Documents

1.2.1 Applicable Documents

Applicable documents are those specification, standards, criteria, etc. used to define the requirements of this Statement of Work (SOW). In the event of a conflict between an applicable document and this SOW this SOW takes precedence. Should a conflict occur among applicable documents, the contractor shall request resolution from the Contracting Officer.

- 423-CDRD-EED2 Contract Data Requirements Document for EED2
- NPR 2210.1, External Release of NASA Software
- NPD 2820.1, NASA Software Policies
- NPR 2810.1A Security of Information Technology
- NPR 7150.2 NASA Software Engineering Requirements
- NASA-STD-8719.13B, NASA Software Safety Standard
- NASA-STD-8739.8, Software Assurance Standard
- IEEE Standard 730, Software Quality Assurance Plans
- Section 508 Standards – see <http://www.section508.gov/index.cfm?FuseAction=Content&ID=12>, particularly Subpart B – Technical Standards 1194.22 Web-based intranet and internet information and applications.

1.2.2 Reference Documents

Reference documents are those documents included for information purposes; they provide insight into the operation, characteristics, and interfaces, as well as relevant background

information. The contractor is bound by these documents to the extent specified in this specification or in its applicable documents.

1.2.2.1 General Reference Documents

- NPR 4200.1F, NASA Equipment Management Procedural Requirements
- NPR 7120.5D, NASA Space Flight Program and Project Management Requirements

1.3 Period of Performance

The period of performance of this task is 10/01/2019 through 08/31/2020.

1.4 Place of Performance

The place of performance is the GSFC, Greenbelt, MD and the contractor's facility in Riverdale Maryland.

Section 2. Work to be Performed

2.1 HDF Scope of Work

As part of its objective of continuously improving the level of service and evolve our capabilities the ESDIS project is looking to enhance the discoverability, accessibility, and usability of its data sets by providing continuing support for the HDF 5 data format and related tools, limited critical-bug support for the HDF 4 data format, and supporting the DAACs, SIPS and other critical users in their use of HDF.

HDF4 is being deprecated in favor of HDF5. Although support will still be offered for HDF4, it will be primarily of a bug-fixing nature, with enhancements to be directed by ESDIS.

All software developed under the EED-2 contract should be open sourced.

2.1.1 HDF Helpdesk Support

The contractor shall provide HDF helpdesk support to programmers, analysts and other NASA science software team members in using HDF tools, in mapping their data to HDF, and in installing, testing and using the HDF libraries. The helpdesk helps users troubleshoot their programs, assists them with performance tuning for HDF5 applications, and helps them make the transition from HDF4 to HDF5. The helpdesk gives assistance to vendors interested in adding HDF support for their products. It also maintains a suite of sample HDF5 files and example programs, to help users better understand the formats and the libraries, and their capabilities.

The contractor shall support DAACs, SIPS, and other critical users in their application of HDF5 and HDF-EOS5, as prioritized by ESDIS.

This includes providing advice on:

1. How to create HDF5 files efficiently
2. How to achieve a high degree of end-user usability.
3. How to efficiently compress HDF5 data

The contractor shall work with tool developers, including federal and federally-funded developers and commercial developers, to meet their needs in providing access to EOSDIS data through their tools.

2.1.2 Customer Outreach

The contractor shall conduct limited customer outreach. Activities include:

1. maintaining the HDF and HDF-EOS websites and HDF-EOS Forum;
2. presentations to interested EOS groups such as DAACs and Working Groups;
3. participation in EOS-related meetings and to host visitors from DAACs and other EOS-related projects;

4. conducting tutorials and workshops about HDF and related tools at workshops that include significant populations of HDF users, such as ESIP.

2.1.3 Metadata Standardization

The contractor shall participate in working groups that aim to standardize the representation and content of metadata inside HDF5 files, such as Climate-Forecast groups, Earth Science Information Partners committees and clusters, and Earth Science Data System Working Groups. Participation is limited to metadata inside HDF files, not catalog metadata, and should be prioritized and coordinated with ESDIS.

2.1.4 Sustaining Engineering

Support the EOSDIS evolutionary development program to improve the reliability, availability, functionality, operability, and performance of HDF-5 and HDF-5 tools while reducing operational and maintenance costs. This includes sustaining engineering to provide:

- Troubleshooting, bug-fixing, and enhancements of HDF-5 format and tools
- Direct DAAC/SIPS/HDF-EOS5 support

2.1.5 Distribution of Binaries

Distribute pre-compiled binaries of libraries and executable programs for platforms as requested by ESDIS.

2.2 OPeNDAP Sustaining Engineering

The contractor shall provide sustaining engineering to support NASA-requested modifications to the Hyrax software application and related support, as prioritized by NASA. This includes:

- Assistance in deploying new capabilities of Hyrax and serving new dataset types through Hyrax.
- Troubleshooting, bug-fixing and enhancements of Hyrax and closely related software deployed in EOSDIS data systems.

Sustaining engineering work may also include targeted enhancements to performance for demonstration prototypes as prioritized by ESDIS along with other proposed Hyrax bug fixes, enhancements and refactoring efforts.

The contractor shall also add support for GeoTIFF, including Cloud-Optimized GeoTIFF, as advised by the EOSDIS OPeNDAP governance group.

2.3 Data Access in the Cloud

2.3.1 Operationalization of Hyrax in the Cloud

The contractor shall take the necessary steps to enable the deployment and operation of Hyrax in the Cloud in a Production Environment on the NASA-Compliant General Application Platform, including:

1. NGAP Onboarding
2. Integration with Earthdata Login
3. Integration with Cumulus ingest
4. Refactoring as necessary for higher performance in the Cloud

2.3.2 Direct Access to Data in Amazon Web Services (AWS)

The contractor shall provide functionality via either OPeNDAP and/or HDF API for fine-grained (chunk and variable) access of data in the AWS Simple Storage Service (S3).

2.3.3 OPeNDAP Multi-vendor Demonstration

The contractor shall demonstrate OPeNDAP working in and accessing data from Google Cloud and Microsoft Azure.

3. Project Deliverables

Deliverable	Delivery Date
Program Monthly Reports, including: <ul style="list-style-type: none">• specific bugs fixed and enhancements made for HDF5 and HDF-EOS5• specific bugs fixed and enhancements made for Hyrax• support provided to ESDS parties, categorized by: end users, SIPS, DAACs, ESDIS and their contractors	Monthly
Travel Report	30 days after travel completion
Software and supporting documentation	As released to the community
NGAP-Deployed OPeNDAP in Production	NLT 08/31/2020
OPeNDAP Multi-vendor Demonstration	NLT 08/31/2020