

**Science Software Integration and Test
(SSI&T) Procedures Document Between
the GSFC ESDIS Project and the ASTER
GDS for the ASTER Level-1 Software**

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1.0 Introduction

This document details the Science Software Integration and Test (SSI&T) Procedures for the ASTER Level 1 production software. This agreement is between the Japanese ASTER Ground Data System (GDS) and the Goddard Space Flight Center (GSFC) Earth Science Data and Information System (ESDIS) Project. The USGS EROS Data Center Distributed Active Archive Center (EDC DAAC) has the responsibility to integrate ASTER Level 1 production software at its own site.

1.1 Purpose

This document describes the interface and responsibilities among the three parties: ESDIS, GDS, and EDC, for the delivery and SSI&T of the GDS provided ASTER Level-1 software into the EOSDIS Core System (ECS) system at the EDC DAAC. This software delivery will enable EDC to be used as a backup processing location to enable disaster recovery or similar strategic readiness capabilities. The Japanese ASTER GDS is the primary processing center. It is recognized that much additional ECS preparation at EDC DAAC will be required to take place prior to the production of Level 1 data at this site.

1.2 Scope

This document is limited to the delivery and integration into the ECS, of software written by the GDS to perform the ASTER Level-1 processing. This applies to the software deliveries leading up to and after launch of the EOS-AM1 platform. ASTER Level-2, flight operations, data ingest, and other functions are covered in separate documents. Lessons learned from previous SSIT may be added to future versions of this document, if agreeable to all parties.

1.3 Content and Structure

This document contains the method and dates for the delivery, the delivery mechanism, delivery contents, and delivery coordination.

1.4 Relevant Documents

- ASTER Project Implementation Plan, vol 2, GSFC 505-10-11
- Data Production Software and Science Computing Facility (SCF) Standards and Guidelines, ESDIS document 423-16-01
- Software Developers Guide to Preparation, Delivery, Integration and Test with ECS, DID 205.

2.0 Science Software Delivery

The ASTER GDS shall deliver three major pre-launch releases (Beta, Engineering Version V1, and Mission Version V2) of the ASTER Level 1 software, plus any post launch updates that are developed. The process for

delta (interim) deliveries is described in Section 5. All notifications and acknowledgments are assumed to be via electronic mail (e-mail). The delivery of the actual ASTER Level 1 software will be via magnetic tape.

2.1 Delivery Dates

Beta Version - 8 November, 1996

Version 1 (engineering version) - 31 July, 1997

Version 2 (flight version) - 30 March, 1998

Updates after Version 2 as required (It is expected that the latest version of Level 1 processing software used for production by ERSDAC will be provided to EOSDIS.)

2.2 Delivery Planning and Notification

The ASTER GDS shall recommend, via email, a method of delivery (magnetic tape media type) to ESDIS and copied to EDC four (4) weeks before the actual delivery. The email message shall contain the media size and type, the resource requirements for the delivery package, known processing dependencies for the software, and points of contact for the resolution of potential integration problems. These are further specified in the following paragraphs. The receipt of this email message will be acknowledged by ESDIS and EDC.

The email address for the points of contact are:

GDS: Yoichiro Yamashita <yamashita@ersdac.or.jp>

ESDIS: Steve Kempler <steve.kempler@gsfc.nasa.gov>

EDC: Tom Kalvelage <kalvelage@edcserver1.cr.usgs.gov>

The EDC DAAC will notify ASTER GDS, with an email cc to ESDIS, upon successful delivery and unpacking of the software package. This package is known as the delivered algorithm package (DAP) as defined in DID 205.

The EDC DAAC will acknowledge to ESDIS and GDS when the Science Software Application Package (SSAP) has been created. The SSAP is the archived version of the ASTER Level-1 software and documentation and would be installed into the ECS Data Server for deliveries after the data Server is available.

2.2.1 Media Size and Type

The physical media on which the actual delivery to ESDIS will be specified. This is composed of a specification for the media, a list of the contents and physical media (if more than one tape) for the proposed delivery, the method of delivery by which the transfer will be made.

2.2.2 Resource Estimates

The GDS shall provide ESDIS with estimates of the resources required to support the science software delivery, including the size of the delivered algorithm package (DAP), runtime storage estimates, level-1 algorithm CPU performance estimates on the GDS computer, sufficient specifications for the GDS computer to allow performance scaling.

2.2.3 Known Processing Dependencies

The GDS shall provide ESDIS with a list of known processing dependencies of their software, including ancillary data files (such as spacecraft ephemeris and instrument calibration parameters), and any science or ancillary data preprocessing requirements.

2.2.4 Contact points for the resolution of integration problems

The GDS will provide a mechanism which will allow the staff at EDC to communicate problems to the ASTER level 1 developers or their representatives, and receive timely responses during the SSI&T effort at EDC. It is anticipated that GDS personnel will not be physically required at the EDC DAAC. Temporary remote access by GDS or their representatives to EDC may be expedient for debugging purposes, if appropriate and agreeable.

2.3 Delivery Contents

This section contains a list of the items which are common to all software deliveries and are listed by releases.

2.3.1 Documentation

Documentation for the beta release

- Delivery memo with a list of delivered items (in English)
- Simple procedures for building the PGE (in English)
- Minimal operations description (in English)
- Minimal description of sample Level-1 Data Product output and comparison techniques to validate the EDC and GDS output Data Products (in English)
- Vendor documentation for any GDS provided COTS products, if available.

Documentation for the Version 1 (engineering version) Science Code.

- Delivery memo with a list of delivered items (in English)
- Test plans and procedures (in English)
- First Draft Operations Manual (in English)
- ASTER GDS Level 1 Data Products Specification(GDS Version) - Standard Data Products, Interim data products, Metadata, and Browse Product descriptions (in English)
- Software Design Document.
- Vendor documentation for any GDS provided COTS products, if available.

Documentation for the Version 2 (launch version) Science Code.

- Delivery memo with a list of delivered items (in English)
- Test plans and procedures (in English)
- Complete Operations Manual (in English)
- ASTER GDS Level 1 Data Products Specification(GDS Version) - Standard Data Products, Interim data products, Metadata, and Browse Product descriptions (in English)
- Software Design Document.
- Vendor documentation for any GDS provided COTS products, if available.

- Detail Design Document - descriptions and detailed documentation for each functional code module

2.3.2 Software

Software for the beta delivery

- Beta Version Source Code for each processing script that includes PGE (using the file I/O portions of the SDP toolkit, version 5.1), Utility program, if applicable, and GDS written library functions, if not part of the PGE.
- Header include files
- Makefiles

Software for the engineering version (Version 1)

- ESDIS will deliver SDP toolkit Release A to GDS six months before ASTER GDS Version 1 delivery.
- Version 1 Source Code for each processing script that includes PGE (using the file and metadata portions of the SDP toolkit, release-A version), Utility program, if applicable, and GDS written library functions, if not part of the PGE.
- ASTER data preprocessing program source code for the ephemeris data files. This is only required if the source code provided by ECS to the ASTER GDS has been modified by GDS.
- Header include files
- Makefiles

Software for the flight ready version (Version 2)

- ESDIS will deliver SDP toolkit Release B to GDS six months before ASTER GDS Version 2 delivery.
- Version 2 Source Code for each processing script that includes PGE (using the file and metadata portions of the SDP toolkit, Release-B version), Utility program, if applicable, and GDS written library functions, if not part of the PGE.
- Production rules written in the ECS production rule syntax. (Production rules are closely tied to the initiation of the execution of science software. e.g., how a PGE is initiated is a production rule. Descriptions and examples will be provided to GDS.)
- ASTER data preprocessing program source code for the ephemeris data files. This is only required if the source code provided by ECS to the ASTER GDS has been modified by GDS.
- Header include files
- Makefiles

Post launch software delivery

All bug fixes or software enhancements (redeliveries) must be provided to maintain consistency with GDS executed software.

2.3.3 Data Files

Beta Version Data Files

- Process control files (pcf)
- Ancillary data files - calibration and coefficient files
- Simulated input ASTER Level-0 Data Product
- Sample output ASTER Level-1 Data Product

Version 1 (engineering version) Data Files

- Process control files (pcf)
- Metadata (core metadata) control files (mcf)
- Ancillary data files - calibration and coefficient files
- Simulated input ASTER Level-0 Data Product
- Sample output ASTER Level-1 Data Product

Version 2 (flight version) Data Files

- Process control files (pcf)
- Metadata (core and instrument specific) control files (mcf)
- Ancillary data files - calibration and coefficient files
- Data files used for instrument trending or other ongoing purposes, if any
- Sample or simulated input ASTER Level-0 Data Product
- Sample output ASTER Level-1 Data Product

2.3.4 Validation and Verification Testing

Beta Version Verification

- Simple, informal execution of the Level-1 software to verify that the program executes to completion and the expected output files and file contents are generated.

Version 1 (engineering version) and Version 2 (flight version) Test Suites

- Test programs and scripts, including custom file comparison utilities, if applicable
- Sample spacecraft ephemeris files. This data may be provided as part of (and identified in) other test data files.
- Expected output data files - test results including intermediate files, log files, and debug files (if applicable)

2.4 Transfer of Delivery Package

The preferred method for transfer of the delivery package to ESDIS is via magnetic tape, consisting of compressed files with a directory structure as specified in DID 205, section 5.6. The contents of the tape will be compressed by use of either the Gnu gzip (preferred) or the UNIX compress utility. The structure of the contents of the tape will be created by the use of the UNIX tar archive utility.

The EDC DAAC will establish a transfer area sufficiently large to hold the entire contents of the untared tape. The EDC staff will place the delivery package into configuration management (CM) for backup purposes and untar the delivery package into the defined area.

3.0 Delivery Verification by the DAAC

Problems with the delivery will be reported to both the GDS and ESDIS. ESDIS will negotiate with GDS for delivery package exceptions.

4.0 Building, Testing, and Acceptance of Delivery at the DAAC.

The EDC staff shall perform and complete the SSIT function with the technical support from the ECS contractor (Hughes science office), and the GDS as described below:

- EDC will demonstrate that the level-1 software can run at the EDC DAAC and the results can be repeated.
- ECS will provide telephone and/or on-site support to EDC as needed.
- GDS will provide email support for ASTER Level-1 software problems and integration problems. This support will be provided via ESDIS with the understanding that email communications between EDC and GDS will eventually become direct, with ESDIS being cc'ed.

5.0 Policies governing delta and/or patch deliveries.

ESDIS and GDS will coordinate necessary patches to delivered software on an as-needed basis for the beta delivery. The V-1 and V-2 deliveries will require a more formal configuration management (CM) procedure as defined by the EDC DAAC. The degree of formality of software configuration control will be defined by the EDC DAAC. (Some minimal level for traceability is expected.)

6.0 Configuration Management and versioning.

The GDS will apply a major and minor revision numbering scheme to the delivered source code and ancillary data files. The revision number will be embedded in a comment field in the source code and increment for each delivery. It is recommended that a revision field be included within each data file as an ASCII record at the beginning of the file.