SC–HIR–135

HIRDLS

HIGH RESOLUTION DYNAMICS LIMB SOUNDER

Originator: Paul Bailey Date: 24 February 1998

Subject / Title: HIRDLS Science Data Management Plan

Contents / Description / Summary:

This document describes the plan for management of the HIRDLS Science Data

This revision is in response to comments made by Laura Milam in a letter dated 2 September 1997. Reviewer comments 1,3 and 4 have been addressed. Comment #2 has been the subject of an e-mail on 2 December 1997 and has been partially incorporated.

Key Words: Data Management, Data Products, DAAC, SCF, Data Processing

Purpose (20 characters maximum): describe plan

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EOS

1.0 Introduction

1.1 Purpose

This document presents the top-level policies by which HIRDLS standard science data products and associated data will be managed. Software to be used to generate the standard data products is described in the HIRDLS Science Software Management Plan.

1.2 Scope

This data management plan describes the data products to result from the HIRDLS mission as well as ancillary data involved in the generation and validation of these data products. The data specifications include "ground truth" and correlative data as well as the standard data products. Temporary files necessary for product generation are also described. Estimates of the storage and retention requirements are provided.

1.3 List of Acronyms and Definitions

CCSDS - Consultative Committee for Space Data Systems

DAAC - Distributed Active Archive Center

DAO - Data Assimilation Office

ECS - EOSDIS Core System

EGSE - Electrical Ground Support Equipment

EOS - Earth Observing System

EOSDIS - EOS Data and Information System

GSFC - Goddard Space Flight Center

HDF - Hierarchical Data Format

HIRDLS - High Resolution Dynamics Limb Sounder

IPS - Instrument Processor Subsystem

IST - Instrument Support Terminal

LPARL - Lockheed Palo Alto Research Laboratories

NCAR - National Center for Atmospheric Research

NMC - National Meteorological Center

PGE - Product Generation Executive

SCF - Science Computing Facility

SDP - Science Data Processing

UK - United Kingdom

1.4 Controlling Documents and References

1. HIRDLS Instrument, Science and Algorithm Development, and Science Computing Facility Statement of Work, Document No. GSFC 424-28-21-05, November, 1996.

2. Data Production Software and SCF Standards and Guidelines, ESDIS Document No. 423-16-01, dated October, 1996 (or subsequent versions)

3. Software Developers Guide to Preparation, Delivery, Integration and Test with ECS, HAIS Document No. 205-CD-005-001, dated January, 1995

4. Interface Requirements Document Between EOSDIS Core System (ECS) and Science Computing Facilities, Document No. 209-CD-005-005, dated March 1996.

5. HIRDLS Work Share Agreement Between Rutherford Appleton Laboratory and The Earth Observing System Project. PM-HIR-109.

6. Proposed ECS Core Metadata Standard: Release 2.0, Document # 420-TP-0001-0005, December, 1994.

7. HDF-EOS Library Users Guide for the ECS Project, Volume 1: Overview and Examples. Document Number 170-TP-005-003. Hughes Information Technology Systems, Upper Marlboro, Maryland. April, 1997.

8. Release A SCF Toolkit Users Guide for the ECS Project, EOSDIS Core System Project Document 333-CD-003-005, Hughes Information Technology Corporation, Landover, Maryland. November, 1996.

2.0 Data Identification

This section identifies the data types, including products, temporary files, ancillary, and correlative data used in the generation and validation of the HIRDLS science data products. Data are identified in the context of the science software classifications presented in the HIRDLS Science Software Management Plan. Figure 1 identifies the basic science software categories and the major software elements within each.

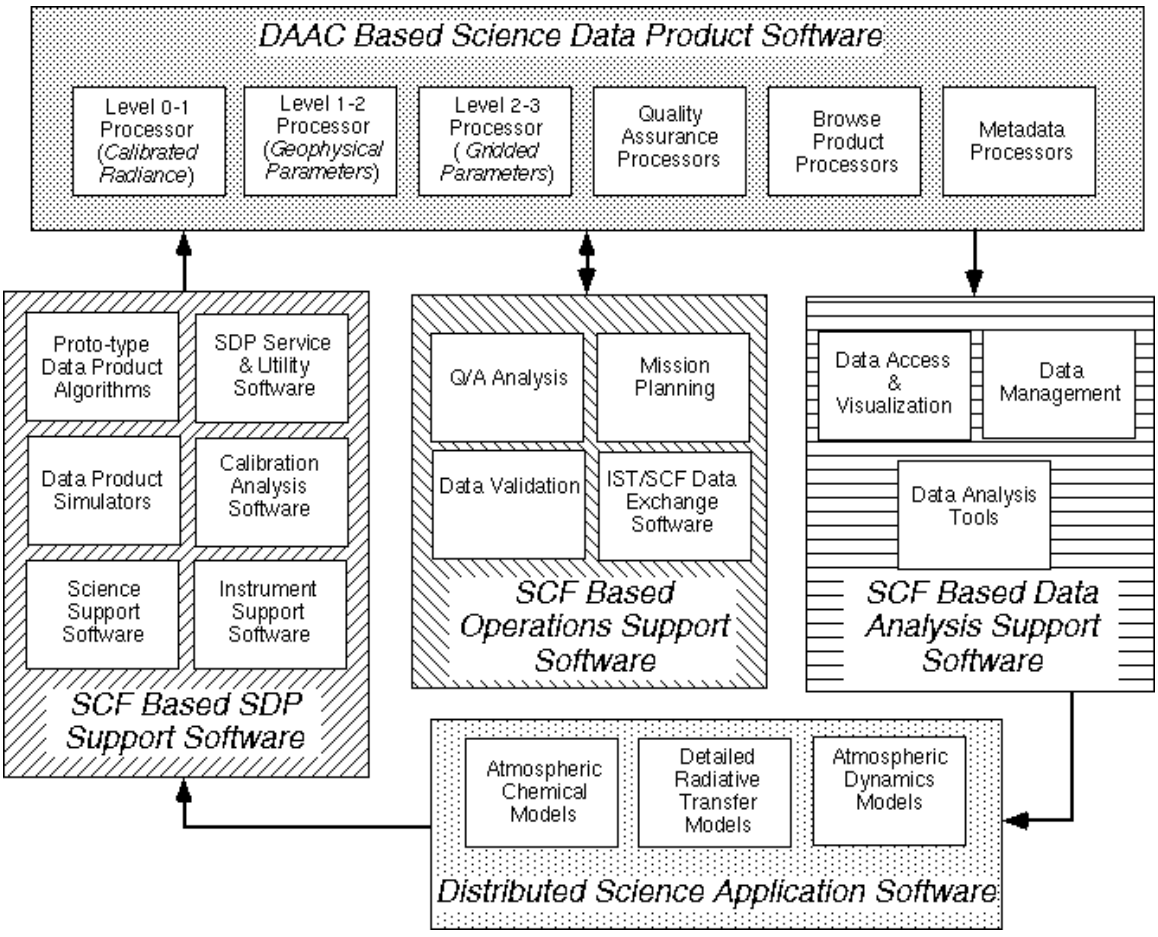

Figure 1, HIRDLS Science Software Categories

2.1 DAAC Based Science Data Processing

Science Data Processing (SDP) refers to those activities which produce HIRDLS standard data products at the EOS DAAC. Science Data Processing consists of three major steps. Level 0-1 processing decodes the raw instrument measurements from telemetry packets and produces calibrated radiances, the core of the Level-1 data product. Level 1-2 processing transforms the calibrated radiance values into vertical profiles of geophysical parameters which include temperature, trace gas mixing ratios, atmospheric aerosol parameters, and geopotential height differences. HIRDLS Level 2-3 processing results in global gridded representations of these atmospheric parameters. The various HIRDLS parameters resulting from these processes are summarized in Table 1.

Table 1: Contents of HIRDLS Standard Products related to EOSDIS Parameter ID.

Parameter	Level-0	Level-1B (HDF-EOS Swath Structure)	Level-2 (HDF-EOS Swath Structure)	Level-3 (HDF-EOS Grid Structure)
Instrument Output	Science Engineering Housekeeping			
Radiance		HIR01		
Pressure			HIR16 Implicit	Included as metadata in all L-3 products
Temperature			HIR15	currently not identified in SPSO database
O3			HIR14	HIR26
H2O			HIR09	HIR21
HNO3			HIR10	HIR22
NO2			HIR13	HIR25
N2O			HIR11	HIR23
N2O5			HIR12	HIR24
CH4			HIR05	HIR19
CFC-11			HIR03	HIR17
CFC-12			HIR04	HIR18
ClONO2			HIR06	HIR20
Aerosol			HIR02	currently not identified in SPSO database
Geopotential Gradient			HIR08	n/a
Winds				HIR27

				Level-4
Cloud Top			HIR07	n/a

2.1.1 Data Types Involved in Level 0-1 Processing

The various input and output data types associated with Level 0-1 processing are described in the following sub-sections. Estimated data volume and retention periods are summarized in Table 2.

2.1.1.1 Level 0 Data (Input)

The Level 0 data include the raw, uncalibrated instrument outputs, engineering and housekeeping data. Science data and engineering data will be multiplexed into EOS standard CCSDS data packets. Spacecraft ephemeris, attitude and status data are also considered to be part of this data stream. In order to help extract long term drift from the HIRDLS instrument gyro during ground processing, high rate spacecraft gyro data which reflects star tracker updates will be required. Alternatively, processed spacecraft attitude from the onboard navigation system may be substituted. The file structures for these data sets will be determined by the project with input from the instrument team.

Source: Level-0 data are provided to the DAAC by the EDOS component of EOSDIS. These data are to be retained within the EOSDIS system in the event that reprocessing of Level-1 HIRDLS products is necessary.

2.1.1.2 Instrument Parameter Tables (Input)

Calibration tables and conversion coefficients for telemetry elements will be maintained in this structure. Most engineering calibration parameters will be determined in pre-launch testing and are unlikely to change during the mission.

Source: These data will be provided by the HIRDLS team as part of the SDP deliveries. File structure will likely be based on HDF.

2.1.1.3 Processing Scripts and Configuration Files (Input)

Rules for dependencies and initiation of Level 0-1 Product Generation Executables (PGEs) will be contained in control scripts and associated configuration files. The content of configuration files will be used to define processing options in the Level 0-1 PGEs. For example, to set the level of verbosity of quality assurance diagnostic outputs. Processing control files and metadata configuration files which map HIRDLS specific attributes into the ECS environment are also required.

Source: These data will be provided by the HIRDLS team as part of the SDP deliveries. File structure will likely be ASCII based.

2.1.1.4 Level 1 Data (Output)

The Level 1 data will include the calibrated radiances located in terms of latitude, longitude and time at the tangent points. The data will be arranged in an HDF-EOS structure consistent with EOS archive requirements. Metadata, data quality, instrument and spacecraft status, spacecraft attitude and calibration data will also be included.

Source: These data are produced at the DAAC by HIRDLS SDP software

2.1.1.5 Calibration History (Output)

A separate instrument performance and calibration history dataset will be maintained for the life of the mission and will be appended at each processing episode. The calibration equations, coefficients and parameters will be maintained in such a way as to allow the basic Level 0 data to be recovered if necessary. Many of the radiometric calibration parameters are determined in-orbit and will require trend analysis before they are applied.

Source: These data are produced at the DAAC by HIRDLS SDP software. Structure will be based on HDF.

2.1.1.6 Data Product Quality Assurance Diagnostics (Output)

In-line Quality Assurance is performed on the calibrated radiances to check for obvious errors in content and form in the calibrated radiances. These files will be transferred to the HIRDLS SCF for review by the HIRDLS Data Processing Operations Group.

Source: These data are produced at the DAAC by HIRDLS SDP software. Exact content and structure are to be defined.

2.1.1.7 Metadata (Output)

EOS required core metadata elements will be produced as part of the Level 0-1 processing. HIRDLS specific metadata describing quality attributes of the data granules may also be generated

Source: These data are produced at the DAAC by HIRDLS SDP software and in accordance with EOS metadata requirements.

2.1.1.8 Browse Products (Output)

No browse products have yet been identified for the HIRDLS Level-1 data product

2.1.1.9 Temporary Files

Various temporary files may be created to communicate data between Level 0-1 PGEs. The exact number and size of these files will not be known until the SDP software design effort is completed. The aggregate size of these files should not exceed the combined Level-0 and Level-1 data for the granule being processed.

Table 2, Data Types Associated With Level 0-1 DAAC Science Data Processing

Data Type	Granule Content	Estimated Size (Mb/Granule)	Retention
Level-0	1 day	540	Permanent Archive
Instrument Param.	Static for mission	10 (total)	Permanent Archive
PGE Scripts & Configuration Files	Static for mission	5 (total)	Permanent Archive
Level-1	1 day	864	Permanent Archive
Calibration History	1 Month	150	Permanent Archive
Q/A Diagnostics	1 day	10	1 day at DAAC Permanent at SCF
Metadata	1 day	0.1	Permanent Archive
Temporary Files	1 day	1404	1 day

2.1.2 Data Types Involved in Level 1-2 Processing

The various input and output data types associated with Level 1-2 processing are described in the following sub-sections. Estimated data volume and retention periods are summarized in Table 3.

2.1.2.1 Level 1 Data (Input)

See section 2.1.1.4 for description

Source: These data are produced at the DAAC by HIRDLS SDP software.

2.1.2.2 Level 1-2 Processing Parameters and Tables (Input)

Parameterizations of atmospheric transmittance will be required for the fast radiative transfer models used in the retrieval process. Climatologies and associated covariances of the various HIRDLS measureables will be required as well.

Source: These data will be provided by the HIRDLS team as part of the SDP deliveries. File structure will likely be based on HDF.

2.1.2.3 Processing Scripts and Configuration Files (Input)

Rules for dependencies and initiation of Level 1-2 PGEs will be contained in control scripts and associated configuration files. The content of configuration files will be used to define processing options in the Level 1-2 PGEs. For example, to set the level of verbosity of quality assurance diagnostic outputs. Processing control files and metadata configuration files which map HIRDLS specific attributes into the ECS environment are also required.

Source: These data will be provided by the HIRDLS team as part of the SDP deliveries. File structure will likely be ASCII based.

2.1.2.4 DAAC Supplied Ancillary Data (Input)

The geopotential height at a lower stratospheric standard pressure level (50 or 30 Mb) must be available at the DAAC to produce the Level-2 geopotential variation profiles and the Level-3 analysis of geopotential at standard pressure levels. It may also be necessary to utilize temperature analyses over the same altitudes. The source of these data may be

global gridded data at 6 hour intervals from the National Meteorological Center (NMC) or the NASA GSFC Data Assimilation Office (DAO).

Source: These data will be acquired by the DAAC from the appropriate operational data center. File structure will likely be of a standard form specified by the operational center. In the case of DAO, data will be supplied in HDF-EOS grid structures.

2.1.2.5 Level 2 Data (Output)

The Level 2 data are profiles of temperature, gas mixing ratio, aerosol parameters and geopotential height variations versus pressure located in terms of latitude and longitude at a nominal profile tangent point and Greenwich time. Data quality and diagnostic information will also be produced. The data will be arranged in HDF-EOS structures consistent with EOS data product archive requirements.

Source: These data are produced at the DAAC by HIRDLS SDP software.

2.1.2.6 Data Product Quality Assurance Diagnostics (Output)

In-line Quality Assurance is performed on the retrieved geophysical parameters to check for obvious errors in form and content . These diagnostic files will be transferred to the HIRDLS SCF for review by the HIRDLS Data Processing Operations Group at the termination of processing of each data granule.

Source: These data are produced at the DAAC by HIRDLS SDP software. Exact content and structure are to be defined.

2.1.2.7 Metadata (Output)

EOS required core metadata elements will be produced as part of the Level 1-2 processing. HIRDLS specific metadata describing quality attributes of the data granules may also be generated. These metadata may be created as part of the DAAC SDP activity or may result from SCF based quality assurance activity.

Source: These data are produced at the DAAC by HIRDLS SDP software and in accordance with EOS metadata requirements.

2.1.2.8 Browse Products (Output)

HIRDLS Level-2 browse products will likely include displays of coverage and statistics on the number of retrieved profiles.

Source: These data are produced at the DAAC by HIRDLS SDP software and in accordance with EOS browse product requirements. In the current ESDIS implementation, these are defined to be raster images contained within HDF structures.

2.1.2.9 Temporary Files (Output)

Various temporary files may be created to communicate data between Level 1-2 PGEs. The exact number and size of these files will not be known until the SDP software design effort is completed. The aggregate size of these files should not exceed the combined Level-1 and Level-2 data for the granule being processed. Temporary files are not expected to be retained for longer than one day after termination of processing for a particular granule.

Table 3, Data Types Associated With Level 1-2 DAAC Science Data Processing

Data Type	Granule Content	Estimated Size (Mb/Granule)	Retention
Level-1	1 day	864	Permanent Archive
Processing Parameters & Tables	static for mission	210 (total)	Permanent Archive
PGE Scripts & Configuration Files	static for mission	5 (total)	Permanent Archive
Ancillary Data	1 day	3	Permanent Archive
Level-2	1 day (Each of 18 HIRDLS geophysical parameter may be in separate file)	87 (Aggregate size of all geophysical parameters)	Permanent Archive
Q/A Diagnostic Files	1 day	10	1 day at DAAC Permanent at SCF
Metadata	1 day	0.1	Permanent Archive
Browse Products	1 day	5	Permanent Archive
Temporary Files	1 day	951	1 day

2.1.3 Data Types Involved in Level 2-3 Processing

The various input and output data types associated with Level 2-3 processing are described in the following sub-sections. Estimated data volume and retention periods are summarized in Table 4.

2.1.3.1 Level-2 (Input)

See section 2.1.2.5 for description.

Source: These data are produced at the DAAC by HIRDLS SDP software.

2.1.3.2 Processing Scripts and Configuration Files (Input)

Rules for dependencies and initiation of Level 2-3 PGEs will be contained in control scripts and associated configuration files. The content of configuration files will be used to define processing options in the Level 2-3 PGEs. For example, to set the level of verbosity of quality assurance diagnostic outputs. Processing control files and metadata configuration files which map HIRDLS specific attributes into the ECS environment are also required.

Source: These data will be provided by the HIRDLS team as part of the SDP deliveries. File structure will likely be ASCII based.

2.1.3.3 Level 3 Data (Output)

Various approaches and algorithms will be evaluated for application to Level 2-3 processing. The current baseline is to use a Kalman filter approach to producing global grids. This procedure optimally estimates zonal Fourier coefficients representing the parameter at synoptic times for standard latitudes and pressure levels. Also included will be a measure of the uncertainty of the estimate and an indication of the data coverage going into the analysis. The Fourier coefficients will be transformed into HDF-EOS grid representations which conform to EOS requirements for data inter-operability. The parameters to be gridded in this manner include temperature, trace gas mixing ratios and aerosol parameters. Derived geopotential height will also be included in the parameters archived.

Data assimilation techniques are also being evaluated as an alternative approach to gridding. However, the resulting data product formats would be the same as proposed for the Kalman filter algorithm.

Source: These data are produced at the DAAC by HIRDLS SDP software.

2.1.3.4 Data Product Quality Assurance Diagnostics (Output)

In-line Quality Assurance is performed on the gridded geophysical parameters to check for obvious errors in form and content . These diagnostic files will be transferred to the HIRDLS SCF for review by the HIRDLS Data Processing Operations Group at the termination of processing of each data granule.

Source: These data are produced at the DAAC by HIRDLS SDP software. Exact content and structure are to be defined.

2.1.3.5 Metadata (Output)

EOS required core metadata elements will be produced as part of the Level 2-3 processing. HIRDLS specific metadata describing quality attributes of the data granules may also be generated. These metadata may be created as part of the DAAC SDP activity or may result from SCF based quality assurance activity.

Source: These data are produced at the DAAC by HIRDLS SDP software and in accordance with EOS metadata requirements.

2.1.3.6 Browse Products (Output)

HIRDLS Level-3 browse products will be global maps of HIRDLS geophysical parameter fields.

Source: These data are produced at the DAAC by HIRDLS SDP software and in accordance with EOS browse product requirements. In the current ESDIS implementation, these are defined to be raster images contained within HDF structures.

2.1.3.7 Temporary Files (Output)

Various temporary files may be created to communicate data between Level 2-3 PGEs. The exact number and size of these files will not be known until the SDP software design effort is completed. The aggregate size of these files should not exceed the combined Level-2 and Level-3 data for the granule being processed. Temporary files are not expected to be retained for longer than one day after termination of processing for a particular granule.

Table 4, Data Types Associated With Level 2-3 DAAC Science Data Processing

Data Type	Granule Content	Estimated Size (Mb/Granule)	Retention
Level-2	1 day (Each of 18 HIRDLS geophysical parameter may be in separate file)	87 (Aggregate size of all geophysical parameters)	Permanent Archive
PGE Scripts & Configuration Files	static for mission	5 (total)	Permanent Archive
Level-3	1 day (Each of 18 HIRDLS geophysical parameter may be in separate file)	60 (Aggregate size of all geophysical parameters assuming 2 deg grid and 25 altitudes)	Permanent Archive
Q/A Diagnostic Files	1 day	10	1 day at DAAC Permanent at SCF
Metadata	1 day	1	Permanent Archive
Browse Products	1 day	5	Permanent Archive
Temporary Files	1 day	147	1 day

2.1.4 Level 4 Data Products

Level-4 data products will be created at HIRDLS SCFs and transferred to the DAAC for archive and distribution to the EOS user community. Particular products have not been defined at this time but are likely to involve the use of data assimilation techniques. Substantial progress has been made in the development of approaches for the assimilation of satellite temperature sounding retrievals into numerical weather prediction models without prior gridding or interpolation, and such techniques are now becoming operational. It is expected that similar techniques will be applied routinely to other types of stratospheric data during the HIRDLS mission time frame as such methods are needed to obtain the most precise time-dependent fields, even when prediction is not required. Data assimilation is planned as a Level 4 activity for HIRDLS and will be performed by Dr. O'Neill who is a Co-Investigator and by the NASA GSFC Data Assimilation Office.

Throughout the mission there may be occasional requirements to produce special products of interest to the IWG. Examples might be a global morphology of gravity wave indices over a period of a week at certain times of the year or eddy diffusion coefficients for particular species produced at a similar frequency. It is essential that the processing scheme is sufficiently flexible to allow these demands to be met.

2.2 Data Types Associated With SCF Based SDP Support Software

2.2.1 Simulated Data Products

An important component in the development of the HIRDLS SDP Software is the creation of data product simulation capabilities. Simulated data products are required with each SDP Software delivery to the DAAC, and are essential in testing the SDP software during development at the SCFs. Simulated data are also important for developing science analysis strategies and tools. These simulations will execute on the team SCF equipment.

The primary goals of the simulation effort are:

- Provide a set of "certified" product files for use in verifying SDP software installation at the DAAC
- Develop a comprehensive set of test cases for checking SDP software "correctness" and exception handling
- Provide a tool useful in "what if" studies and to guide planning and decision making
- Provide data sets useful for developing science validation and analysis software
- Provide test sets for ground system testing within EOSDIS

Production of simulated data products that test all possible contingencies in an end-to-end sense is not the goal of the simulation effort. Developing a comprehensive end-to-end simulator would lead to an effort on the order of the SDP software development effort. In an effort to pursue a more cost effective approach to simulation, separate simulators will be built for each data level. These simulators will be capable of simulating normal data as well as producing the pathological cases that affect the particular processor for a given data level. End-to-end testing under benign conditions will be done to demonstrate overall functionality.

Source: Simulated data products will developed at the SCFs using simulators developed by various groups within the Science Team. Formats for these simulated products will be the same as equivalent standard products generated at the DAAC.

2.2.2 Radiative Transfer Model Data

A detailed radiative transfer model is needed to assure that the physics of the problem are correctly represented. Such models require spectroscopic data bases for the gases important in the HIRDLS spectral bands. High resolution transmittance and radiance calculations from these detailed models are necessary in the development of parameterizations for fast radiative models for use in production processing. A model is essential to retrieving the geophysical parameters of the HIRDLS Level-2 data product. A fast model is also required to generate simulated data for testing the retrieval algorithms over a range of atmospheric conditions. These models will be developed and operated at the SCFs.

Source: The various members of the Science Team working on aspects of HIRDLS radiative transfer will be responsible for acquiring the appropriate fundamental spectroscopic data and for generating the various intermediate products necessary to support the activity.

2.2.3 Instrument Calibration and Characterization Data

Most engineering calibration parameters will be determined in pre-launch testing and are unlikely to change during the mission. All data taken from the instrument in pre-launch testing and spacecraft integration will be archived on the Electrical Ground Support Equipment (EGSE) in a form that can be readily analyzed on the Principal Investigator SCFs. Much of this information must be condensed and formatted into tables for use by DAAC SDP software. This data manipulation will take place at the SCFs and the resulting information delivered as part of the SDP suite.

Many of the radiometric calibration parameters are determined in-orbit and will require trend analysis before they are applied. Calibration history files accumulated during Level 0-1 processing at the DAAC will be transferred to the SCFs for further trend and instrument performance analysis.

Primary calibration data and associated documentation will be provided in accordance with EOS Project guidelines to the appropriate EOS Archive.

Source: These data will be acquired from various sources during the test, calibration and flight of the HIRDLS instrument. The various members of the Science Team working on aspects of HIRDLS calibration and characterization will be responsible for acquiring the appropriate data and for generating the various intermediate products necessary to support the activity.

2.2.4 Atmospheric Model and Climatological Data

Atmospheric data of various types are required in the development of prototype algorithms, simulated data products, and to support instrument design tradeoff studies.

Source: These data will be acquired from various sources as required during the development of prototype algorithms and simulated data products. The various members of the Science Team working on these aspects of HIRDLS will be responsible for acquiring the appropriate data and for generating the various intermediate products necessary to support the activity.

2.3 Data Types Associated With SCF Based Operations Support Activities

This section describes data associated with the activities supporting standard data product generation at the DAAC in the post-launch period. These are activities that take place at the SCFs and involve personnel from the HIRDLS team. From Figure 1, the primary software functions for this software category are:

- Q/A Analysis:

  Diagnostic and quality assurance summaries from each DAAC processing run will be forwarded to the HIRDLS SCFs for analysis by the Data Processing Operations Group. These summaries will be examined for data product "correctness". Appropriate metadata entries will be returned to the DAAC to reflect the outcome of this examination. Those data granules failing Q/A should be withheld from general distribution until corrective action has taken place and the product regenerated. Software to support these activities will include a database system, statistical analysis, display and software to extract information form the Q/A summaries. Q/A analysis will be restricted to those activities which can be performed within a few hours of product generation. Longer term analysis to establish trends, accuracies and systematic errors will be undertaken as part of the Data Validation activity.

- Data Validation:

  The goals of data validation activities are to establish the absolute accuracies of derived parameters and any temporal and spatial variations in the accuracies. Also, it is important to establish any constraints as to the utility of the products for certain research applications. Instrument performance and calibration history are an important part of these studies as well as the understanding of algorithmic errors. Comparison of HIRDLS observations with independent correlative measurements is necessary to demonstrate the consistency of error analyses. A variety of software tools will be used in support of data validation. These include database systems, data ingest tools, statistical analysis and graphical display. Analyses will also make use of data acquired in Q/A activities and in instrument operation via the IST.

- Mission Planning:

Special observation periods in support of field programs or correlative measurements may require interaction between the data processing operations and the instrument operations. Also, changes to the instrument configuration which affect calibration or resulting data

products will need to be coordinated. Mission planning software may include tools for predicting future data coverage or spacecraft events.

- Instrument Support Terminal:

  The IST will provide the principle means for the Instrument Team to interact with the HIRDLS instrument during the flight phase of the mission. Information obtained by the Flight Operations Group on instrument performance will be useful in data validation. Likewise, long-term Q/A information will be important to those responsible for operation of the instrument.

2.3.1 Data Product Quality Assurance Database

Information from these summaries will also be abstracted and entered into a data base for long-term trend analysis. This will include data on instrument performance and calibration as well as trends in parameters which describe the derived data products.

Source: Quality assurance diagnostics generated at the DAAC by HIRDLS team SDP software.

2.3.2 Correlative Data Used in Data Product Validation

Data collected by other EOS instruments or standard meteorological services as well as special ground, balloon and aircraft based systems will be required to validate the Level-1, Level-2 and Level-3 products and to support the scientific investigations. This will include data from instruments measuring the same parameters over similar altitude ranges, winds, species in addition to the HIRDLS compliment and measurements of gravity wave parameters. Examples are: radiosonde data, information from the Network for Detection of Stratospheric Change, MST radar data, data from balloon borne sensors, space shuttle sorties, and data from other satellite systems. A description of the required correlative data is given in the HIRDLS Data Validation Plan.

Source: Correlative data will be acquired from many sources. In some instances these will be standard data products produced by EOS. In many cases the material will be gathered from collaborators outside of EOS. Considerable data may be acquired from other agencies such as NOAA and NSF.

2.3.3 Mission Planning Data

Several forms of data will be required as experiment planning aids. These include predicted spacecraft, solar and lunar ephemeris, the anticipated schedule for special maneuvers by the spacecraft and a schedule for any special observing situations which might support an intercomparison with other EOS instruments.

Source: Mission planning data is expected to be provided by the Flight Operations System within EOSDIS.

2.3.4 Instrument Performance and Calibration Database

Instrument performance data captured in the calibration history file will also be maintained at the SCFs for trend analysis. These data may be required to remove long-term calibration drifts in subsequent reprocessing if analysis indicates that it is necessary.

Source: Pre-flight measurements at the HIRDLS calibration facility and post-launch in-flight calibration history produced by DAAC based SDP software.

2.4 Data Types Associated With SCF Based Data Analysis Support Activities

This section includes data types and management functions which support the use of HIRDLS (and other EOS data) data products in scientific research. Activities in this area do not have a direct bearing on the DAAC. Software which support these activities is described in the HIRDLS Science Software Management Plan.

2.4.1 EOS Data Products for Scientific Analysis

Both the US and the UK SCFs will be the primary repositories for HIRDLS and other EOS data products used by their local science teams. These products will be transferred from the DAACs to the SCFs and be maintained under local data management.

2.4.2 SCF Data Catalogs

SCF data and software holdings will be cataloged using a database management system for access by the local user communities.

2.4.3 SCF Software Libraries

Various toolkits and software libraries will be maintained at the SCF to assist investigators in data access and display.

2.5 Data Management Associated With Distributed Science Activities

Data management at HIRDLS team member sites other than the distributed SCF is outside the scope of this plan.

3.0 Data Management

3.1 SCF Configuration Management

Data configuration management at the SCFs will closely follow the configuration management approach utilized for the corresponding software category. Software configuration management is discussed in the HIRDLS Science Software Management Plan. As with the software, data configuration management will depend upon the level of criticality. For example, data items directly associated with DAAC based SDP functions will be subject to the highest level of configuration management. At the other extreme, data items belonging to individual researchers as part of scientific analysis are the responsibility of that researcher. All SCF filestores will undergo periodic full backup and frequent incremental backup.

3.2 Expected EOSDIS Data Management Functions

HIRDLS standard data products (Level 1-3), metadata and browse products will be produced and permanently archived at the DAAC and made available to the general user community via the EOSDIS data distribution interface. The DAAC will also provide a permanent archive for the SDP software and associated data used in the creation of these products. The DAAC will provide the archive and distribution function for Special (Level-4) Products created at the HIRDLS SCF and subsequently transferred to the DAAC.

The following data management functions are expected to be provided by EOSDIS.

3.2.1 Science Data Processing Environment

EOSDIS will provide the computing environment at the DAAC for production of the HIRDLS Science Data Products. This includes the computation resources necessary to produce the products, and the necessary data storage.

3.2.2 Science Data Processing Toolkit

Within the Science Data Processing environment EOSDIS will provide a Science Data Processing Toolkit. This toolkit will be available at the GSFC DAAC and at the NCAR SCF. Proper use of the SDP Toolkit should make it possible for the HIRDLS team to develop software at the NCAR SCF that will also operate at the DAAC.

3.2.3 Availability of Data for Processing

EOSDIS will make available at the DAAC the appropriate ensemble of Level-0, ancillary and HIRDLS provided SDP data necessary for HIRDLS Science Data processing. This involves providing an interface between the GSFC DAAC and the EDOS.

3.2.4 Science Data Product Archive and Distribution

EOSDIS will provide storage and distribution of the HIRDLS Science Data Products for the general science community. This will include a user access interface, advertisement of data availability and the necessary user support.

EOSDIS will be responsible for maintaining permanent archival of the HIRDLS instrument telemetry and derived data products. This will include any necessary updates of storage media and suitable physical storage space for these media.

3.3 HIRDLS Team Data Management Functions

As described in the HIRDLS Science Software Management Plan, both the UK and the USA are actively involved in the development of software in support of the HIRDLS instrument. The organization of the distributed HIRDLS Software Development Team is shown in Figure 2. Also shown are the major software components for which each group has lead responsibility as defined in the work share agreement between the UK HIRDLS management organization and NASA. It should be noted that a considerable fraction of the UK work share involves in-flight software, ground support equipment software and instrument test and calibration support software that are covered in other management plans. In addition to supplying the software components shown in Figure 2, the US is responsible for the delivery, integration and test of all DAAC based components of the HIRDLS standard data product generation software and provides the point-of-contact between the HIRDLS team and the EOSDIS for mission data processing operations issues.

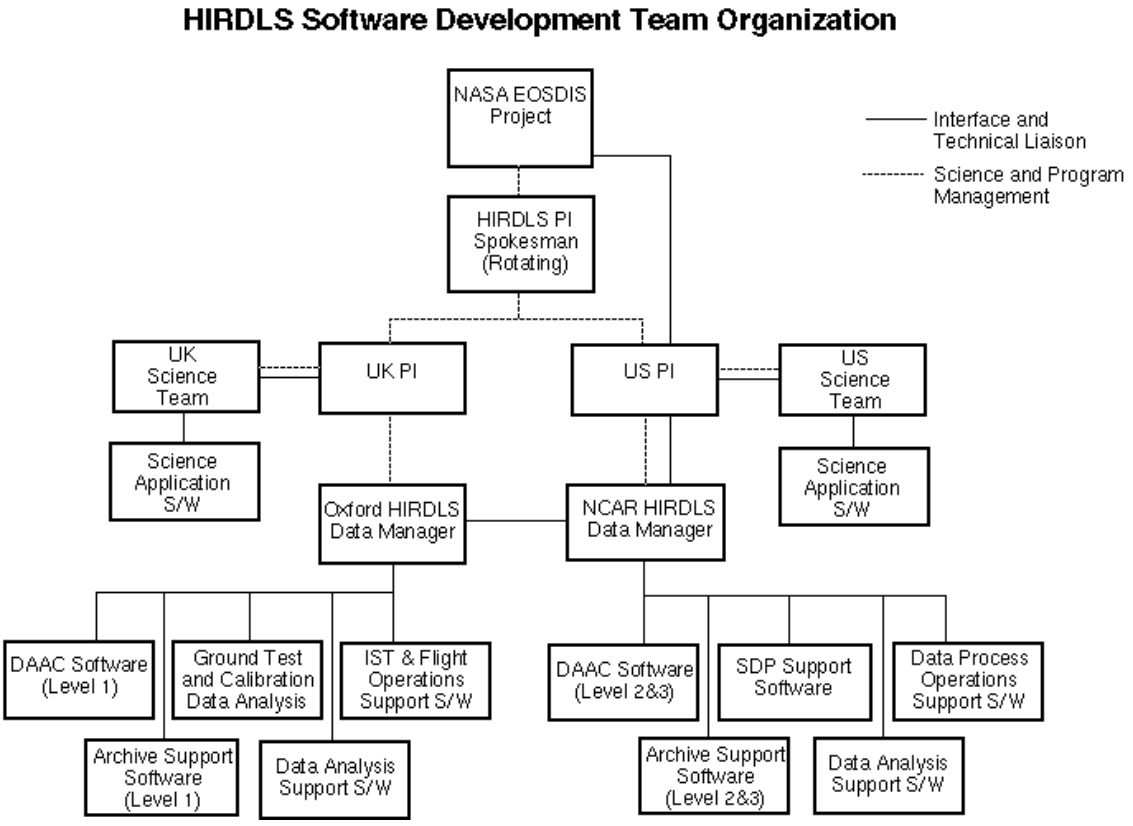

Figure 2, HIRDLS Software Team Organization and Responsibilities

3.3.1 UK Data Management Responsibilities

The UK has responsibility for those data management functions which pertain to those data and software functions for which they have lead responsibility as defined in the Work Share Agreement. Mr. Robert Wells at Oxford is the UK Data Manager and is a member of the UK Science Team.

3.3.2 US Data Management Responsibilities

The US has responsibility for those data management functions which pertain to those data and software functions for which they have lead responsibility as defined in the Work Share Agreement. Mr. Paul L. Bailey at the National Center for Atmospheric Research is the US Data Manager and serves on the US Science Team.