NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GODDARD SPACE FLIGHT CENTER

Earth Observing 1 (EO-1) Mission Operations Center (MOC) to Mission Science User Working Group (MSUWG)

Interface Control Document

Version 4

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Earth Observing 1 (EO-1) Mission Operations Center (MOC) to Mission Science User Working Group Interface Control Document (ICD)

Signature Page

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1 OVERVIEW

1.1 Scope / Purpose

The Earth Observing-1 (EO-1) mission is the first earth-observing mission of the NASA New Millennium Program. This document defines the interfaces and data products exchanged between the Mission Operations Center (MOC) and the EO-1 Mission Science User Working Group (SUWG). The SUWG includes the Mission Planning Office (MPO), the EO-1 Science Validation Facility, and the EO-1 Instrument Teams (TRW Hyperion, MIT/Lincoln Labs ALI and GSFC LEISA/AC).

Interface documents exist between the EO-1 Instrument Teams and the EO-1 project. Where applicable this document will refer to these ICDs.

1.2 Applicable Documents

1. Earth Orbiter-1 (EO-1) Spaceraft to Ground Interface Control Document, Baseline, September 24, 1998.
2. Detailed Mission Requirements (DMR) Document for the New Millennium Earth Observing-1 (NMP/EO-1), Review Copy (Issue 6), March 31, 1999.
3. EO-1 Functional and Performance Requirements
4. MOU Between the MOPSS and the MPO, Long Term Plan Format
5. Earth Observing-1 Memorandum of Understanding Between the Mission Operations Center and Flight Dynamics Facility Mission Aides Transformation System Formats, August 15, 1999, Revision 2.
6. Earth Observer 1 Interface Control Document For Radiometric Calibration Processing and Performance Assessment Processing Between the National Aeronautics and Space Administration Goddard Space Flight Center and the Massachusetts Institute of Technology Lincoln Laboratory, Revision B 1/8/99.
7. Hyperion Level-Zero Interface Control Document
8. Earth Observing 1 Data Interface Control Document for LEISA/AC to EO-1 Science Data Products.
9. New Millennium Program Earth Observing-1 (EO-1) Ground Segment Level II Requirements, Baseline, June 22, 1998.
10. EO-1 Mission Operations Document Vol 1 and 2
11. Hierachical Data Format - http://hdf.ncsa.uiuc.edu/
12. ASIST Home Page and User's Guide - http://rs733.gsfc.nasa.gov/ASIST/ASIST-home.html

See also http://eo1.gsfc.nasa.gov/Iso9000/Catalogue/catalogue1.htm for online versions of many of the above EO-1 documents.

2 INTERFACE DEFINITION

This section defines the interfaces between the EO-1 MOC and the SUWG. The SUWG consists of the following organizations: the Mission Planning Office, Science Validation Facility, and the TRW, LEISA/AC, and MIT/LL instrument teams.

A graphical representation of the interface can be seen in Figure 2.1.

2.1 MOC Ground System

The EO-1 MOC is responsible for the command and control of the EO-1 spacecraft and for the Level-Zero processing and distribution of the EO-1 science data. The MOC consists of the Data Processing System, Combined Ground System, Flight Dynamics Support System, and the Mission Operations Planning and Scheduling System.

The MOC is located at Goddard Space Flight Center (GSFC) in Greenbelt Maryland in Building 14 . The EO-1 MOC ground system is being provided by NASA GSFC Code 581. The EO-1 Ground System Manager is responsible for insuring the EO-1 MOC ground system complies with the interfaces specified herein.

2.1.1 Data Processing System

The Data Processing System (DPS) receives data from the ground stations in realtime and on an AMPEX tape. Real-time data consists of data downlinked on the S-band antenna during station contacts. The AMPEX tape will contain one or more Data Collection Events (DCE's). The DPS will de-interleave, de-randomize, decode and correct errors detected by the Reed-Solomon error code, process the data into instrument data frames, and produce imageable Hierarchical Data Format (HDF) data files for each instrument and associated spacecraft ancillary and housekeeping data associated with the DCE. Algorithms for re-sequencing scene data are supplied prior to launch to the DPS by the 3 instrument teams, and integrated into the DPS software.

These Level-Zero processed data files will be written to Digital Linear Tape (DLT) and distributed as follows: one each to LL/MIT, TRW, LEISA/AC, SVF, and the MOC archive.

2.1.2 Combined Ground System

The Combined Ground System (CGS) is responsible for the real-time command and control of the spacecraft and the generation, management and uplink of command loads. The CGS uses the Advanced Spacecraft Integration and Test (ASIST) software for command and control functions and the Command Management System (CMS) for managing the command loads to the spacecraft. The CGS has no direct interface with the SUWG.

2.1.3 Flight Dynamics Support System

The Flight Dynamics Support System (FDSS) generates and provides access to EO-1 orbit and attitude products for use in the planning, calibrating, and processing of EO-1 imaging. FDSS products are placed in a FDS Product Directory where they are available via ftp.

2.1.4 Mission Operations Planning and Scheduling System

The Mission Operations Planning and Scheduling System (MOPSS) receives the prioritized scene list from the MPO, the L7 daily target list from Landsat-7, cloud predicts from the National Centers for Environmental Prediction (NCEP), and orbit and attitude data from FDSS.

2.2 SUWG

The following is a brief description of each organizations role and principle contact for Science data planning and processing.

2.2.1 Mission Science Office

The EO-1 MPO provides the EO-1 science and technology long-term planning function as well as the planning for day to day mission activities. The MPO is also responsible for generating a mission catalog for tracking user requests for scenes. All requests for scene acquisition are to be routed through the Mission Planning Office. The MPO will determine suitability and set priorities on the requests, and forward the selected DCE targets to the MOC.

The MPO will provide a weekly 'prioritized' scene list on the order of 8-10 targets per day of which typically up to 4 targets will be scheduled for each day. The FOT will check the cloud thresholds of these scenes against cloud predictions and drop those scenes that do not meet cloud cover requirements.

2.2.2 SVF

The SVF is responsible for providing Level 1 processing of ALI data during EOC and processing ALI and AC data during nominal operations. The SVF is also responsible for fulfilling science user requests for EO-1 data.

The MPO/SVF will examine the L0 data and determine if the image is useable and keep appropriate records for access by the SWUG. If required, the DCE can be rescheduled.

2.2.3 TRW Hyperion

The TRW Hyperion instument team is responsible for performing the instrument checkout and validation of the Hyperion hyperspectral instrument. In addition they provide Level 1 processing and periodic instrument performance checks for the Hyperion instrument.

2.2.4 MIT/LL ALI

The MIT/LL Instrument team is responsible for performing the instrument checkout and validation of the Advanced Land Imager/MS-PAN capability.

2.2.5 GSFC LEISA/AC

The LEISA/AC Instrument team is responsible for performing the instrument checkout and validation of the LEISA/AC instrument. In addition, they provide Level 1 processing of the LEISA/AC instrument data during the early orbit checkout period.

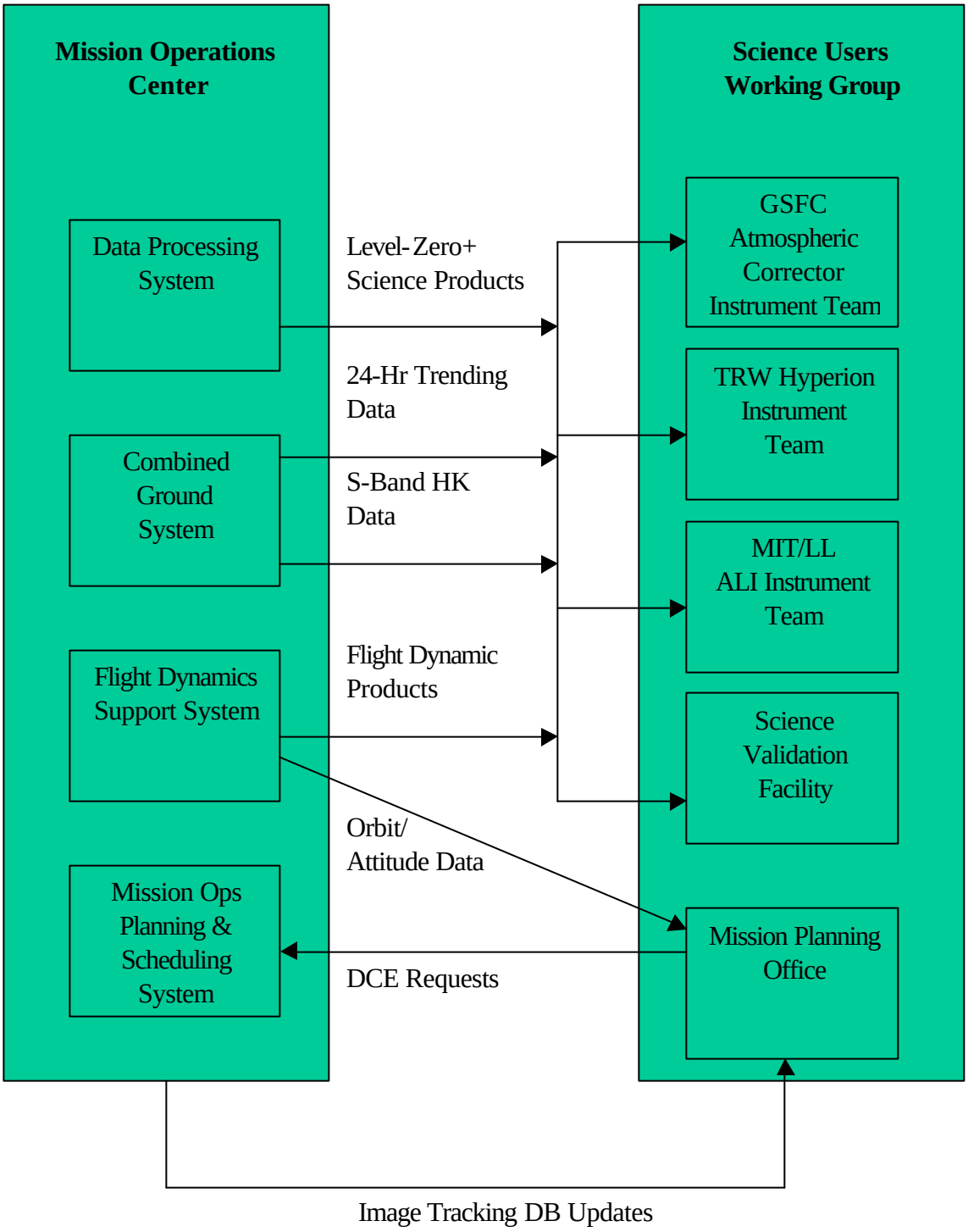

Mission Operations Center
Science Users Working Group
Data Processing System
Combined Ground System
Flight Dynamics Support System
Mission Ops Planning & Scheduling System
Level-Zero+ Science Products
24-Hr Trending Data
S-Band HK Data
Flight Dynamic Products
Orbit/ Attitude Data
DCE Requests
GSFC Atmospheric Corrector Instrument Team
TRW Hyperion Instrument Team
MIT/LL ALI Instrument Team
Science Validation Facility
Mission Planning Office
Image Tracking DB Updates

Figure 2.1 MOC/MSUWG Interface Diagram

3 DATA PRODUCTS

This section defines the products exchanged between the MOC and SUWG.

The products exchanged between the MOC and SUWG consist of: science Level-Zero data, DCE state of health, 24-hr trended S-Band state of health, raw spacecraft housekeeping telemetry, DCE DLT products, flight dynamics products, Ground Processing File, and DCE requests.

3.1 MOC to SUWG

3.1.1 Level-Zero Science Data

3.1.1.1 Description

Level-Zero science data consists of the scenes taken by the spacecraft. This data is stored onboard the spacecraft on the Wideband Advanced Recorder Processor (WARP). It will nominally be downlinked via the X band phased array antenna. In contingency situations the S band antenna may be used to transmit the scene data. The only difference between the two methods affecting data processing is the amount of data that can be downloaded daily. With the X band antenna, as much as 80 Gbits of data can be downloaded per day. If the S band antenna is used, the amount of data is reduced to 10 Gbits per day. The data sent to the ground is recorded onto an AMPEX tape at the ground station and then mailed to the MOC.

3.1.1.2 Format

The Level-Zero files created by the MOC will be in HDF. The content and format of the Level-Zero files is specified in the individual instrument ICDs. The format of the Level-Zero filenames are defined in the individual instrument ICDs (see below). These filenames are of the form EO1YYYYDDDHHMMSS.Desc where

EO1 is the mission designator
YYYYDDDHHMMSS is the year, day of year, hour, minute and second of DCE start
Desc is a descriptor identifying the type of data in the file (e.g. WVZ is the WIS VNIR ALI port Level-Zero raw data file)

3.1.1.2.1 LEISA/AC

The format of the LEISA/AC Level-Zero Science Data is described in the document “Earth Observing 1 Data Interface Control Document for LEISA/AC to Science Data Products”.

3.1.1.2.2 ALI

The format of the ALI Level-Zero Science Data is described in the document "Earth Observing-1 (EO-1)1 Interface Control Document for Radiometric Calibration Processing and Performance Assessment Processing Between Goddard Space Flight Center and Massachusetts Institute of Technology Lincoln Laboratory".

3.1.1.2.3 Hyperion

The format of the Hyperion Level-Zero Science Data is described in the document "Hyperion Level-Zero Interface Control Document".

3.1.1.3 Data Availability

During normal operations Level-Zero science data is not available online to the users. This data is placed on DLTs and shipped to the users. See section 3.1.8.

During EOC and some contingencies, small DCEs (i.e. <125MB in size) will be made available online to the instrument teams. These data are expected to be available approximately 3.5 hours after the end of an S-band pass. The data will be made available on an ftp server that can be accessed at any time by the instrument teams. These small DCE data sets will remain on line for a minimum of three days.

3.1.2 Level-Zero Intermediate Files

3.1.2.1 Description

As part of the Level-Zero data processing function, Level-Zero intermediate files are created for each of the instruments. These files are not distributed with the Level-Zero data but will be made available to the instrument teams for use during EOC and by request.

3.1.2.2 Format

The Level-Zero intermediate files are in science data format with all transmission artifacts removed. The filenames for these files will be of format YYYY_DDD_FileID.Ver, where

YYYY is the four-digit year of DCE start
DDD is the three-digit day of yearof DCE start
FileID is the File ID #
Ver is a version number

3.1.2.3 Data Availability

During EOC and some contingencies, the Level-Zero intermediate files will be placed online and made available to the instrument teams via ftp. These files will be kept online for a period of at least one day.

3.1.3 DCE SOH

3.1.3.1 Description

The DCE SOH data is the spacecraft health and safety data recorded during a DCE. This data is stored on the WARP and is downlinked with the scene data. The MOC will process this data and generate a file which consists of a subset of mnemonics converted to engineering units. The selected mnemonics are the union of those requested by each individual instrument team as documented in the instrument team ICDs.

3.1.3.2 Format

The DCE SOH file is created in HDF. For each mnemonic requested, two 64-bit floating point arrays are created. The first array is given the name of the mnemonic and contains the mnemonic values. The second array is given the name A@mnemonic_name(TIME_MEASURED) and contains the times for each point in the mnemonic array. Below are the results from running the HDF vshow command on a sample HDF file. This file contains values for a single submnemonic called *sine*.

```
FILE: sinewave.hdf

vg:0 <1965/26> (fakeDim0 {UDim0.0}) has 2 entries:
  0 attributes.
  vs:0 <1962/24> nv=1 i=0 fld [Values] vsize=4 (fakeDim0 {DimVal0.1})
 0 attributes.
  vs:1 <1962/25> nv=1 i=0 fld [Values] vsize=4 (fakeDim0 {DimVal0.0})
 0 attributes.

vg:1 <1965/29> (fakeDim1 {UDim0.0}) has 2 entries:
  0 attributes.
  vs:0 <1962/27> nv=1 i=0 fld [Values] vsize=4 (fakeDim1 {DimVal0.1})
 0 attributes.
  vs:1 <1962/28> nv=1 i=0 fld [Values] vsize=4 (fakeDim1 {DimVal0.0})
 0 attributes.

vg:2 <1965/34> (sine {Var0.0}) has 8 entries:
  0 attributes.
  vg:0 <1965/26> ne=2 (fakeDim0 {UDim0.0})
  0 attributes.
  vs:1 <1962/30> nv=1 i=0 fld [VALUES] vsize=18 (Description {Attr0.0})
 0 attributes.
  vs:2 <1962/31> nv=1 i=0 fld [VALUES] vsize=2 (Units {Attr0.0})
 0 attributes.
  vs:3 <1962/32> nv=1 i=0 fld [VALUES] vsize=7 (ConversionType {Attr0.0})
 0 attributes.
  --:4 <702/23> Scientific Data
  --:5 <106/33> Number type
  --:6 <701/33> SciData dimension record
  --:7 <720/2> Numeric Data Group
```

```
vg:3 <1965/39> (A@sine(TIME_MEASURED) {Var0.0}) has 8 entries:
  0 attributes.
  vg:0 <1965/29> ne=2 (fakeDim1 {UDim0.0})
  0 attributes.
  vs:1 <1962/35> nv=1 i=0 fld [VALUES] vsize=18 (Description {Attr0.0})
 0 attributes.
  vs:2 <1962/36> nv=1 i=0 fld [VALUES] vsize=2 (Units {Attr0.0})
 0 attributes.
  vs:3 <1962/37> nv=1 i=0 fld [VALUES] vsize=7 (ConversionType {Attr0.0})
 0 attributes.
  --:4 <702/22> Scientific Data
  --:5 <106/38> Number type
  --:6 <701/38> SciData dimension record
  --:7 <720/3> Numeric Data Group

vg:4 <1965/41> (/s/dev/accounts/global/data/sinewave.hdf {CDF0.0}) has 5
entries:
  0 attributes.
  vg:0 <1965/26> ne=2 (fakeDim0 {UDim0.0})
  0 attributes.
  vg:1 <1965/29> ne=2 (fakeDim1 {UDim0.0})
  0 attributes.
  vg:2 <1965/34> ne=8 (sine {Var0.0})
  0 attributes.
  vg:3 <1965/39> ne=8 (A@sine(TIME_MEASURED) {Var0.0})
  0 attributes.
  vs:4 <1962/40> nv=1 i=0 fld [VALUES] vsize=20 (Creator {Attr0.0})
 0 attributes.
```

3.1.3.3 Data Availability

During normal operations the DCE SOH data is not available online to the users. This data is placed on DLTs and shipped to the users. See section 3.1.8.

The DCE SOH data associated with the small DCEs will be made available as described in Section 3.1.1.3 for the Level-Zero data.

3.1.4 24-HR Trended SOH

3.1.4.1 Description

The MOC will provide the SUWG with a 24-hour Trended SOH file which consists of a subset of mnemonics converted to engineering units. The selected mnemonics are the union of those requested by each individual instrument team as documented in the instrument team ICDs.

3.1.4.2 Format

The 24-hour Trended SOH file is generated as an ASIST sequential print file (ASCII). See the ASIST User's Guide for a description of the sequential print function. Below is an example sequential print.

The command *seq print on PODCSTIME using %s PODCMTIME using %s* generates:

```
844985909.148 P0DC:  96-284-22:18:29.148 02-283-22:18:27.769
844985911.148 P0DC:  96-284-22:18:31.148 02-283-22:18:29.769
844985913.148 P0DC:  96-284-22:18:33.148 02-283-22:18:31.769
844985915.148 P0DC:  96-284-22:18:35.148 02-283-22:18:33.769
844985917.148 P0DC:  96-284-22:18:37.148 02-283-22:18:35.769
844985919.148 P0DC:  96-284-22:18:39.148 02-283-22:18:37.769
844985921.148 P0DC:  96-284-22:18:41.148 02-283-22:18:39.769
844985923.148 P0DC:  96-284-22:18:43.148 02-283-22:18:41.769
844985925.148 P0DC:  96-284-22:18:45.148 02-283-22:18:43.769
844985927.148 P0DC:  96-284-22:18:47.148 02-283-22:18:45.769
844985929.148 P0DC:  96-284-22:18:49.148 02-283-22:18:47.769
```

3.1.4.3 Data Availability

The 24-hour Trended SOH file is generated by the FOT after receipt of a full day of S-Band housekeeping data. The sequential print file is placed online and is available to the users via ftp. This file will be available online for at least 7 days.

3.1.5 S-Band Housekeeping Data

3.1.5.1 Description

C&DH Virtual Recorder (VR) housekeeping data consists of the health and safety data from the spacecraft that has been reconstructed and had all communications artifacts removed from it. It includes information from all spacecraft subsystems. This data is stored continuously on the Mongoose V computer used by the C&DH subsystem. The housekeeping data stored in the C&DH is downloaded on S band supports during each pass. It will be stored on the front end at the ground station, and sent to the SAFS data server located at GSFC after the pass. The MOC will retrieve the data and it will be stored on the ASIST Front End Data System (FEDS) DHDS subsystem.

3.1.5.2 Format

The S-Band housekeeping data is stored on the FEDS as virtual channels. The data comprises the following VCs:

VC0 real-time telemetry
VC1 real-time telemetry recorded during playback
VC2 events messages
VC3 WARP DCE SOH

3.1.5.3 Data Availability

The C&DH housekeeping data will be available upon completion of the ftp of the data from the SAFS server.

A user can connect to the FEDS using an ASIST workstation and request the data for playback.

The C&DH housekeeping data are stored on the DHDS for the life of the mission.

3.1.6 Orbit and Attitude Data

3.1.6.1 Description

The FDDS provides products to assist the SUWG in the scheduling of scene requests

The table below describes the products available from the MOC Flight Dynamics Support System.

Product Description	**Product Length**	**Product File Name**
Sun Angles for Power Monitoring	8 Days	EO1yyyydddBETSUN.S00
Sun Angles for Power Monitoring	5 Weeks	EO1yyyydddBETSUN.L00
Ground Track	8 Days	EO1yyyydddGRDTRK.S00
Ground Track	5 Weeks	EO1yyyydddGRDTRK.L00
Station Inviews	8 Days	EO1yyyydddINVIEW.S00
Station Inviews	5 Weeks	EO1yyyydddINVIEW.L00
X-Band Phased Array Antenna Station Inviews	8 Days	EO1yyyydddINVWXB.S00
X-Band Phased Array Antenna Station Inviews	5 Weeks	EO1yyyydddINVWXB.L00
Solar Array Lunar Eclipse Times	8 Days	EO1yyyydddLUNECL.S00
Solar Array Lunar Eclipse Times	5 Weeks	EO1yyyydddLUNECL.L00
Miscellaneous Zone of Exclusion Entry & Exit Times	8 Days	EO1yyyydddMISZOE.S00
Miscellaneous Zone of Exclusion Entry & Exit Times	5 Weeks	EO1yyyydddMISZOE.L00
SAA Entry & Exit Times	8 Days	EO1yyyydddSAATIM.S00
SAA Entry & Exit Times	5 Weeks	EO1yyyydddSAATIM.L00
EO-1 Spacecraft Shadows	8 Days	EO1yyyydddSHADOW.S00
EO-1 Spacecraft Shadows	5 Weeks	EO1yyyydddSHADOW.L00
EO-1 Sub-Satellite Point Shadow Entry & Exit Times	8 Days	EO1yyyydddSUBSHA.S00
EO-1 Sub-Satellite Point Shadow Entry & Exit Times	5 Weeks	EO1yyyydddSUBSHA.L00
Mean Local Time of Ascending Node	8 Days	EO1yyyydddMLTAND.S00
Mean Local Time of Ascending Node	5 Weeks	EO1yyyydddMLTAND.L00
Mean Local Time of Descending Node	8 Days	EO1yyyydddMLTDND.S00
Mean Local Time of Descending Node	5 Weeks	EO1yyyydddMLTDND.L00
EO-1 EPV File	8 Days	EO1yyyydddEO1EPV.S00
Landsat-7 EPV File	8 Days	EO1yyyydddLS7EPV.S00
EO-1 Maneuver Planning File	NA	EO1yyyydddEO1MPF.vv
EO-1 Maneuver Command File	NA	EO1yyyydddEO1MCF.vv
Landsat-7 Maneuver Planning File	NA	EO1yyyydddLS7MPF.vv
Sun Angles at WRS Scene Centers	NA	EO1yyyydddWRSSUN.vv
Lunar Calibration Slew	NA	EO1yyyydddLUNSLW.vv

Product Description	Product Length	Product File Name
Deep Space Calibration Slew	NA	EO1yyyydddDSPSLW.vv
Solar Calibration Slew	NA	EO1yyyydddSOLSLW.vv
Engineering Slew	NA	EO1yyyydddENGSLW.vv

3.1.6.2 Format

All FDSS products are ASCII files. The format of each of these files is described in the document "Earth Observing-1 Memorandum of Understanding Between the Mission Operations Center and Flight Dynamics Facility Mission Aides Transformation System Formats".

3.1.6.3 Data Availability

Products of 8-day length are generated on Monday and Wednesday each week. Products of 5-week length and maneuver planning files are generated on Fridays. All other products are generated by request.

The data will be placed online and will be available to users via ftp.

3.1.7 Ground Processing File

3.1.7.1 Description

The Ground Processing File (GPF) is generated as part of the Level-Zero processing of the DCEs. This file contains information on the quality of the data, parameters used in processing the data, and statistics on the output products. It includes, but is not limited to, the following information:

- Number of scans
- Number of missed scans
- Start time
- Stop time
- DPS software version
- Instrument algorithm software version

3.1.7.2 Format

This report is generated as an ASCII file.

3.1.7.3 Data Availability

The GPF is created at the same time the Level-Zero products are generated. This report is included with each DCE on the DLTs.

3.1.8 Level-Zero DLT

3.1.8.1 Description

The Level-Zero DLTs are DLT 7000 cartridges containing one or more Level-Zero+ product sets. A Level-Zero+ product set is all the files associated with a single DCE. These are the DCE instrument Level-Zero files for each of the instruments, the DCE housekeeping file, and the GPF. These tapes are mailed to the members of the SUWG.

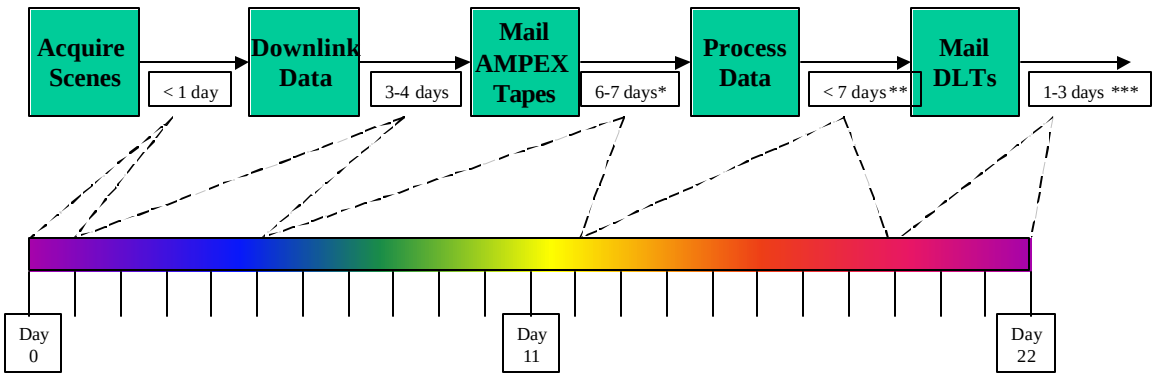
3.1.8.2 Format

A Level-Zero DLT is created by using the Unix tar command to place the individual files on the tape. The first file placed on the tape is an index file (00index) listing all of the remaining files to be found on the tape. Each DLT will have an external label specifying the contents.

3.1.8.3 Data Availability

The availability of the Level-Zero DLTs depends on the arrival of the AMPEX tapes from the EO-1 ground stations. Level-Zero DLTs will be carried to the SVF and mailed to TRW, MIT/LL, and the GSFC AC team. A nominal processing timeline from scene acquisition to receipt by the user of the DLT is shown below.

During normal operations the Level-Zero DLTs will be shipped twice per week. During EOC and some contingency situations the DLTs will be shipped from the MOC daily (M-F).



* Avg. based on mail delays seen on L7 data from Norway
** Based on DPS Requirements for getting out a DLT
*** Based on estimate

3.1.9 Image Tracking DB Updates

3.1.9.1 Description

The image tracking database provides a means of tracking a scene through the system. The database will provide information on the image being requested such as: requestor, requested WRS path/row, etc. The database will also track when the image was scheduled, acquired and downlinked, and will also contain image assessments if those have been completed on the data.

3.1.9.2 Format

The FOT will use the MPO provided web interface to the image catalog to enter information.

3.1.9.3 Data Availability

Inputs to the image catalog will be provided to the MPO by the MOC as needed.

3.2 SUWG to MOC

3.2.1 DCE Requests

3.2.1.1 Description

The MPO uses a long-term plan to create a weekly schedule of DCE requests. The long-term plan consists of DCE requests covering a period of one year. The weekly request schedule is constructed using the long-term plan as a baseline. The MPO will deliver the initial weekly schedule to the MOC no later than activity week minus 21 days. Updates to the schedule must be received by the MOC no later than activity week minus 7 days. Updates to the schedule received after activity week minus 7 days may not be processed in time to make it into the final activity plan.

The FOT will use the weekly request schedule to create the command load. The request schedule will be input into the planning and scheduling tool, MOPSS. The FOT will use MOPSS to create the activity plan for each day.

The EO-1 FOT will receive the L7 target list daily (available on the web ~1pm). The DCE requests to the MOC will have a 'paired scene abort' parameter to cancel a DCE if L7 is not planning to take the scene. In the event that L7 will not be taking their half of a planned paired scene DCE and the paired scene abort parameter is set then, time permitting, the EO-1 scene will be replaced with an alternate scene from the prioritized list if one is available.

3.2.1.2 Format

The MPO will use the MOPSS as a planning and scheduling tool, editing the scene acquisition list by accessing MOPSS via an X-windows capable remote terminal located in the MPO.

The MOC will be provided with the following information:

Item	Format	Range
Comment Field (Text field to provide additional information to clarify request. For FOT input only.)	Text	<256 char.
Scene request type (NDR=nadir, PTG=pointing, MTN=maintain, CAL=calibration, STE=stereo, SPC=special,…)	XXX	
Paired Scene Abort (Y=abort if not on L7 target list)	X	Y/N
Acquisition request ID (request unique, >1 scene possible)	(10 Alphanumeric)	
Scene ID (see below)	(21 Alphanumeric)	
Satellite path	NNN	1-233
Satellite Start row (row 1-123 = day, 124-248 = night)	NNN	1-248
Satellite Delta Time Offset from WRS start path (always positive)	+NN	0 – 27
Satellite Stop row	NNN	1-248
Satellite Delta Time Offset from WRS stop path (NN subtracted from nominal endtime)	NN	0 - 27
Target path	NNN	1-233
Target Start row (row 1-123 = day, 124-248 = night)	NNN	1-248
Target Stop row	NNN	1-248
Day of year	NNN	1-366
Year	NNNN	≥1999
Sensor mode (which science streams are to be collected) Bit 0 (least significant bit) = MS/Pan Bit 1 = AC1 (30 Hz) Bit 2 = AC2 (60 Hz) Bit 3 = HSI SWIR Bit 4 = HSI VNIR e.g. Hex number '05' (in binary 00000101) means turn on both MS/Pan and AC2	HH (hex)	00-FF
Pointing Mode: A. baseline nadir: Zero roll angle, with instruments pointing at edge of Landsat swath, plus a roll/pitch/yaw offset. B. instrument roll/pitch/yaw: Use roll/pitch/yaw offset fields to determine pointing of the specified instrument. Values of 0,0,0 indicate that the instrument is pointing straight down. C. instrument at a latitude/longitude: A given instrument is pointing at a particular scene location given by latitude and longitude, plus a roll/pitch/yaw offset. MOPSS will use latitude and longitude to calculate roll angle. D. stereo Landsat: Paired scene (co-view) with	X	A-E

Item	Format	Range
Landsat 7. Scene location given by latitude and longitude, pitch is calculated by MOPSS, Path/Row is for L7. E. Maintain pointing attitude of previous scene.		
Roll offset (degrees) (using FDSS supplied tool)	+- NNN.NNNNNN	0 to +-360
Pitch offset (degrees) (using FDSS supplied tool)	+- NNN.NNNNNN	0 to +-360
Yaw offset (degrees) (using FDSS supplied tool)	+- NNN.NNNNNN	0 to +-360
Latitude/longitude/sensor (EO-1 MOPSS support field is an enhancement) (i.e., to specify a particular sensor is to point to a particular lat/long) Site latitude (degrees) Site longitude (degrees)	 +-NN.NNNNNN +-NNN.NNNNNN	 0 to +-90 0 to 360
Sensor (1 = MS/Pan, 2 = MS/Pan_1, 3 = MS/Pan_2, 4 = MS/Pan_3, 5 = MS/Pan_4, 6 = AC, 7, 8, 9 = AC chips, 10 = Hyperion)	NN	1-15
Alignment bias (none, ALI, HSI)	XXXX	
Maximum acceptable cloud cover (in %; abort if predicted cloud cover > threshold; 100=always acquire)	NNN	0-100
Maximum acceptable solar zenith angle (degrees, 99-take in any case)	NNN	0-99
Momentum management priorities HIGH (optimized for image) MARGINAL (try for optimal range but any wheel speed not near zero is OK) ANY (try for optimal range but any wheel speed is OK) SPECIFIED (get optimal range from WHEEL_SPEED parameter) NONE (don't perform momentum management) (FDSS will retrieve appropriate wheel speeds from file for HIGH and MARGINAL mm checking)	X	(H, M, A, S, N)
Wheel speed Specific allowable minimum wheel speed for momentum management checks Specific allowable maximum wheel speed for momentum management checks (applied only when SPECIFIED is used for mm)	 NNNN NNNN	
Set ALI Parameters	X	Y/N
ALI Integration time – nominal value or specified value (in microseconds)	NNNN.NNN	0 to <10000
ALI Frame rate	NNNN	0-4095
Acquisition priority (999 is highest priority)	NNN	0-999
Special AC DEEP SPACE calibration required (if AC is	X	Y/N

Item	Format	Range
on, the dark Earth is taken within two orbits). Default to N.		
Auto release (whether OPS should confirm ground release prior to releasing data for WARP overwrite. Generally will automatically release prior to next image). Default to Y= release without confirmation.	X	Y/N
ALI Level 1 processing req'd	X	T / F
HSI Level 1 processing req'd	X	T / F
AC Level 1 processing req'd	X	T / F

Item	Format	Range
on, the dark Earth is taken within two orbits). Default to N.		
Auto release (whether OPS should confirm ground release prior to releaseing data for WARP overwrite. Generally will automatically release prior to next image). Default to Y = release without confirmation.	X	Y/N
ALI Level 1 processing req'd HSI level 1 processing req'd AC Level 1 processing req'd	X X X	T/F T/F T/F

The following are examples of scene requests.

nadir landsat,NDR,N,000001001S,EO10330372000168111NF,33,37, ,37,
,168,2000,27,A, , , , , , ,ALI,0,90,H, , ,N, , ,0,Y,Y

pointing within swath,PTG,N,000002001D,EO10400332000260100PP,40,
33,15,33,5,260,2000,24,C, , , ,38.5,-115.5,10,ALI,0,83.9,H, , ,N, , ,0,N,Y

pointing within swath--angles specified,PTG,N,000003001C,
E010350382000237011PF,35,38, ,38, ,237,2000,3,B,-5,0.000012,
-0.002004, , ,5,ALI,0, ,S,-100,100,N, , ,0,Y,N

stereo landsat,STE,N,000004001S,EO10280322000111111KF,28,32, ,32,
,111,2000,27,D, , , ,36.65,-97.5,1,ALI,0, ,M, , ,N, , ,0,Y,N,

maintain pointing,MTN,N,000004002S,EO10280352000111111KF,28,35, ,35, ,111,2000,27,E, , , , , ,
,none,0, ,A, , ,N, , ,0, ,N

AC swath,SPC,N,000005001S,EO10041142000022001NS,4,114, ,123,
,22,2000,4,A, , , , , , ,none,0, ,N, , ,N, , ,0,Y,Y

Hyp swir,PTG,N,000002002D,E011870342000134100KP,187,34,10,34,
3,134,2000,24,C, , , ,37.7,15.1,10,HSI,0, ,H, , ,N, , ,0,N,Y

3.2.1.3 Data Availability

A strawman schedule will be delivered to the MOC by activity week minus 21 days. A conflict free schedule, in the form of changes desired from the strawman schedule, will be delivered by activity week minus 14 days. The MPO will notify the MOC via email in the event there are no changes to the strawman schedule. Updates for the final schedule must be delivered by activity week minus 7 days (5pm Monday the week prior to the activity week). At activity week minus 7 days the MOC will use the information at hand to create the activity plan. In the event that the updates to the schedule are extensive the MOC may request that the MPO send a new and complete schedule.

The MPO will deliver schedules and schedule updates to the MOC via ftp to a MOPSS drop-site. Account, password, and location for copying the files will be provided by the MOC. The FOT will acknowledge receipt of the schedule and schedule updates via an email to an MPO-supplied account.

Figure 3.1 shows a timeline of schedule deliveries and load creation.

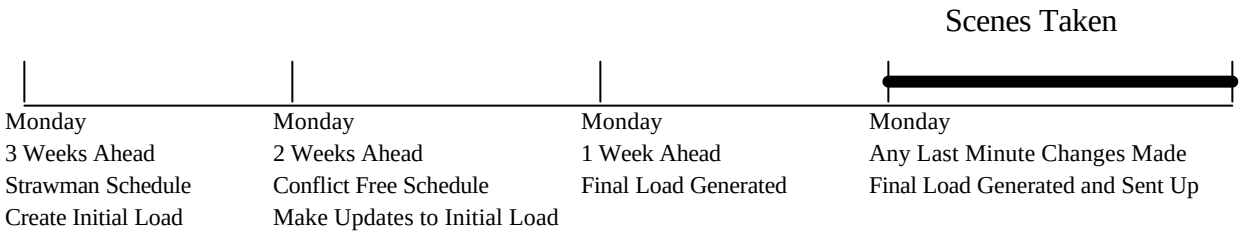


Figure 3.1: Schedule Timeline

4 APPENDIX E ACRONYMS AND DEFINITIONS

C&DH	Command and Data Handling
CGS	Combined Ground System
DCE	Data Collection Event
DHDS	Data Handling and Distribution System
DLT	Digital Linear Tape
DPS	Data Processing System
EOC	Early Orbit Checkout
FDSS	Flight Dynamics Support System
FEDS	Front End Data System
FOT	Flight Operations Team
GPF	Ground Processing File
HDF	Hierarchical Data Format
MOC	Mission Operations Center
MOPSS	Mission Operations Planning and Scheduling System
MPO	Mission Planning Office
MSO	Mission Science Office
NCEP	National Centers for Environmental Prediction
SAFS	Store and Forward System
SOH	State of Health
SVF	Science Verification Facility
VR	Virtual Recorder
WARP	Wideband Advanced Recorder Processor