

Description of DSCOVR data stream

For the earth science instruments, EPIC and NISTAR, there will be a single antenna at Wallops Island, Virginia (WCDAS) devoted to bring down the data from DSCOVR. The maximum download time is scheduled as 5 hours, which corresponds to the amount of time the spacecraft will be in view during winter solstice. DSCOVR data from other times will be stored onboard until the Wallops antenna is in view. The data stream will be funneled to DSOC (DSCOVR Science Operations Center) and a portion will go to the MOC (Mission Operations Center). The MOC will provide NASA generated commands for EPIC and NISTAR. DSOC will separate the telemetry into separate earth science data streams and process the data to produce Level-1 (Geolocated calibrate Radiances in HDF5 format). The resulting data will then be transmitted to the Langley DAAC for archiving and access by the individual ROSES teams.

Primary DSOC Functions

- Ingest & Telemetry Process
 - Interface with external sites & systems to which science data telemetry is sent
 - Storing and archiving raw telemetry
 - Monitoring instrument science and data health
- EPIC
 - Converting raw telemetry to level 0 products
 - Calculating calibration coefficients, geolocation, and stray light correction
 - Applying corrections to create level 1 products

- NISTAR
 - Converting raw telemetry to level 0 products
 - Creating level 1 products
- PlasMag
 - Converting raw telemetry to level 0 products
- Archive and Distribution
 - Storage for reprocessing
 - Archival and data dissemination via GES DISC and SPDF



DSOC Key Requirements

Interfaces

Key L2's	Derived Key L3
[L2-GS-110] The DSCOVR Ground Segment shall process Observatory telemetry formatted in accordance with the DSCOVR Space to Ground ICD.	[L3-DSOC-50] The DSOC shall receive Observatory VC2-VC4 data from the CDAS as described in the DSCOVR Wallops Command and Data Acquisition Station ICD.
	[L3-DSOC-80] The DSOC shall receive Integrated Contact Schedules from the MOC as described in the DSCOVR Mission Operations Center ICD.
	[L3-DSOC-100] The DSOC shall receive Observatory VC0 and VC1 data from the NGDC as described in the DSCOVR National Geophysical Data Center ICD.

General

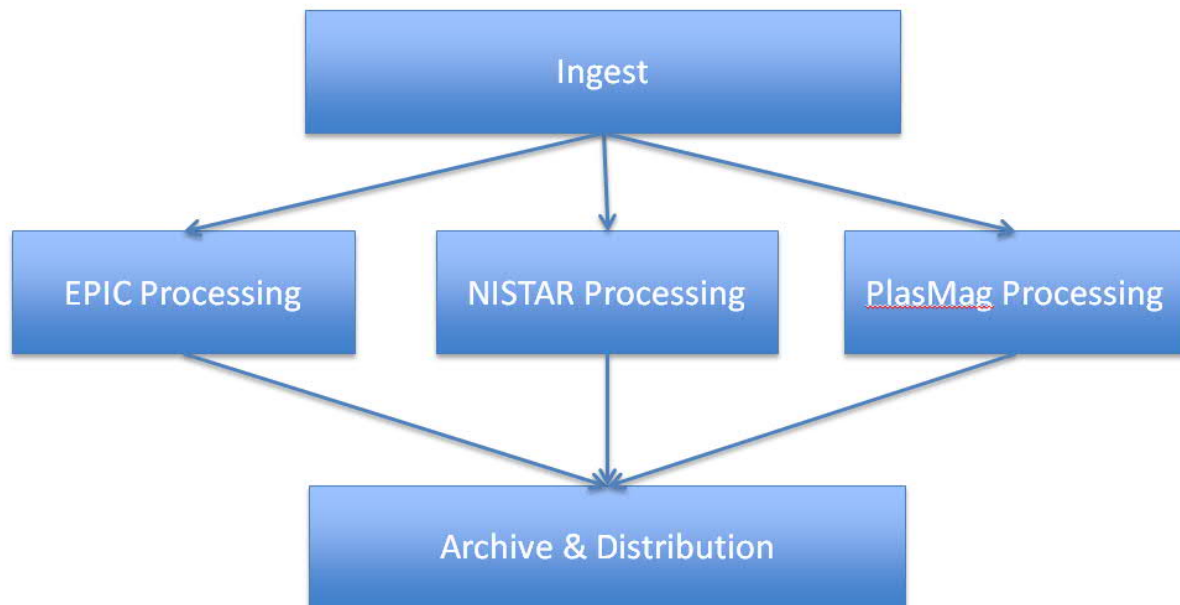
Key L2's	Derived Key L3
[L2-GS-210] The DSCOVR Ground Segment shall support the Observatory for a mission life of at least 2 years.	[L3-DSOC-140] The DSOC shall support the Observatory until at least two years after launch.

Monitoring Health & Safety

Key L2's	Derived Key L3
[L2-GS-500] The DSCOVR Ground Segment shall monitor real-time Observatory telemetry in near real-time to determine the status of the Observatory.	[L3-DSOC-310] The DSOC shall detect and report limit violations by telemetry parameters contained in real-time and stored Observatory telemetry.
	[L3-DSOC-340] The DSOC shall notify the operator of observatory anomalies detected from real-time and stored observatory telemetry.
	[L3-DSOC-440] The DSOC shall notify designated operations personnel in the event of instrument anomalies detected in Observatory telemetry.
	[L3-DSOC-480] The DSOC shall detect software processing problems or issues with the instrument housekeeping data mnemonics for red and yellow limit violations.

Earth Science Data Processing

[L2-GS-1460] The DSCOVR Ground Segment shall generate Level 1 Earth Science Data Products from NISTAR Level 0 Data, EPIC Raw Image Files, and the associated ancillary data.	[L3-DSOC-510] The DSOC shall generate Level-1 products in hierarchical data format (HDF5), using the version documented in the EPIC Data Format Control Book (DFCB), <u>uncalibrated</u> and include a browse image, metadata and wavelength-band files.
	[L3-DSOC-530] The DSOC shall achieve a geometric registration accuracy for Level-1 products of 0.5 pixels (8 to 12 kilometers).
	[L3-DSOC-540] The DSOC shall generate Earth Science data quality statistics including mean pixel value, standard deviation, skewness and the percentage of bad pixels in each product.
	[L3-DSOC-550] The DSOC shall recognize bad pixels in the input data and filter these out of the data processing algorithms.
	[L3-DSOC-560] The DSOC shall use an initial set of pre-launch calibration values including absolute calibration matrices for dark signal, shutter exposure corrections, readout mode corrections and temperature corrections.
	[L3-DSOC-570] The DSOC shall extract attitude data from real-time Observatory telemetry.
	[L3-DSOC-580] The DSOC shall generate Level 1 NISTAR data products and daily science products of the sunlit full Earth disk including broad band irradiances of 0.2 to >100 microns, 0.2 to 4 microns and 0.7 to 4 microns.
	[L3-DSOC-590] The DSOC shall generate all NISTAR products in HDF5 format, using the version documented in the NISTAR DFCB.
	[L3-DSOC-600] The DSOC shall append NISTAR pre-launch and ground calibration information to the NISTAR Level-1 Science Data products.
	[L3-DSOC-610] The DSOC shall include Earth Science Data Quality Statistics in the metadata fields for each Level 1 product.
[L2-GS-1480] The DSCOVR Ground Segment shall generate EPIC RGB Images from EPIC Raw Image Files.	[L3-DSOC-620] The DSOC shall quarantine Level 1 science data processing when one or more of the calculated mean, standard deviation, and <u>skewness</u> of pixel intensities values in the Earth Science data quality statistics are out of range.
	[L3-DSOC-520] The DSOC shall generate a high resolution quality co-registered composite, calibrated RGB Image from the combinations of the calibrated ten spectral bands observed by the EPIC instrument.
	[L3-DSOC-530] The DSOC shall achieve a geometric registration accuracy for Level-1 products of 0.5 pixels (8 to 12 kilometers).



DSOC Function Relationship

Abbreviations

- CDAS – Collectively known as CDAS, the NOAA provided ground stations located in Wallops Island, VA, and Fairbanks, AK, provide real-time and stored PlasMag telemetry to the SWPC.
- MMFD – The Multi-Mission Flight Dynamics provides orbit prediction products to the SWPC.

- MOC – The Mission Operation Center provides commanding and health and safety monitoring for the DSCOVR spacecraft.
- NGDC – The National Geophysical Data Center provides long-term archival of raw and processed telemetry and support files for the Plasmag and NISTAR instruments.
- SWPC – Space Weather Prediction Center. Provides data to the NGDC and 15 minute summary data to the DSOC
- SPDF – Space Physics Data Facility. Archive for PlasMag data

