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NPP Science Data Segment: EDR Assessment

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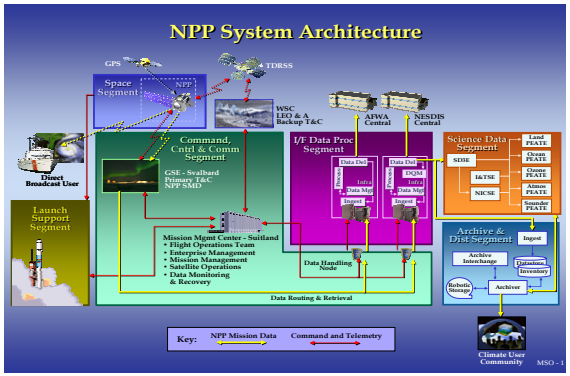
Abstract—The NPP Science Data Segment (SDS) is a prototype element for future Earth Science Program distributed data systems. The SDS is intended to be a research tool that uses a distributed architecture, with 5 functionally independent elements organized around key Environmental Data Records: atmospheric sounding, ocean, land, ozone, and atmospheric composition products. The SDS will enable Climate Analysis Research Systems (CARS) development that will focus on the following areas: Atmospheric Composition, Climate Change, Carbon/Ecosystems, Solid Earth, Weather, and Water/Energy Cycle.

The primary role of the NPP SDS is to assess the quality of the NPP Environmental Data Records (EDRs) for their ability to determine climate variability and change, i.e., Climate Research. Additionally, the SDS will have the capability to provide and demonstrate algorithm enchantments if needed.



Introduction

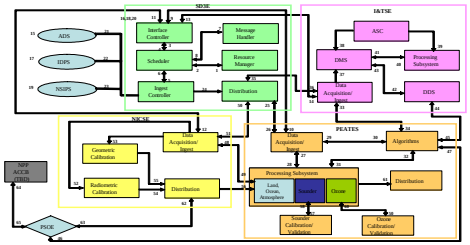
The NPP Science Data Segment is a prototype element for future Earth Science Enterprise (ESE) distributed data systems. The mission of ESE is to develop a scientific understanding of the Earth system and its responses to changes, as well as to improve prediction capabilities for climate, weather, air quality, and natural hazards.

The SDS is intended to be a research tool that uses a fully distributed interoperable architecture, with independent elements organized around key Environmental Data Records: atmospheric sounding, ocean, land, ozone, and atmospheric composition products. It is intended to enable Climate Analysis Research Systems (CARS) development that will focus on the following areas: Atmospheric Composition, Climate Change, Carbon/Ecosystems, Solid Earth, Weather, and Water/Energy Cycle.

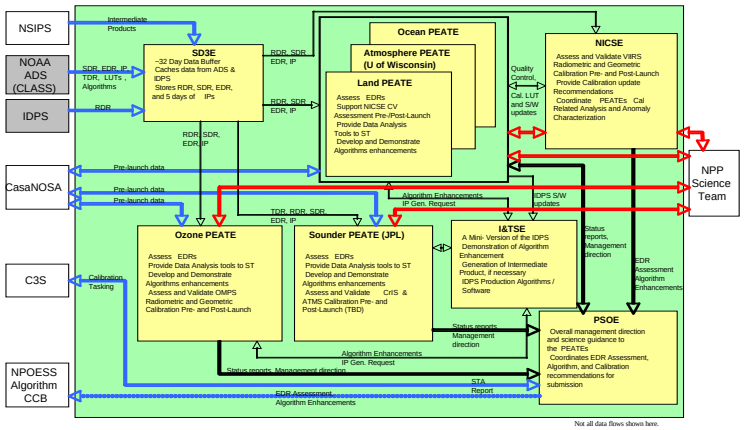
The primary role of the NPP SDS is to assess the quality of the NPP Environmental Data Records (EDRs) for accomplishing climate research. In instances where EDRs are short of supporting climate research, algorithm enhancements can be provided and demonstrated.

The NPP SDS is preparing for a September 2009 Launch Readiness Date.

Simplified SDS Architecture Diagram

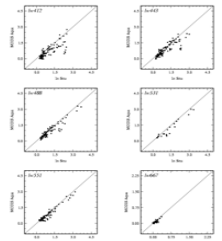


SDS Block Diagram



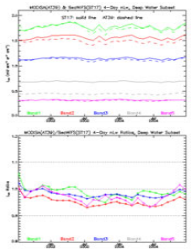
Matchup Analysis

- Ocean data granules in ODPS catalog are automatically matched with in situ data
- SeaWiFS Bio-optical Archive and Storage System (SeaBASS) stores and manages in situ holdings from field programs and supported investigators.
- Ocean staff acquire, QC and analyze new data samples
- Over 300,000 in situ samples stored



Sensor Cross-Comparisons

- Level-3 parameters (e.g., nLw) compared for common spectral bands
- Common bins extracted and compared over the period of overlap between the sensors
- Comparisons are performed globally (deep water, clear water, coastal), zonally and for specified regions.



Pre Launch Activities

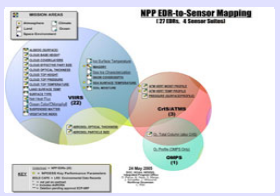
•Pre Launch: In the pre-launch time frame each of the PEATEs acquire, adapt and integrate science and operational SDR and EDR software into processing systems, adapt and update existing systems, perform functional testing of operational code, acquire and manage various preflight instrument characterization data sets, and support, as necessary, compatibility and functional testing. Additionally, as needed, support generation and review of proxy and simulated data and provide independent review of critical program information such as end user data formats.

Post Launch Activities

•Post Launch: During the post launch era, nominally, each PEATE acquires respective RDR, SDR, & EDR, data sets of interest from the SD3E. After integrity verification data is then cataloged and archived. The data is then validated against ground-base or in situ measurements. On-orbit instrument performance and calibration are assessed (e.g. detector striping). Select RDRs are processed to SDRs & EDRs using adapted or wrapped production software with alternative calibration parameters, and SDRs are processed to EDRs using revised or alternative algorithms. The production EDRs and the locally generated EDRs are made available internally to respective Science Team members for further analysis including, Cross-Comparison with concurrent observations, comparison with past data sets from other missions, assessments of internal consistencies and effect of flagging and masking algorithms.

System Description

The SDS is composed of the following nine elements: the SDS Data Distribution and Depository Element (SD3E), the Integration and Test System Element (I&TSE), the Project Science Office Element (PSOE), the NPP Instrument Calibration Support Element (NICSE), and five Product Evaluation and Analysis Tools Elements (PEATEs), one for each of the following disciplines: Atmosphere, Land, Ocean, Ozone, and Sounder. A conceptual block diagram of the SDS is shown in the following figure.



NPP & NPOESS Environmental Data Records (EDRs)

SDS allocates EDR evaluation to 5 investigator-led Product Evaluation and Test Elements (PEATEs)

Land PEATE	**Atmosphere PEATE**
1. Albedo (Surface)	13. Suspended Matter
2. Land Surface Temperature	14. Cloud Cover/Layers
3. Snow Cover and Depth	15. Cloud Effective Particle Size
4. Surface Type	16. Cloud Top Height
5. Active Fires	17. Cloud Top Pressure
6. Ice Surface Temperature	18. Cloud Top Temperature
7. Vegetation Index	19. Cloud Base Height
8. Aerosol Optical Thickness	20. Cloud Optical Thickness
9. Aerosol Particle Size	**Sounder PEATE**
Ocean PEATE	21. Atmospheric Vertical Moisture Profile
10. Ocean Color/Chlorophyll	22. Atmospheric Vertical Temperature Profile
11. Sea Surface Temperature	23. Atm Vertical Pressure Profile
Ozone PEATE	
12. Ozone Total Column/Profile	

Internal Consistency Analysis

- Global averages from successive years are overplotted to determine interannual repeatability.