NASA's EOSDIS, Trust and Certification

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Science Systems and Applications, Inc. and NASA GSFC ESDIS Project
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Earth Observing System Data and Information System (EOSDIS)

- Operating since August 1994
- Designated by Federal Government
  - legally bound by Circular A-130 (Managing Federal Information as a Strategic Resource) and the Federal Records Act
  - Must follow NIST and NARA regulations
  - NASA Procedural Requirements (NPR 7120.5) govern details of Program/Project Management
- Provides end-to-end capabilities for managing NASA’s Earth science data.
  - Science Operations
    - Science data processing
    - Data management
    - Interoperable distributed data archives
    - On-line data access services
    - Earth science discipline-oriented user services
  - Network Data Transport to distributed system elements
Distributed Active Archive Centers (DAACs)

Alaska Satellite Facility DAAC
SAR Products, Sea Ice, Polar Processes, Geophysics

SAR Products, Sea Ice, Polar Processes, Geophysics

National Snow and Ice Data Center DAAC
Frozen Ground, Glaciers, Ice Sheets, Sea Ice, Snow, Soil Moisture

Land Processes DAAC
Land Cover, Surface Reflectance, Radiance, Temperature, Topography, Vegetation Indices

Goddard Earth Sciences Data and Information Services Center
Global Precipitation, Solar Irradiance, Atmospheric Composition and Dynamics, Global Modeling

Socioeconomic Data and Applications Center
Human Interactions, Land Use, Environmental Sustainability, Geospatial Data

Physical Oceanography DAAC
Gravity, Sea Surface Temperature, Ocean Winds, Topography, Circulation & Currents

Land Processes DAAC
Land Cover, Surface Reflectance, Radiance, Temperature, Topography, Vegetation Indices

Crustal Dynamics Data Information System
Space Geodesy, Solid Earth

Ocean Biology DAAC
Ocean Biology, Sea Surface Temperature

Global Snow and Ice DAAC
Frozen Ground, Glaciers, Ice Sheets, Sea Ice, Snow, Soil Moisture

Global Hydrology Resource Center DAAC
Hazardous Weather, Lightning, Tropical Cyclones and Storm-induced Hazards

LaRC Atmospheric Science Data Center
Radiation Budget, Clouds, Aerosols, Tropospheric Chemistry

Goddard Earth Sciences Data and Information Services Center
Global Precipitation, Solar Irradiance, Atmospheric Composition and Dynamics, Global Modeling

Sea Level and Ocean Dynamics Data Information System
Space Geodesy, Solid Earth

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Sea Level and Ocean Dynamics Data Information System
Space Geodesy, Solid Earth
SIPSs perform forward processing of standard products, and reprocess data to incorporate algorithm improvements.
What certification process did you use for your use case?
- ICSU/World Data System (most recently)

Why was this certification process selected?
- Recommendation in 2012 by Bernard Minster (Member, Earth Science Subcommittee of NASA Advisory Committee) and request by Martha Maiden (NASA HQ Program Executive for Earth Science Data Systems)

What were the pros and cons as a result of using the identified certification process?
- Pros
  - Provides opportunity for self-examination
  - Relatively easy process given the rigor with which the system and its data centers have been developed and managed
- Cons
  - One more review and certification in addition to regular internal and external reviews
Session Questions and “Quick” answers

■ Where were the key outcomes?
  ➢ ESDIS Project is a Network Member of WDS
  ➢ 10 of 12 DAACs are Regular Members of WDS
  ➢ Potentially broader visibility (difficult to measure – no specific metrics to assess incremental change that resulted by the certification)
  ➢ Participation in ICSU/WDS/CODATA sponsored meetings (SciDataCon; WDS Forum)

■ What are the next steps?
  ➢ WDS and Data Seal of Approval (DSA) certification have merged
  ➢ Recertification every 3 years
A Little History (1 of 5)

- EOSDIS Advisory Panel (early to mid-1990’s)
  - adhere to a flexible, distributed, portable, evolutionary design;
  - distribute data products by appropriate high-bandwidth communication or other media;
  - operate prototypes in a changing experimental environment

  ◆ NASA response:
  → Distributed architecture with DAACs
  → Version 0 working prototype

- DAAC User Working Groups (on-going)
  - Science discipline community input to DAAC performance

  ◆ NASA response:
  → Implemented process for adding community-developed tools, services and datasets to the DAACs
A Little History (2 of 5)

- **NRC Review (1995)**
  - “Responsibility for product generation and publication and for user services should be transferred to a federation of partners selected through a competitive process open to all”
  - [http://www.gcrio.org/USGCRP/LaJolla/appF.html](http://www.gcrio.org/USGCRP/LaJolla/appF.html)
  - **NASA response:**
    - Working Prototype Earth Science Information Partners (ESIP) Federation

- **EOSDIS Review Group (1997)**
  - Recommended “an adaptive approach which will be less centralized, giving more responsibility to the PIs”
  - **NASA response:**
    - PI-led Science Investigator-led Processing System (SIPs)

- **NRC Review of DAACs (site visits 1997-1998)**
  - Detailed recertification activity

- Six recommendations
  - Clearly define components
  - Employ Infrastructure providing NASA-private sector liaisons
  - Employ competitive processes to select components
  - Empower science investigators for data system development, processing archiving and distribution
  - Apply lessons learned from WP-ESIP Federation
  - Charter transition team

NASA response:
- Core and Community Data Systems (Core: EOSDIS with DAACs; Community: REASoN projects ➔ ACCESS & MEaSUREs)
- ESIP Federation
- Earth Science Data System Working Groups (ESDSWG, 2004)
A Little History (4 of 5)

  - NASA response:
    - Initiated annual American Consumer Satisfaction Index (ACSI) surveys through CFI, an independent organization

- Evolution of EOSDIS Elements Study Team/ Technical Team (2005)
  - Developed “EOSDIS 2015 Vision”
    - EEE Study Team (2005) Evolution of EOSDIS Elements, Study Team Briefing to NASA.
      - [http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20090003203.pdf](http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20090003203.pdf)
  - NASA response:
    - First step implementation during 2006-2008 – reallocated functions, simplified system, increased automation, improved services, reduced operations costs
    - Vision tenets continue to be used as a checklist to assess progress of on-going improvements
A Little History (5 of 5)

- Evolution of EOSDIS Elements Study Team/ Technical Team (2005)
  - Developed “EOSDIS 2015 Vision”
    - EEE Study Team (2005) Evolution of EOSDIS Elements, Study Team Briefing to NASA.
    - [http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20090003203.pdf](http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20090003203.pdf)
  
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- NASA Technology and Capabilities Assessment Team (TCAT, 2014)
  - Evolution and Efficiency Team Recommendations
    - Consider advancing current efforts to achieve efficiencies across DAACs, including cloud computing, open source software, and dataset interoperability

- EOSDIS Review Team (2015)
Pre-2000 Review History (1 of 4)

Program Reviews and Science Reviews with Redirection

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### Other External Reviews

| Year | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
|------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1992 | GAO Audit | GAO Audit | GAO Audit | EOSDIS Cost Review (Data Panel) | IG Audit | EOSDIS Cost Review (IWG) | IG Audit | IG Audit / Subcontract Mgmt | IG Audit / ECS Award Fee | IG Audit / ECS Award Fee | IG Audit / ECS Award Fee | IG Audit / ECS Award Fee | IG Audit / ECS Award Fee | IG Audit / ECS Award Fee | IG Audit / ECS Award Fee | IG Audit / ECS Award Fee | IG Audit / ECS Award Fee | IG Audit / ECS Award Fee | IG Audit / ECS Award Fee |

**Pre-2000 Review History (2 of 4)**
### ESDIS Project Reviews

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**EOSDIS Core System (ECS) Project Reviews**

- L7 MOR
- L7 FOR
- Terra ORR
- Aqua MOR
- Rel 4B RRR
- Rel 5A CSR
- Rel 5B IRR
- Rel 6A IRR
- Rel 6B IRR
- Rel 5B CSR
- Rel 6B IRR
ESDIS Project/Program/Science/Other External Reviews

1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4

- GAO Audit
- Rel 6A IRR
- EOS Rescope
- Rel 6B IRR
- EOS Reshape
- Rel 5B IRR
- EOS Reshape Implement Study
- EOS Refinement of Federation recomm.
- EOSDIS Review Group (ERG)
- EOS Progress Review
- EOSDIS Cost Review
- EOS Biennial Review
- IG-Dissemination of MTPE Info.
- EOS Rebaselining
- IG Award Fee
- IG Review of DAACs
- IAR
- ECS Progress Review
- EOSDIS Cost Review
- IG Federation
- IG Review of DAACs
- IAR
- EOS Rebaselining
- IG Award Fee
- IG Review of DAACs
- IAR
- IAR
- ECS Performance Review
As a result of the 2003 Panel Review, ESDIS was requested to conduct an Independent Survey of DAAC performance and customer satisfaction.

- Survey contract was awarded to the CFI Group that runs the American Customer Satisfaction Index.

For 13 years, EOSDIS consistently exceeded the Federal Government average.

Ratings in the mid to upper 70s are considered “very good/world class” by the rating organization, the CFI Group.


Comments in surveys help define DAAC system improvements.
EOSDIS ACSI History

EOSDIS ACSI Scores consistently exceed the Federal Government Overall Score

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