**ABSTRACT**

NASA Earth Sciences Division (ESD) has made great investments in the development and maintenance of data management systems and information technologies, to maximize the use of NASA generated Earth science data.

- With information management system infrastructure in place, mature and operational, very small delta costs are required to fully support data archival, processing, and data support services required by the recommended Decadal Study missions.
- This presentation describes the services and capabilities of the Goddard Space Flight Center (GSFC) Earth Sciences Data and Information Services Center (GES DISC) and the reusability for these future missions.
- The GES DISC has developed a series of modular, reusable data management components currently in use. They include data archive and distribution (Simple, Scalable, Script-based, Science [S4] Product Archive aka S4PA), data processing (S4 Processor for Measurements aka S4PM), data search (Mirador), data browse, visualization, and analysis (Giovanni), and data mining services.
- Information management system components are based on atmospheric science data sets being served by GES DISC, and they include data archive and distribution (Simple, Scalable, Script-based, Science Product Archive - S4PA), data processing (S4 Processor for Measurements aka S4PM), data search (Mirador), data browse, visualization, and analysis (Giovanni), and data mining services.
- Large development and maintenance cost savings can be realized through their reuse in future missions.

**DECADAL STUDY**

The National Research Council’s Committee on Earth Science and Applications from Space vision includes “a decadal program of Earth science research and applications in support of society—a vision that includes advances in fundamental understanding of the Earth system and increased application of this understanding to serve the nation and the people of the world.” - The committee made several key recommendations regarding research strategies, missions, and measurement goals.

In addition, the committee addressed information management with the following recommendations:

- As new Earth observation missions are developed, early attention should be given to developing the requisite data processing and distribution system, and data archive. Distribution of data should be free or at low cost to users, and provided in an easily accessible manner.
- A formal interagency planning and review process should be put into place that focuses on effectively implementing the recommendations made in the present decadal survey report and sustaining and building an Earth knowledge and information system for the next decade and beyond.

(Email: Earth Science and Applications from Space: National Imperatives for the Next Decade and Beyond, NRC, 2007)

**USING INFORMATION MANAGEMENT SERVICES THAT FACILITATE AEROSOL AND CLOUD STUDIES**

Atmospheric science data sets being served by GES DISC Tools and Services include:

- Atmospheric Infrared Sounder (AIRS) - clouds, humidity, water vapor, CO, ozone
- High Resolution Dynamics Limb Sounder (HIRDLIS) - water vapor, chemistry, aerosols
- Limb Infrared Monitor of the Stratosphere (LIMS) - chemistry mixing ratios
- Modern Era Retrospective-analysis for Research and Applications (MERRA) - atmospheric model
- Microwave Limb Sounder (MLS) - chemistry, water vapor, carbon monoxide, relative humidity
- Ozone Monitoring Instrument (OMI) - chemistry, aerosol, clouds
- Solar Radiation and Climate Experiment (SORCE) - solar irradiance
- Total Ozone Mapping Spectrometer (TOMS) - ozone, Total Ozone and Ionospheric Radiowave Absorption (TOAR) - precipitation
- Upper Atmospheric Research Satellite (UARS) - trace gases, temperature, aerosols
- Northern Eurasia Earth Science Partnership Initiative (NEESP) (AIRS, MODIS) - aerosol, clouds
- A-Train subsetted data (AIRS, OMI, MLS, CloudSat, CALIPSO, MODIS, POLDER) - chemistry, clouds
- Air Quality Giovanni - PM2.5, MODIS

**REUSING SERVICES FOR RECOMMENDED DECADAL STUDY MISSIONS**

Recommended Decadal Study Missions include:

- **Atmospheric Science and Applications from Space:**
  - Atmospheric Infrared Sounder (AIRS) - clouds, humidity, water vapor, CO, ozone
  - High Resolution Dynamics Limb Sounder (HIRDLIS) - water vapor, chemistry, aerosols
  - Limb Infrared Monitor of the Stratosphere (LIMS) - chemistry mixing ratios
  - Modern Era Retrospective-analysis for Research and Applications (MERRA) - atmospheric model
  - Microwave Limb Sounder (MLS) - chemistry, water vapor, carbon monoxide, relative humidity
  - Ozone Monitoring Instrument (OMI) - chemistry, aerosol, clouds
  - Solar Radiation and Climate Experiment (SORCE) - solar irradiance
  - Total Ozone Mapping Spectrometer (TOMS) - ozone, Total Ozone and Ionospheric Radiowave Absorption (TOAR) - precipitation
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  - A-Train subsetted data (AIRS, OMI, MLS, CloudSat, CALIPSO, MODIS, POLDER) - chemistry, clouds
  - Air Quality Giovanni - PM2.5, MODIS

- **Active Sensing of CO2 Emissions Over Nights, Days, and Seasons (ASCENDS):**
  - Aerosol-Cloud-Ecosystems (ACE) - aerosols, clouds
  - Climate Absolute, Radiance and Refractivity Observatory (CLARREO) - solar irradiance, water vapor
  - Geostationary Coastal and Air Pollution Events (GEO-CAPE) - chemistry, aerosol
  - Global Atmospheric Composition Mission (GACM) - chemistry, aerosol
  - Precipitation and All-Weather Temperature and Humidity (PATH) - precipitation, water vapor, clouds
  - Three-Dimensional Tropospheric Winds From Space-Based Lidar (3D-WINDS) - wind, atmospheric composition transport