**The GES DISC Approach**

- **Engage Users**
  - Communications must be frequent
  - Dedicated points of contact to gather/provide information are identified
- **Build economically**
  - Look for reuse, ways to save funds
  - Willing to take calculated risks; Otherwise low risk
- **But also, to build new technologies**
- **Engage employees**
  - Ensure that employees realize the value of their contributions
  - Treat all employees equally

We will not: Build it and they will come.
We will: Build it because they came (collaborating on mutual interest)

**Successes**

- **Up to date on all Mission reprocessing and documentation**
- Successfully released first data products produced for newest missions: GPM, OCO-2, SNPP
- Completed transition to dynamic web page capability, driven by EMR web documentation
- Released new version of Giovanni (smoothing maps, histograms, download GeoTIFFs, etc.)
- Delivered the first version of Unified User Interface with support for faceted navigation
- Completed population of HYRIS data and documentation into preservation system; Other datasets in the works
- Deployed User Registration for GES DISC services and data access
- Recovered heritage data (Nimbus, et al) from 1960's vintage media
- GES DISC is now a recognized data repository by Scientific Data, an open-access, peer-reviewed journal for descriptions of scientifically valuable data

**Challenges**

- Efficiently adapting potentially useful advancing technologies to specific problems
- Facilitating science research or the masses, based on a handful of use cases
- Rapidly responding to the needs of users needs for value added products, tools, and services
- So much to do... so little time to do it.

**Best Practices**

- Implement in response to user driven needs
  - LRNS, but also user feedback, user surveys, science meetings
- Seek opportunities for collaboration
  - EOSDIS drivers, but also new shareable initiatives
- Strategically utilize technology to enhance efficiency in the face of growing archives and number of users
  - Freely understand forward looking relevant information technologies, but also engage science data users and information technologists
- Partner with users and producers
  - Remain expert in Atmospheric, Hydrology, Climate Modeling data (both NASA and others) and data management services, but also engage science research and applications users to better understand their needs, and improve GES DISC services
- Publish results for the betterment of information science

**Stewarding Mission Data**

- **New Missions**
- **Science Access/Engagement**
- **Data Accessory/Services Administration**
- **Science/Vision**
- **Quality Assurance**
- **Data Products**
- **GEOSS (GFOD, SNAP)**
- **PCMDIS (Cloud) Data Center**
- **Giovanni (Earth) Data Center**
- **EOSDIS (All Others)**

**What We Do**

- **Science User/Data Support**
  - Receive and disposition data, science, service requires daily
  - Understand and develop new research driven tools and services
  - Analyze metrics to address research needs priorities
  - Perform Outreach, Documentation, Capturing data preservation artifacts
- **Mission Support**
  - Build tailored archive, distribution, service systems to requirements of new project: Develop IDDs. Ensure formats and metadata guidelines are met. Build/have systems cost effectively to spec. Interfaces work
  - Support/maintain a Direct Interface Identifier, Landing Pages
- **Software Engineering**
  - Lead overall system architecture: planning/implementer
  - Implement and maintain flexible system tools and services to enhance data usability, to accommodate evolving user needs
  - Empty advanced SW Engineering techniques (Agile Methodologies)

**Who We Are: Summary of Expertise**

- **Science Data Management** – Ph.D scientists in applicable earth science disciplines who collaborate with researchers to develop data ingestion/application tools to facilitate information extraction and multi-mission data coordination; Who understand how data was generated and provide user support
- **Mission Support** – Engineers who understand the requirements for costing and saving information management systems for new or existing missions
- **Software Engineering** – Engineers who understand the most effective advanced technologies to further mature data management system usability and efficiency
- **Operations** – R XS (24 X 7 call) staff that understands the importance of, and ensures, continuous data ingest, processing, archive and distribution

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**Goddard Earth Science Data and Information Services Center (GES DISC)**

http://disc.sci.gsfc.nasa.gov

Steve Kempler
NASA Goddard Space Flight Center

**GES DISC Vision**

To enable researchers and educators maximize knowledge of the Earth by engaging in understanding their goals, and by leading the advancement of remote sensing information services in response to satisfying their goals

**The GES DISC ‘World’**

- **Global Earth System Data Community**
- **Data Products**
- **Data Services**
- **Data Uptake**
- **Data Products**
- **Data Services**
- **Data Uptake**

**What We Do**

- **Infrastructure**
  - Perform System Administration upgrades, patches, installations, backups, etc.
  - Security, web, system configuration management
  - Virtual Machine to support IA.
- **Data Value Added**
  - Implement and analyse cloud computing application prototyping
- **Operations**
  - Data ingest, archive, and distribution
  - Apply system monitoring tools to enhance operations efficiency
- **Management**
  - Manage a diverse staff and out of functions: Contracts, cooperative agreements, budgets, ~60 people, new business, system ownership, etc.

**Goddard Earth Science Data and Information Services Center (GES DISC)**

**Science**

- **Atmospheric Composition**
- **Atmospheric Composition**
- **Geophysics**
- **Atmospheric Compositions**

**Infrastructure**

- **Operational Support**
- **GrADS**
- **Data Products**
- **Data Products**

**Currently Operational Services/Tools**

- Giovanni – Data Discovery, Visualization and Exploration
- Wonder – Search and access
- Simple Subset Wizard – Cross DISCDAF effort to provide subsetting
- Data Recipes
- OpenDAF & GISDS Data Server
- Open Geospatial Consortium (OGC) Web Map Service (WMS)
- Data provided in various formats (HDF, netCDF, ASCI, tiff, others)
- Shapefiles – Suitable for applications
- Data Reduction – Submit desired measurements from data products
- User Registration
- Digital Object Identifier and Landing Pages
- Data Stewardship
- Caching
- Cloud applications
- Unified User Interface

**Leadership Activities**

- ESDWG Participation
- Sponsor – Virtual Collections (Currently)
- Time series – (Current)
- Data Interoperability (C0-lead)
- Led (C1) Data management (C1)
- Atmospheric Science User Forum (C0-leads, work)
- Participant – Data Recipes (Completed)
- Data Quality, Geochemical Web Services Best Practices, SPE/DAF – Search Relevance
- ESDWG Participation
- Leader
- Earth Science Data Analysis
- Agriculture and Climate
- Participant
- Education, Preservation and Stewardship, Openness, Data Quality

**GES DISC Facts – As of 2015**

- **Archive Volume (as of 7/15):** 1,441 TB
- **Distribution Volume:** 2,071 TB (up 100% in 4 years)
- **Granules Distributed:** 5,423 M (up 100% in 3 years)
- **NRT Distribution Volume:** 38.7 TB (up 150% in 3 years)
- **NRT Granules Distributed:** 6,707 K (up 100% in 2 years)
- **Number of Unique Users:** 92,341 (almost 100% in 4 years)
- **GES DISC Publications/Presentations:** ~25/year
- **Number of Publications/other (Giovanni):** ~2020/year
- **Number of Recipes (Currently):** 31
- **Number of OIDs registered (Currently):** 384
- **Data Collections with Landing Pages:** 48

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**World Data System (WDS) Meetings:**

- WDS Forum – Sept. 11, 2016, Denver, CO