**Exposing NASA data rods to the world**

**Motivation and Prior Work**
- An ongoing NASA-funded “Data Rods” (time series) project has demonstrated the removal of a longstanding barrier to accessing NASA data (i.e., accessing archived time-step array data as point-time series) for selected variables of the North American and Global Land Data Assimilation Systems (NLDAS and GLDAS, respectively) and other NASA data sets.
- Data rods are pre-generated or generated on-the-fly (OTF), leveraging the NASA Simple Subset Wizard (SSW), a gateway to NASA data centers.
- Data rods Web services are accessible through the CUHIS Hydrological Information System (HIS) and the Goddard Earth Sciences Data and Information Services Center (GES DISC) but are not easily discoverable by users of other non-NASA data systems.
- An ongoing “GEOSS Water Services” project aims to develop a distributed, global registry of water data, map, and modeling services cataloged using the standards and procedures of the Open Geospatial Consortium and the World Meteorological Organization.
- Preliminary work has shown GEOSS can be leveraged to help provide access to data rods. Another ongoing NASA-funded project is extending this prior work.

**Removing Barrier to Accessing NASA Data**

**Original Data Archive**
- One variable, one grid point, all time steps per file

**Reorganized Data Rods**
- All variables, all grid points, one time step per file
- More than 300,000 time steps plotted in << 1 sec.

Schematic diagram for data reorganization for optimal time series access

- Other variables available: Precipitation, Runoff, ET, Surface Temperature
- Probability presentation of Data Rods
- Map-to-display (Value, Anomaly, or Percentile)
- CDF & current value (Azure cloud)
- Previous 30 days (data rods)

**NASA Hydrological Data via GEOSS**
- Bidirectional process flow of data and services between NASA and non-NASA data systems

**Data Rods (on-the-fly, OTF)**
- One variable, all grid points, several time steps per file

**Data Rods (pre-generated)**
- Higher data access performance
- Higher # of data variables

**Global Change Master Directory**

**Web map for time series**

**Data rods Web services; both OTF and pre-generated**

**Data rods Web services accessible via a web interface, providing a probability description at each grid cell and for each day.**

Current values can be seen in the context of a probability distribution of past values, for that location and time.

**Web applications development and hosting environment**

**For More Information**

**Hydrology Portal**
- GES DISC
- LDAS Portal
- GLDAS Hourly

**Giovanni Portal**
- LDAS Portal
- GLDAS Hourly

**For More Information**

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