NASA's Earth Observing System Data and Information System (EOSDIS)

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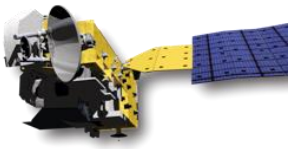
Extensive Data Collection

- **Started in the 1990s, EOSDIS today has 11,000+ data types (collections)**
  - Land
    - » Cover & Usage
    - » Surface temperature
    - » Soil moisture
    - » Surface topography
  - Atmosphere
    - » Winds & Precipitation
    - » Aerosols & Clouds
    - » Temperature & Humidity
    - » Solar radiation
  - Ocean
    - » Surface temperature
    - » Surface wind fields & Heat flux
    - » Surface topography
    - » Ocean color
  - Cryosphere
    - » Sea/Land Ice & Snow Cover

- Human Dimensions
  - » Population & Land Use
  - » Human & Environmental Health
  - » Ecosystems

Earth Observing System Data and Information System (EOSDIS)



data downlink

EOSDIS

capture and clean

process

archive

subset

distribute

Research

Applications

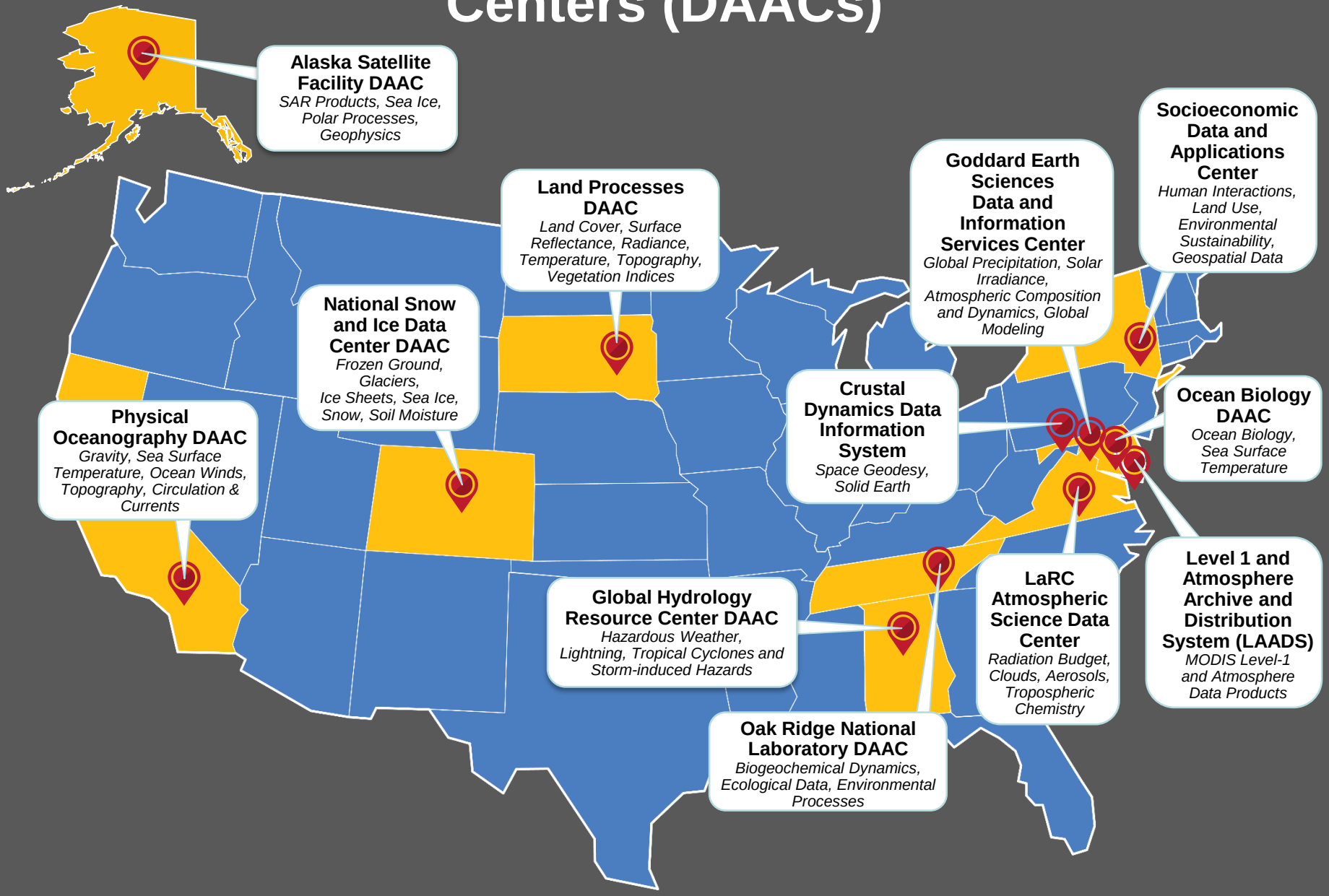
Education

Users

EOSDIS – NASA's Earth Science Data System

- Has over 17 Petabytes of Earth science data archived
- In fiscal year 2016, delivered over 2 Billion data products to over 2.6 Million science users from around the world under a free and open data policy
- Delivers near-real-time products in under 3 hours from observation
- Provides easy access and discovery of data through many entry points, to over 11,000 unique data products
- Provides the ability to search 34,000 data collections in a Common Metadata Repository on which 97% of the queries complete in less than 1 second.
- There are over 370.2 Million data granules in the repository. 95% of granule searches complete in less than 1 second.
- Over 224,000 users have registered with EOSDIS and we routinely respond to over 100 user inquiries per week.

Distributed Active Archive Centers (DAACs)

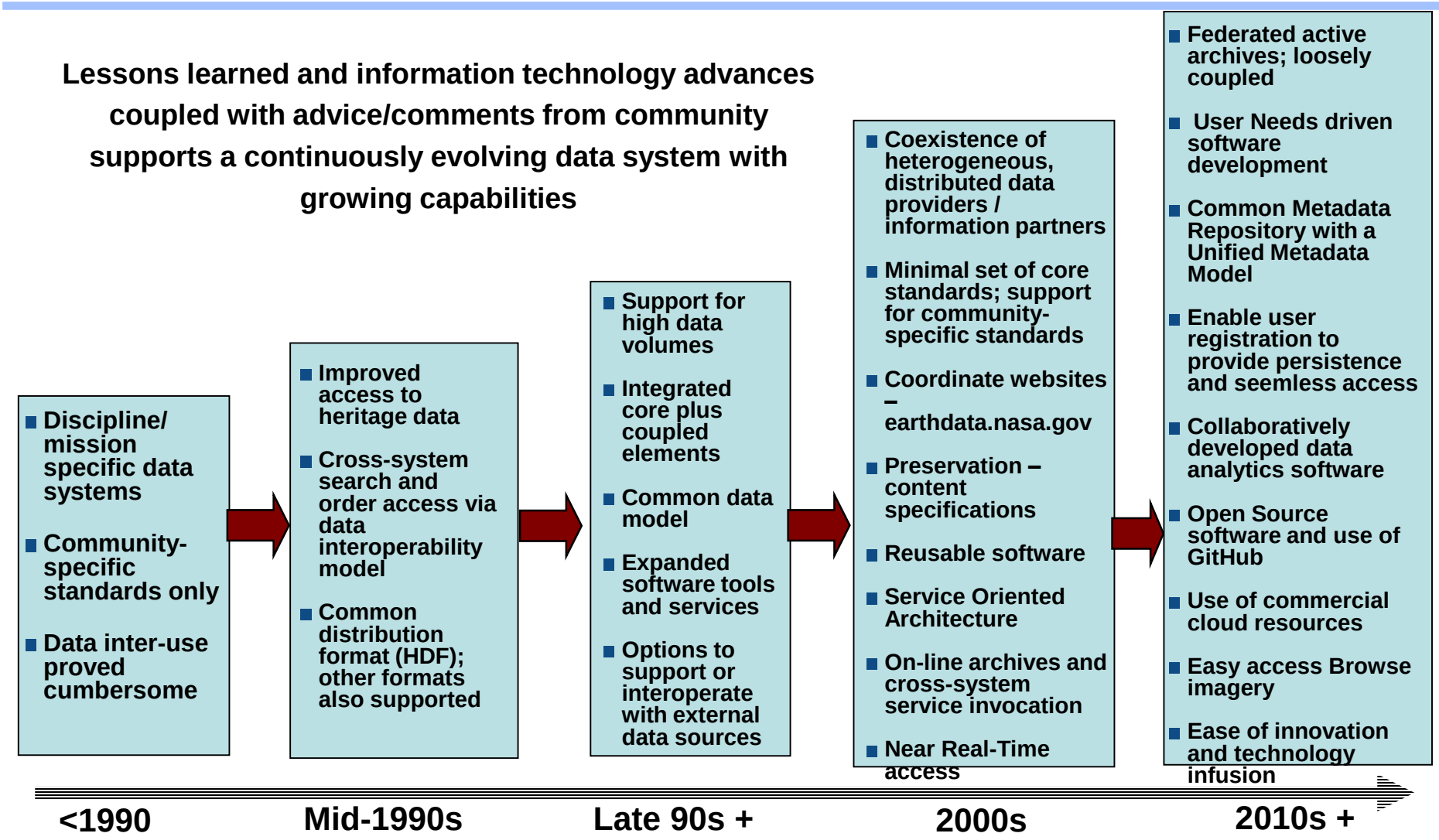


Preserving NASA Earth Science Data

- **General requirements**
  - No loss of bits
  - Discoverability and accessibility
  - Readability
  - Understandability
  - Usability
  - Reproducibility of results
- **NASA has developed Preservation Content Specification for Earth Science Data**

EOSDIS Technology Improvements and System Evolution

Lessons learned and information technology advances coupled with advice/comments from community supports a continuously evolving data system with growing capabilities



Worldview and Global Browse Imagery Services

GIBS / Worldview Goal:

To transform how users interact with and discover NASA Earth data; make it visual

Approach:

- The **Global Imagery Browse Services (GIBS)** provide open access to full resolution imagery derived from NASA products to any mapping client and script

  https://earthdata.nasa.gov/gibs

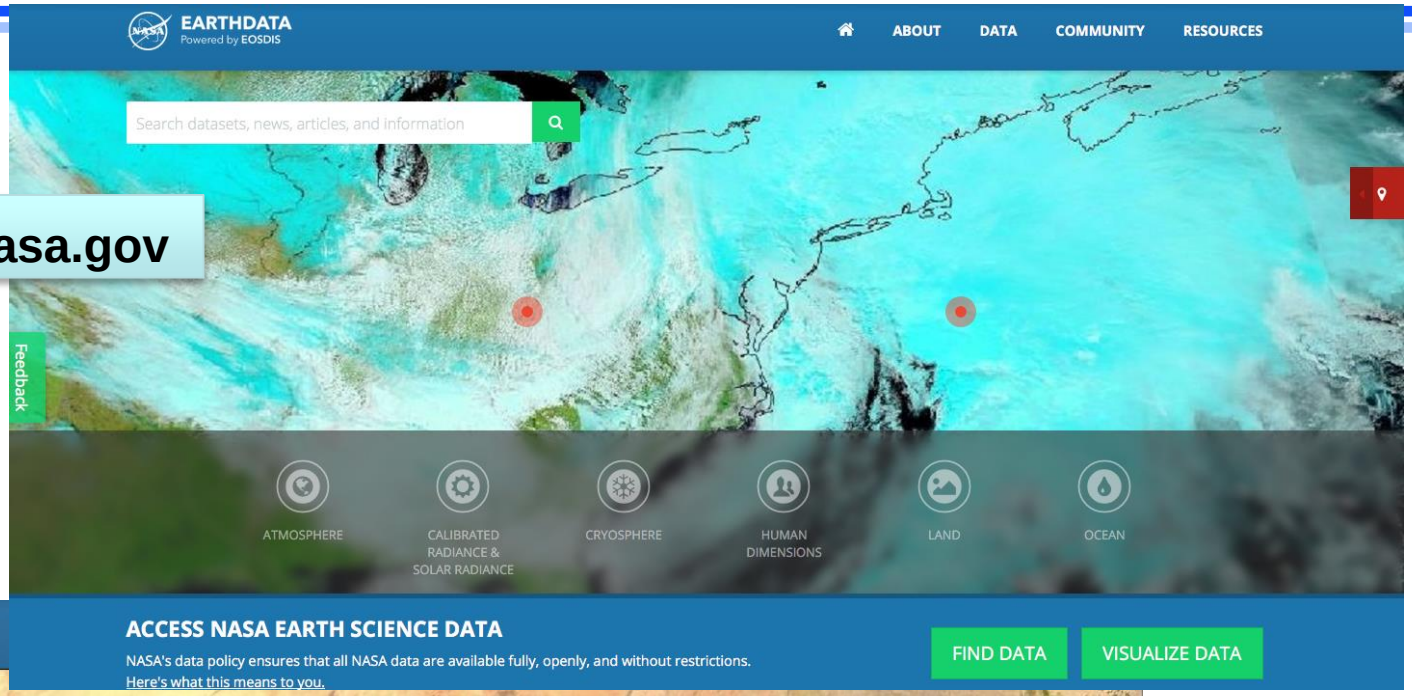
- **Worldview** is an open source, browser-based client to interactively explore GIBS (and SEDAC) imagery and download the underlying data

  https://worldview.earthdata.nasa.gov

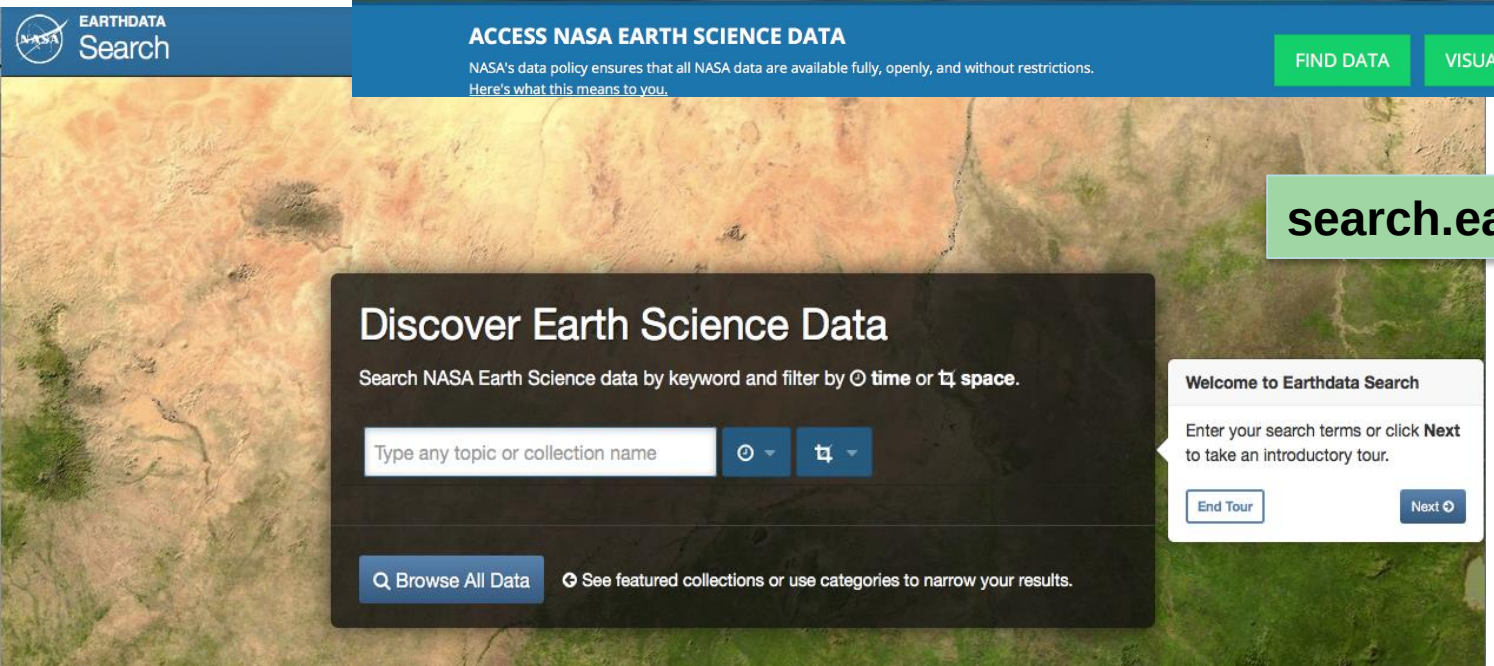
Open-Access Servers

Client

Looking for Earth Science data?



earthdata.nasa.gov



search.earthdata.nasa.gov

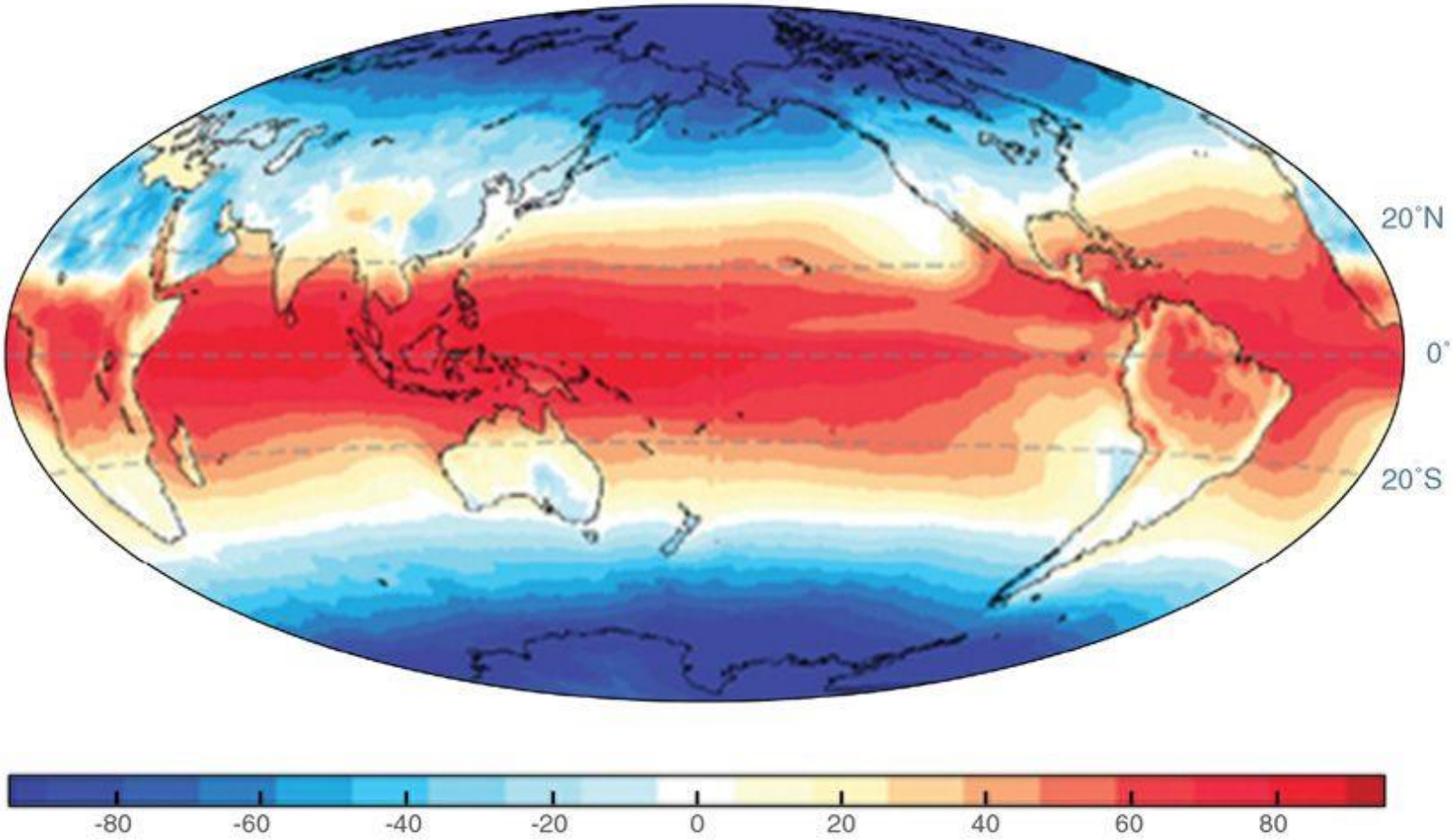
THANKS!!!!

Backup

Categories of Content to be Preserved

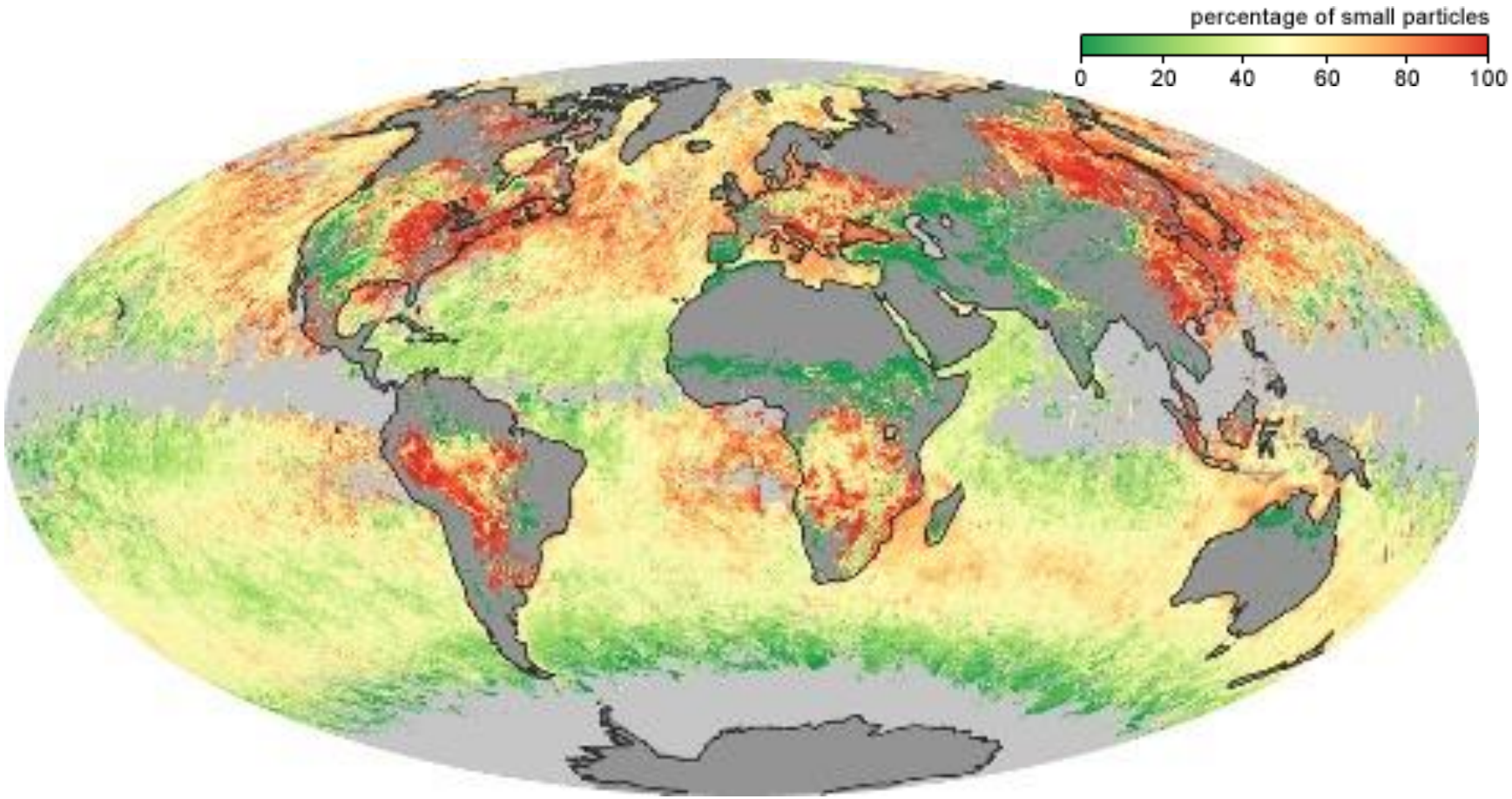
1. **Preflight/Pre-Operations:** Instrument/Sensor characteristics including pre-flight/pre-operations performance measurements; calibration method; radiometric and spectral response; noise characteristics; detector offsets
2. **Science Data Products:** Raw instrument data, Level 0 through Level 4 data products and associated metadata
3. **Science Data Product Documentation:** Structure and format with definitions of all parameters and metadata fields; algorithm theoretical basis; processing history and product version history; quality assessment information
4. **Mission Data Calibration:** Instrument/sensor calibration method (in operation) and data; calibration software used to generate lookup tables; instrument and platform events and maneuvers
5. **Science Data Product Software:** Product generation software and software documentation
6. **Science Data Product Algorithm Input:** Any ancillary data or other data sets used in generation or calibration of the data or derived product; ancillary data description and documentation
7. **Science Data Product Validation:** Records, publications and data sets
8. **Science Data Software Tools:** product access (reader) tools.

Top of Atmosphere Radiation



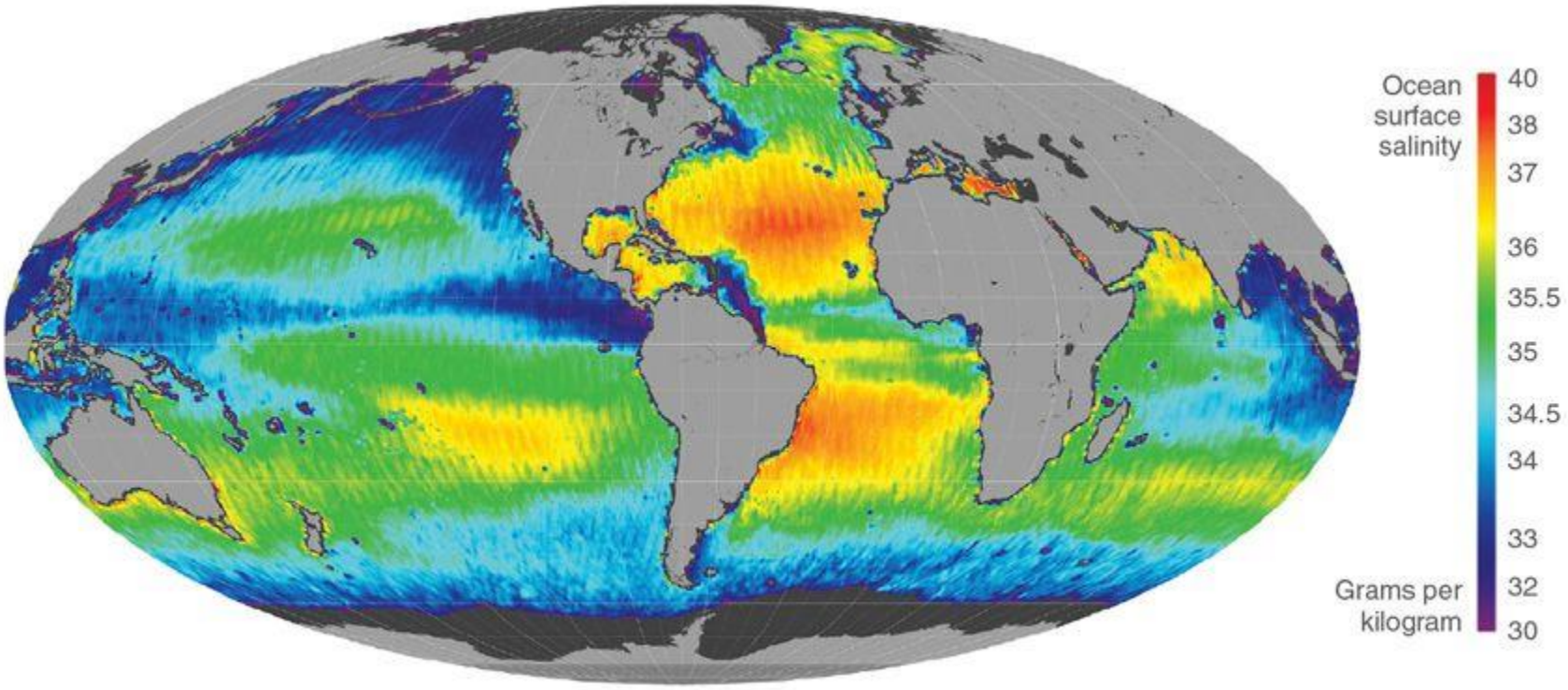
At the top of the atmosphere (TOA), incoming and outgoing radiation determine Earth's average temperature. This image shows averaged net downward TOA radiation from the Clouds and Earth's Radiant Energy System (CERES) instrument from 2001 to 2010. The Southern Hemisphere receives more net radiation than the Northern Hemisphere. (Courtesy D. Frierson et al., 2013, Nature Geoscience) – accessed through https://earthdata.nasa.gov/user-resources/sensing-our-planet/rooting-out-rainfall

Aerosol Size – August 2015



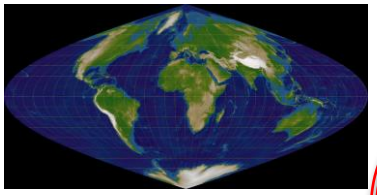
Aerosol particle sizes – red = small (man made); green = large (natural); yellow = mixed.
Map based on data from MODIS instrument on NASA's Terra satellite.
http://earthobservatory.nasa.gov/GlobalMaps/view.php?d1=MODAL2_M_AER_RA

Sea Surface Salinity



This image of Aquarius sea surface salinity (SSS) measurements averaged for 2012 shows a global color scale of salinity intensity. Warm colors mark stronger salinity values. Values are shown in a range between 30 grams per kilogram (purple) and 40 grams per kilogram (red). (Courtesy N. Kuring/NASA) – accessed through https://earthdata.nasa.gov/user-resources/sensing-our-planet/salt-of-the-sea.

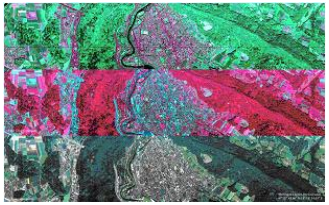
Data transformation options of several kinds can help with Variety and Volume



Map Projection

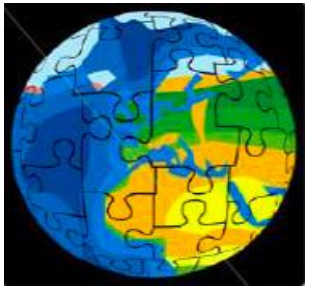
Shapefile ArcInfo Grid SDST KML BIL ADRG BSQ IMG HDF-EOS GML DRG USGS DEM GeoTIFF netCDF MrSid BIP VPF

Format Conversion

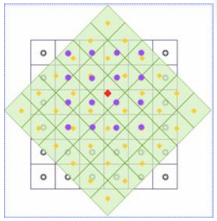


Spectral Subsetting

Data Transformation



Spatial Subsetting



Resampling Parameters

Data transformation applies fundamental changes and conversions to attributes of the original data to suit the application requirements of end-users

Courtesy of B. Ramachandran, MODAPS/LAADS