



How can we improve multi-sensor data access and usage?

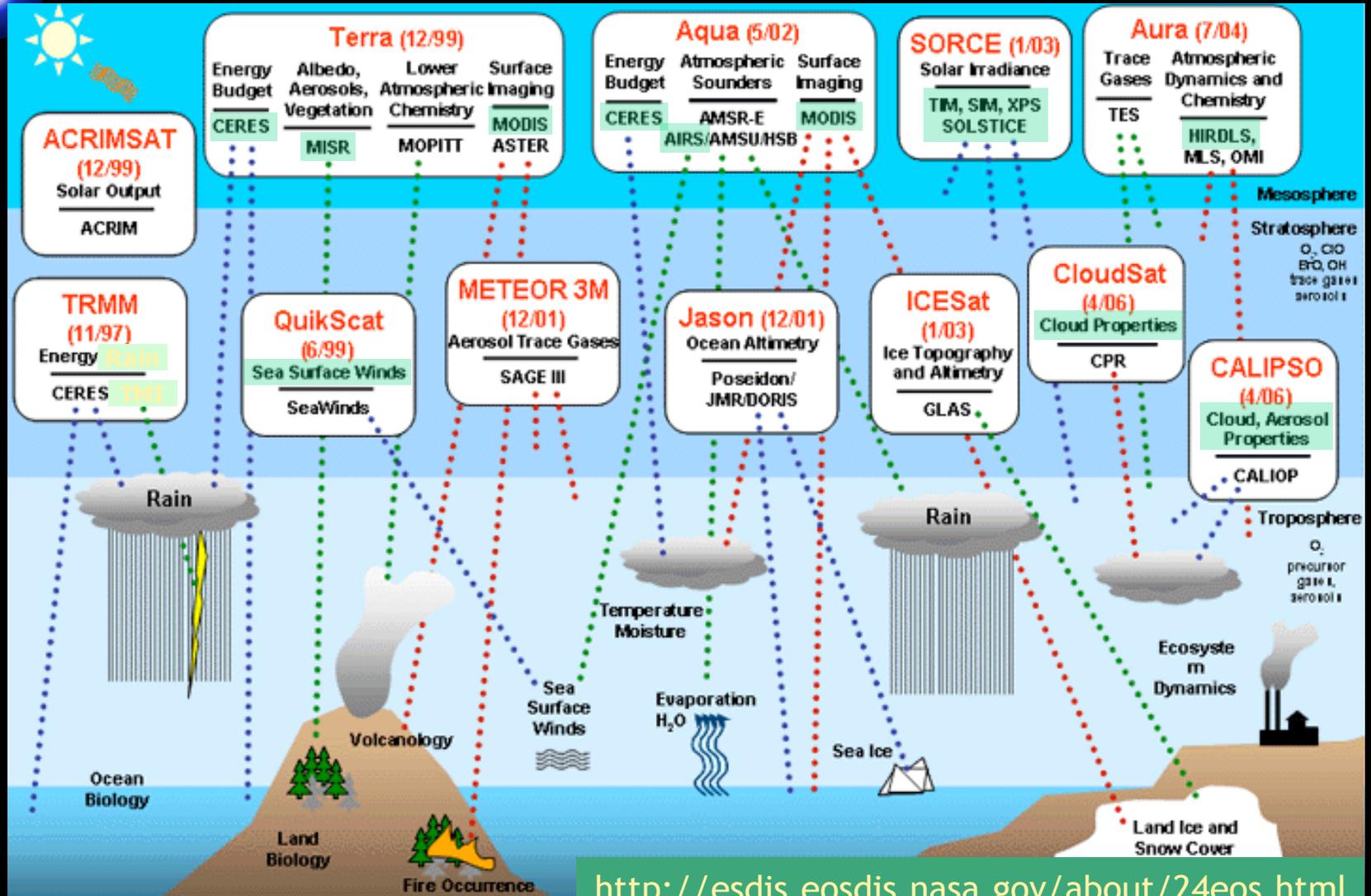




GES DAAC Support for EOS Missions

EOSDIS Manages Data for All 24 EOS Measurements

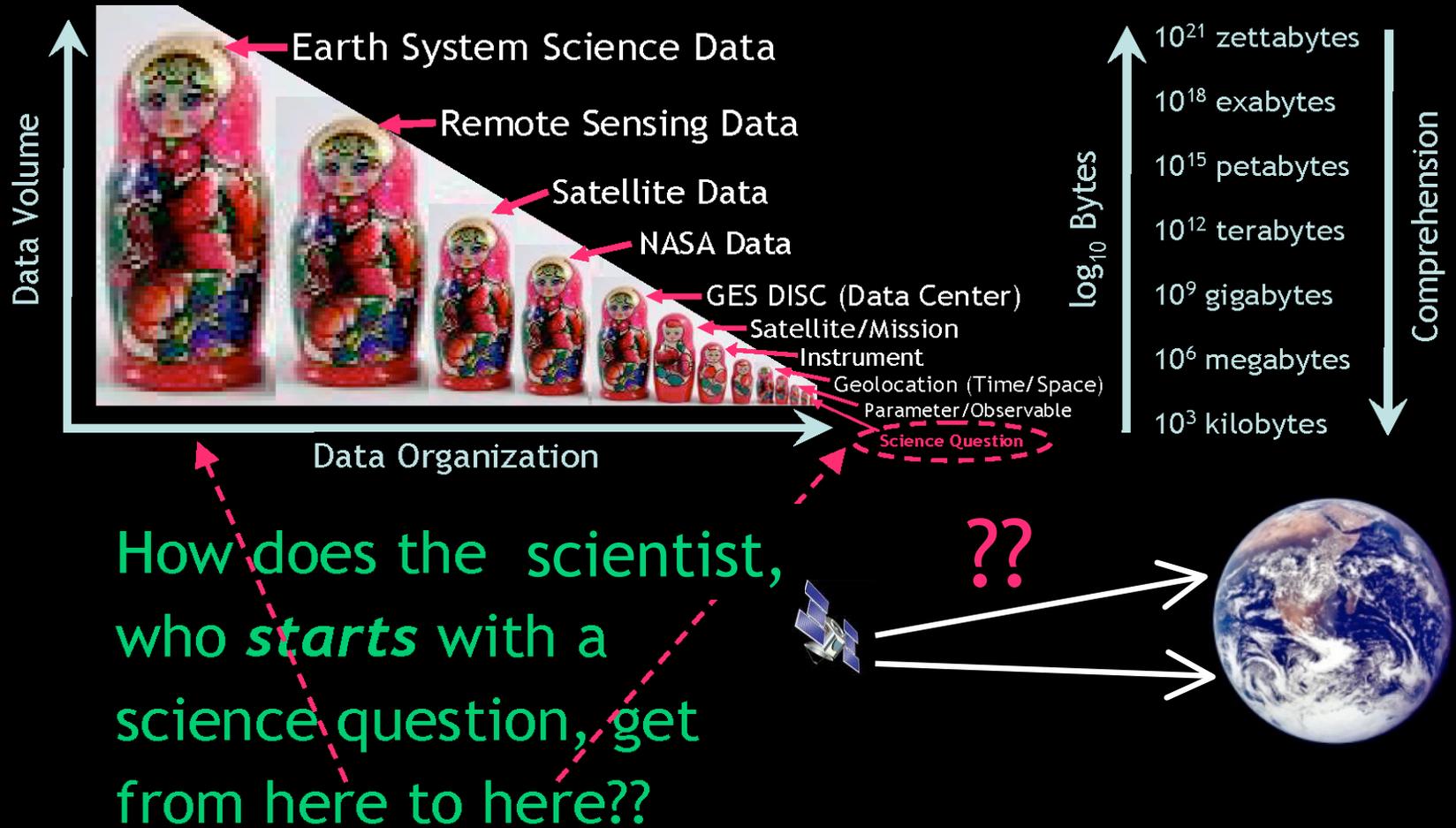
Green Highlight Indicates GES DAAC Involvement in Datasets



<http://esdis.eosdis.nasa.gov/about/24eos.html>



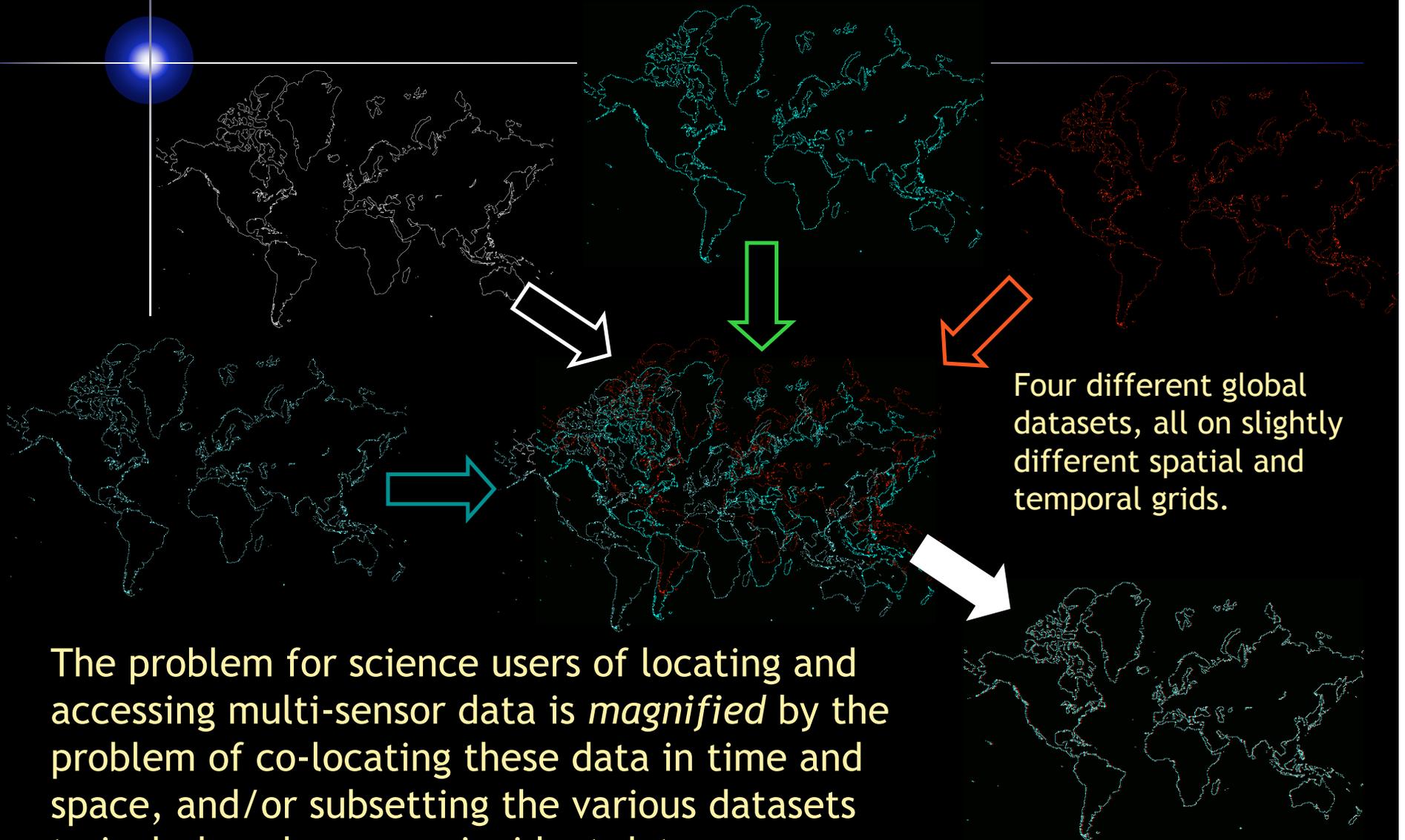
Multi-Sensor Science Data Paradigm



Not only how to *use* the data, but how not to *misuse* it...



Co-locating Datasets in Time and Space

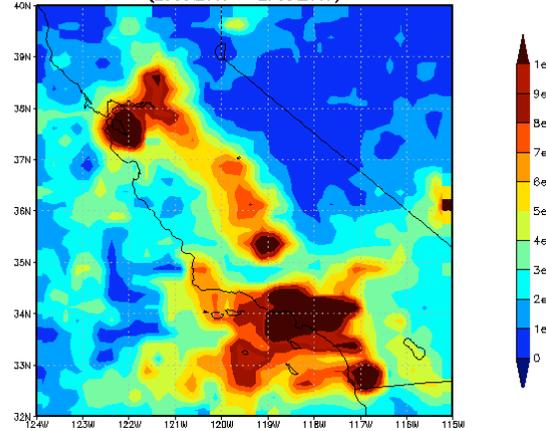


The problem for science users of locating and accessing multi-sensor data is *magnified* by the problem of co-locating these data in time and space, and/or subsetting the various datasets to include only near-coincident data.



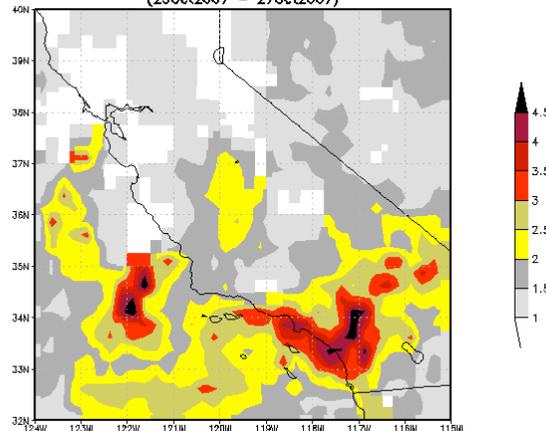
Southern California Wildfires

OMNO2E.002 NO2 Tropospheric Vertical Column Density [molec/cm²]
(23Oct2007 - 27Oct2007)



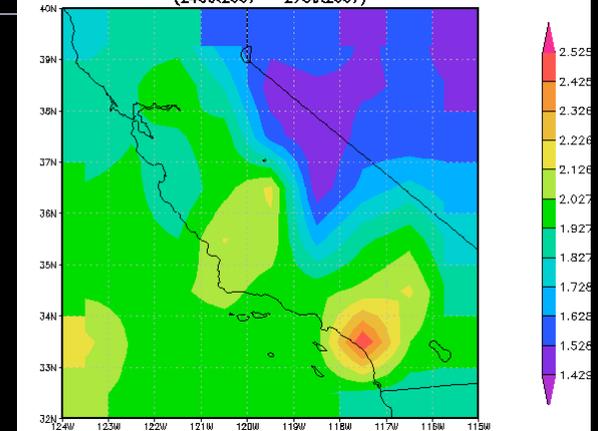
OMI Tropospheric NO₂

OMT03E.002 UV Aerosol Index [unitless]
(23Oct2007 - 27Oct2007)



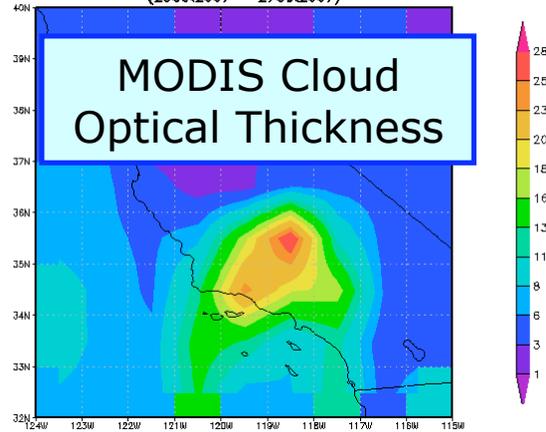
OMI UV Aerosol Index

STD.005 total column CO ascending (CO total column A) [molecules/cm²]
(24Oct2007 - 27Oct2007)



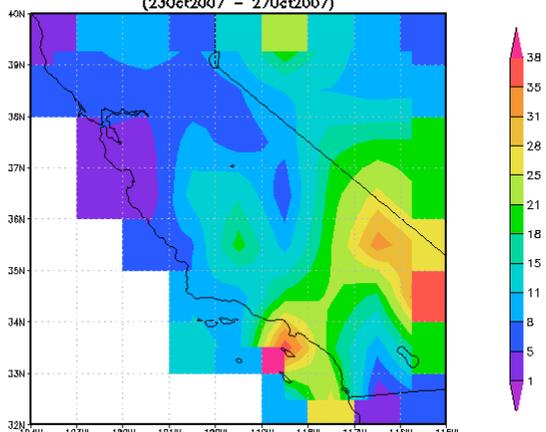
AIRS Carbon Monoxide (CO)

08_D3.005 Cloud Optical Thickness - Combined (QA-weighted) [unitless]
(23Oct2007 - 27Oct2007)



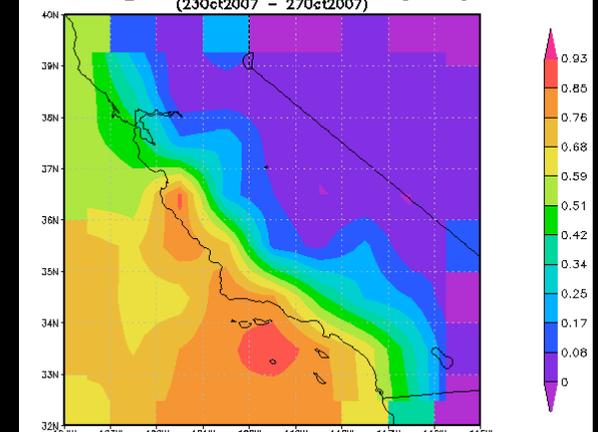
MODIS Cloud Optical Thickness

08_D3.005 Mass Concentration over Land (QA-weighted) [1.0e-6g/cm²]
(23Oct2007 - 27Oct2007)



MODIS Aerosol Mass over Land

MOD08_D3.005 Aerosol Small Mode Fraction [unitless]
(23Oct2007 - 27Oct2007)



MODIS Small Aerosol Fraction



Comprehensive Data Systems

“A **comprehensive data and information system**, a community of scientists performing research with the data acquired, and extensive ground and airborne campaigns are all important components.”

-- *2006 EOS Science Reference Handbook, p. 2*



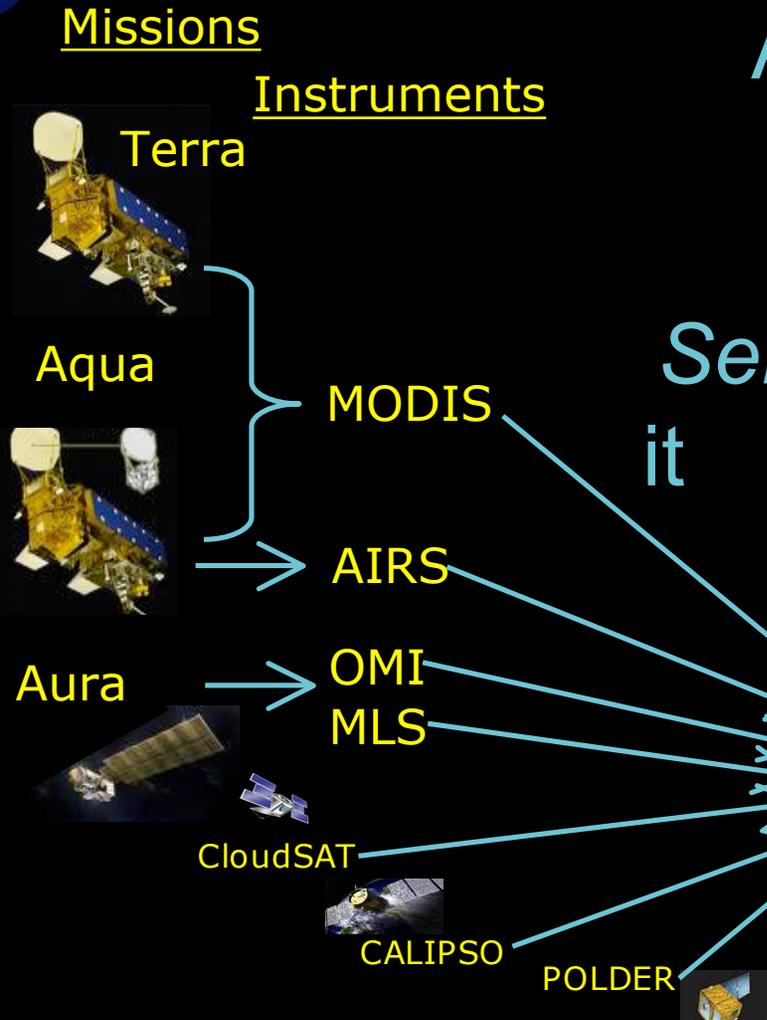
Multi-Sensor Data Systems

Four data systems at the GES DISC represent our effort to move into *comprehensive data systems*:

- 🌍 A-Train Data Depot
- 🌍 Aerosol Giovanni
- 🌍 Air Pollution Giovanni
- 🌍 TRMM TOVAS



Multi-Sensor Data Systems



A-Train Data Depot the first example of a *Comprehensive Multi-Sensor Data System*, and it continues to evolve.

ECMWF Assimilation Model

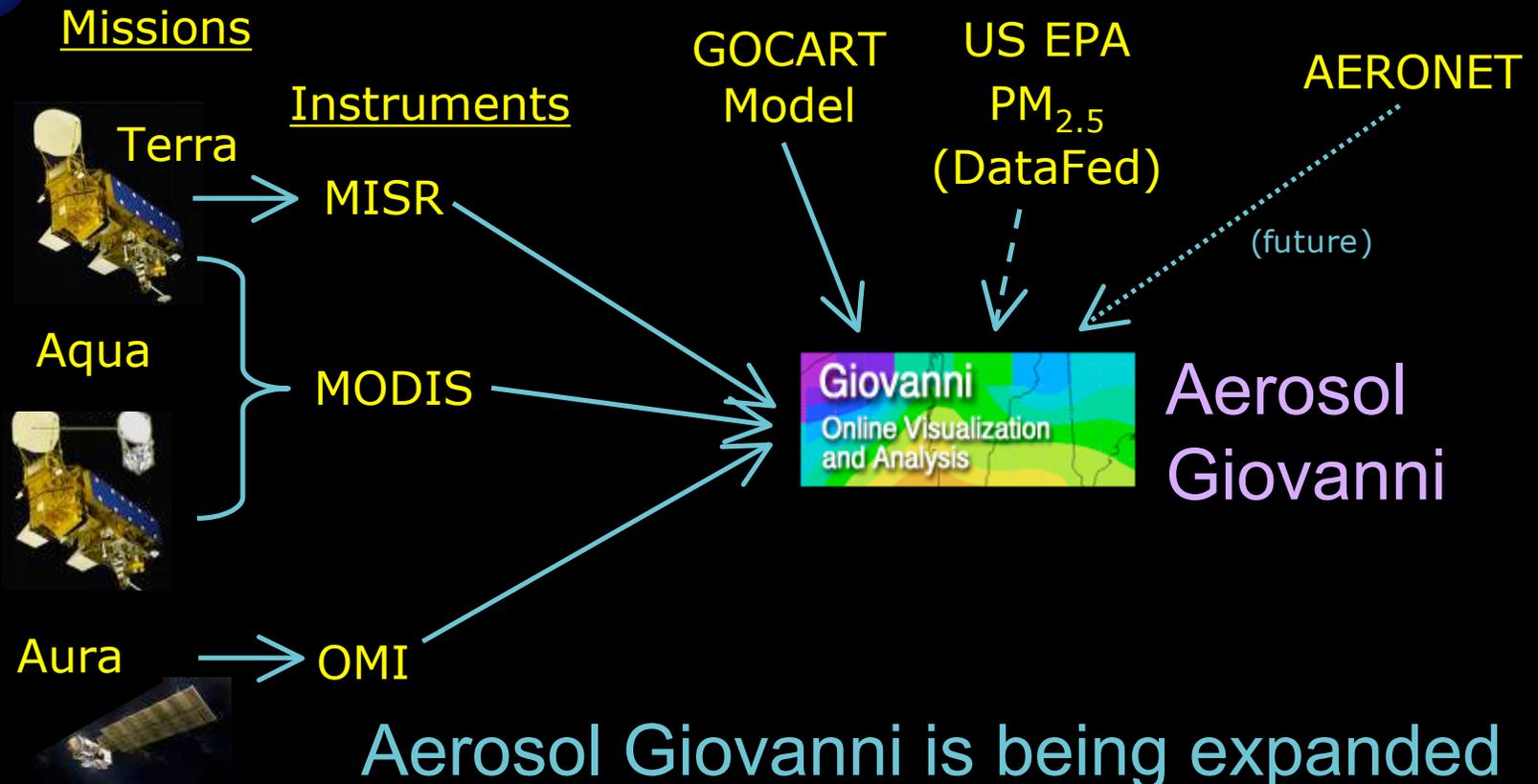


A-Train Giovanni

Current GES DISC Implementation



Multi-Sensor Data Systems



Aerosol Giovanni is being expanded to including more models and coincident ground-based data sets.



Multi-Sensor Air Quality Giovanni

- 🌍 Giovanni typically provides visualizations of Level-3 gridded satellite data
- 🌍 Air Quality Giovanni is the first instance in which point source data (PM_{2.5} ground-based aerosol observations from EPA *via* DataFed across the US) is co-located with a variety of satellite datasets
- 🌍 Multi-sensor observations of aerosols *facilitate analysis of air pollution events*
- 🌍 This capability helps bridge the gap between observations and air quality applications

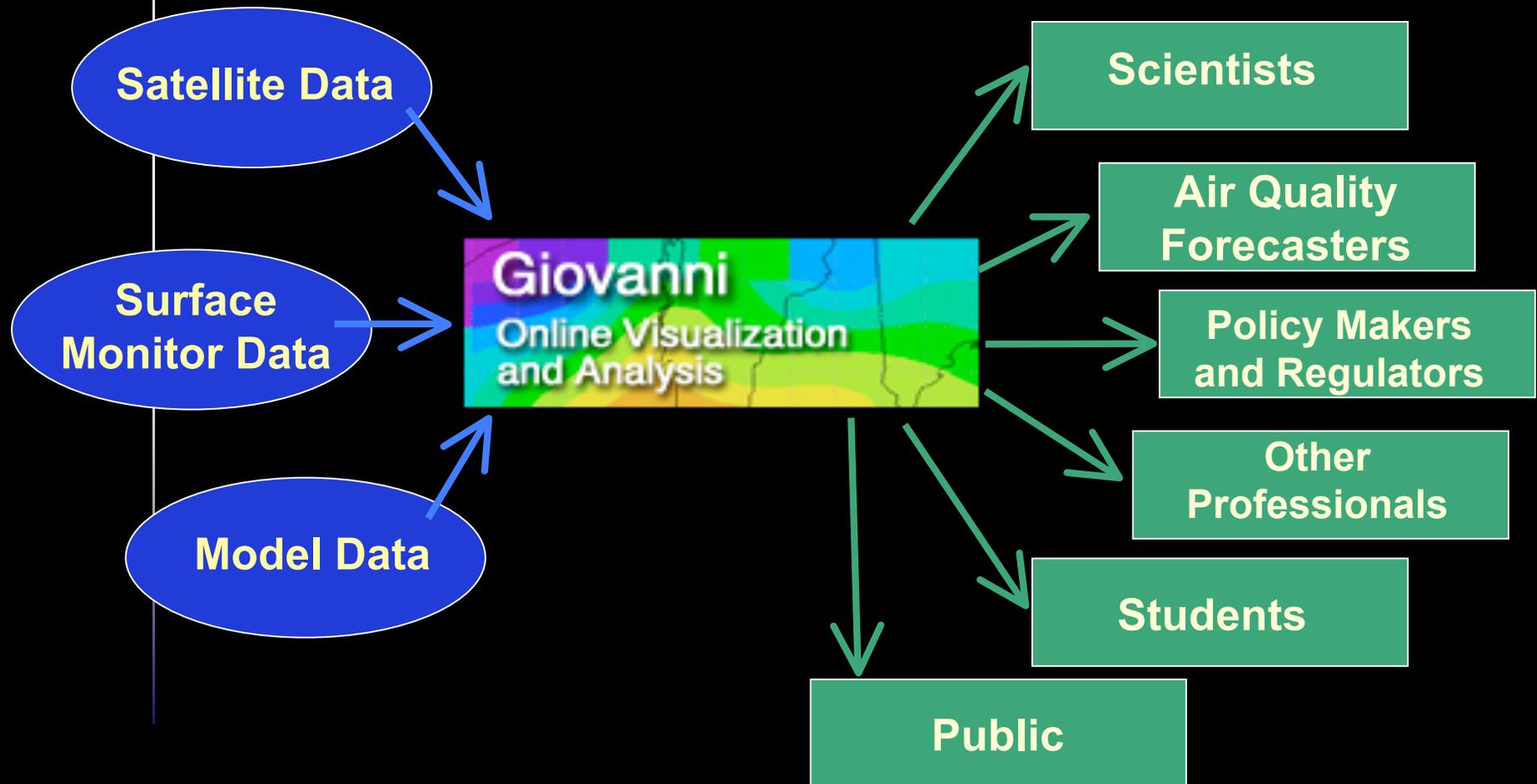


Multi-Sensor Air Quality Giovanni

Data Sources

Multi-sensor Giovanni

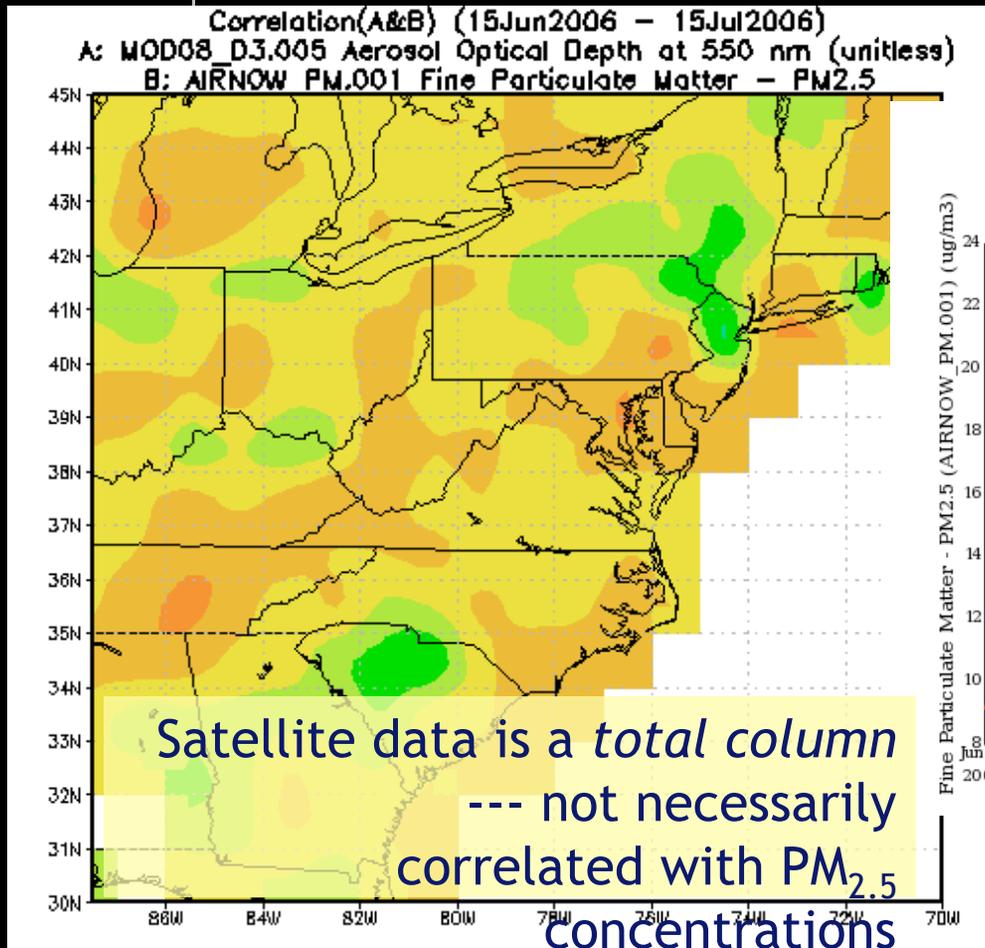
End Users



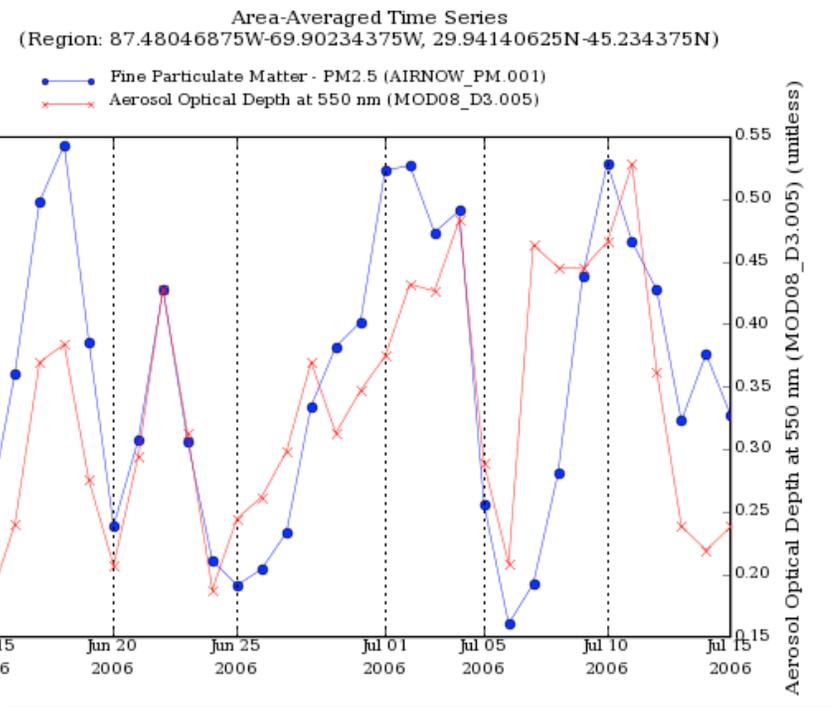


Multi-Sensor Applications: Monitor-Satellite Comparisons

June 15- July 15th, 2006



MODIS/PM_{2.5} Time Series



MODIS/PM_{2.5} Correlation



Comprehensive Data Systems

Current Satellites (NASA, NOAA, ESA, JAXA)



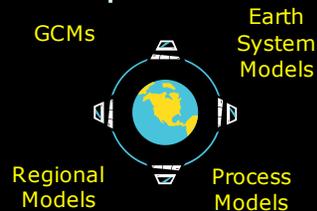
Legacy Satellites



Ground-Based Observations



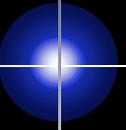
Computer Models



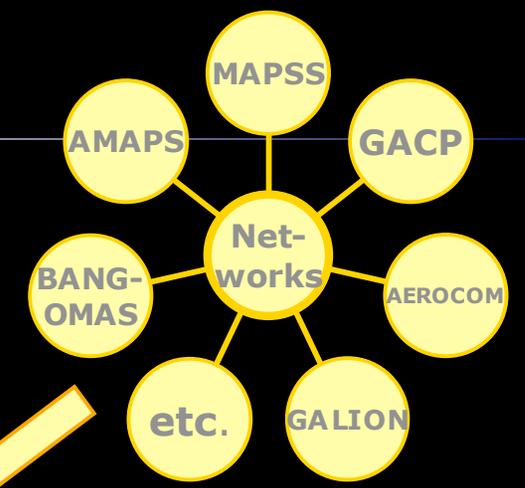
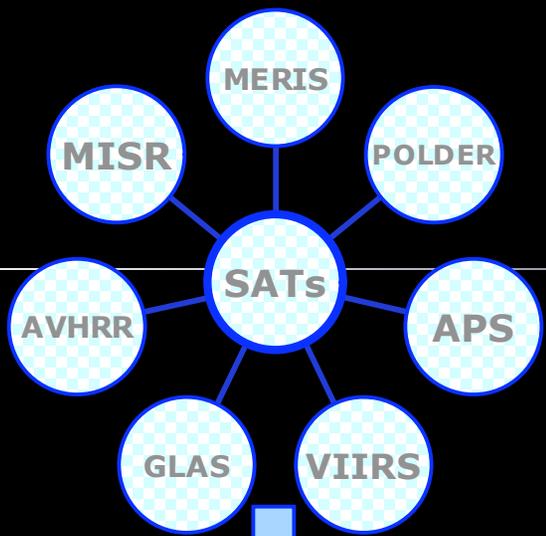
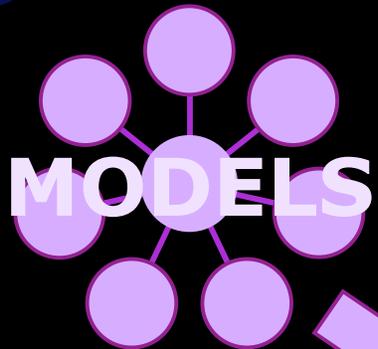
Comprehensive Data Systems provide an environment for working with a variety of sources of relevant data (satellite, ground-based and models) across the full range of temporal and spatial scales.



Future GES DISC
Implementation



MODELS



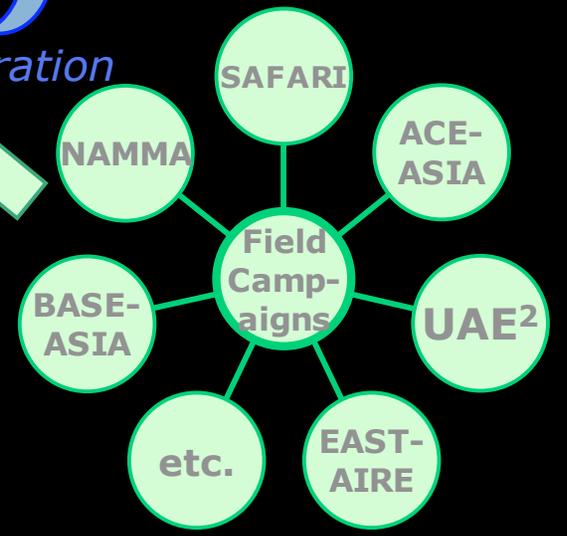
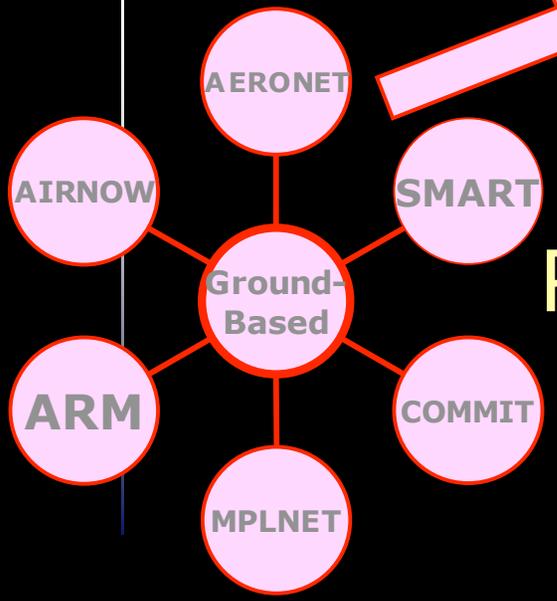
Data Requirements

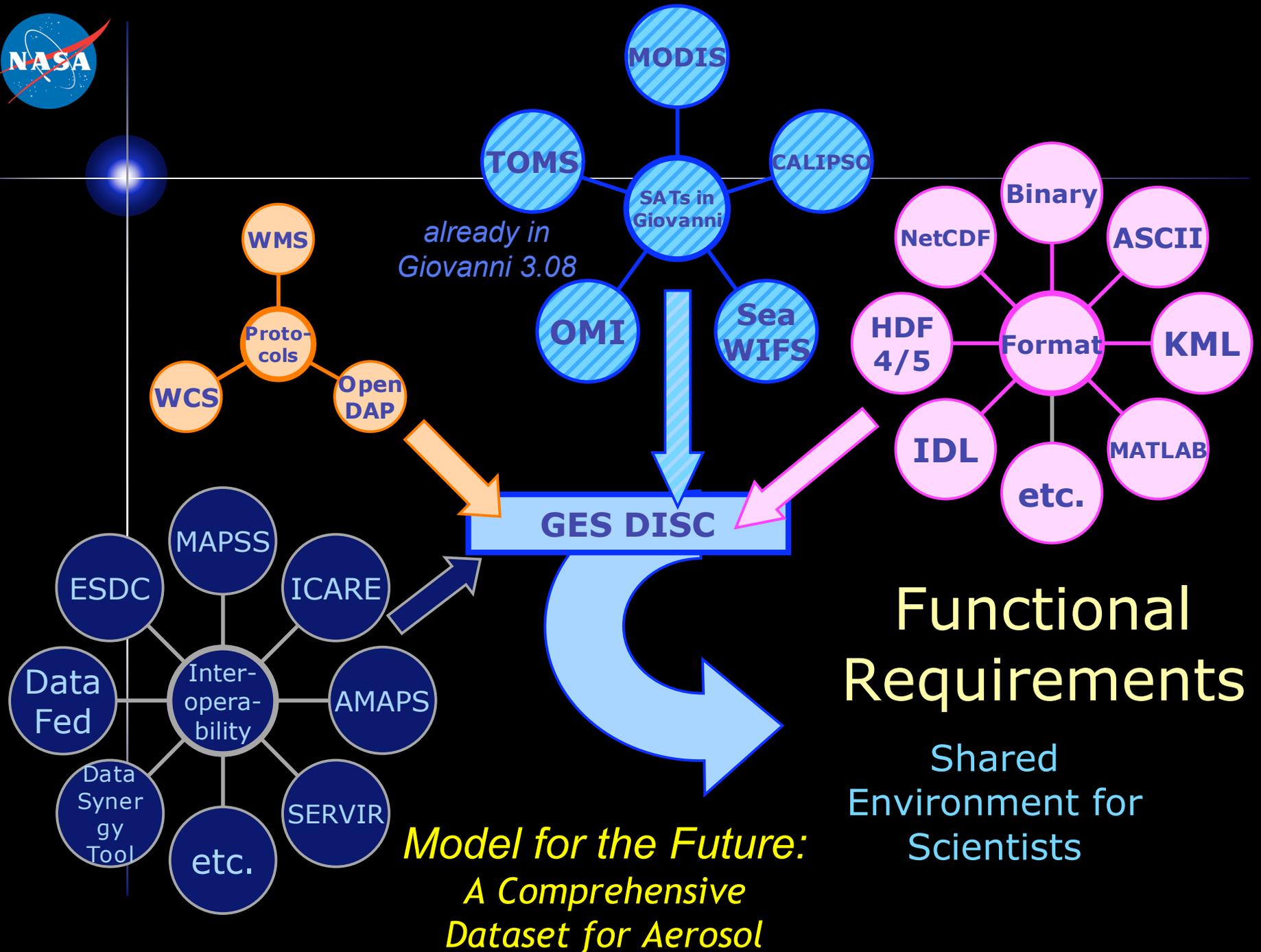
GES DISC



Data Requirements

Model for the Future: A Comprehensive Dataset for Aerial Studies





Functional Requirements
Shared Environment for Scientists

*Model for the Future:
A Comprehensive
Dataset for Aerosol*



Comprehensive, Multi-Sensor Data Systems

Comprehensive, Multi-Sensor Data Systems will **advise** the science user about the applicability of data intercomparisons so as to avoid “apples and oranges” comparisons.

Comprehensive, Multi-Sensor Data Systems will encapsulate the **synergies** between the related datasets.



How can we improve multi-sensor data access and usage?

- 🌍 hierarchy of disciplines
- 🌍 interoperability with other data centers
- 🌍 enhance analysis component
- 🌍 more remote sensing data (L2?)
- 🌍 data brokering
- 🌍 ground-based measurements
- 🌍 multi-sensor/model intercomparisons
- 🌍 more user-friendly
- 🌍 science quality/provenance
- 🌍 data fusion



Back Up





Interoperability of Air Quality Data Products

Current

Future

AERONET
SYNERGY

TOOL

DataFED

EPA Surface Obs

Giovanni
Online Visualization
and Analysis

Air Quality Data Products

VIEWS/TSS

(model/satellite
comparisons)

Others ?

Interoperability enables the GES DAAC to obtain and serve air quality products, which makes it easier for applications users to improve their analysis of air pollution events.