NASA GIBS and Worldview: Leveraging Visualizations to Improve Data Discovery

IN51A-02

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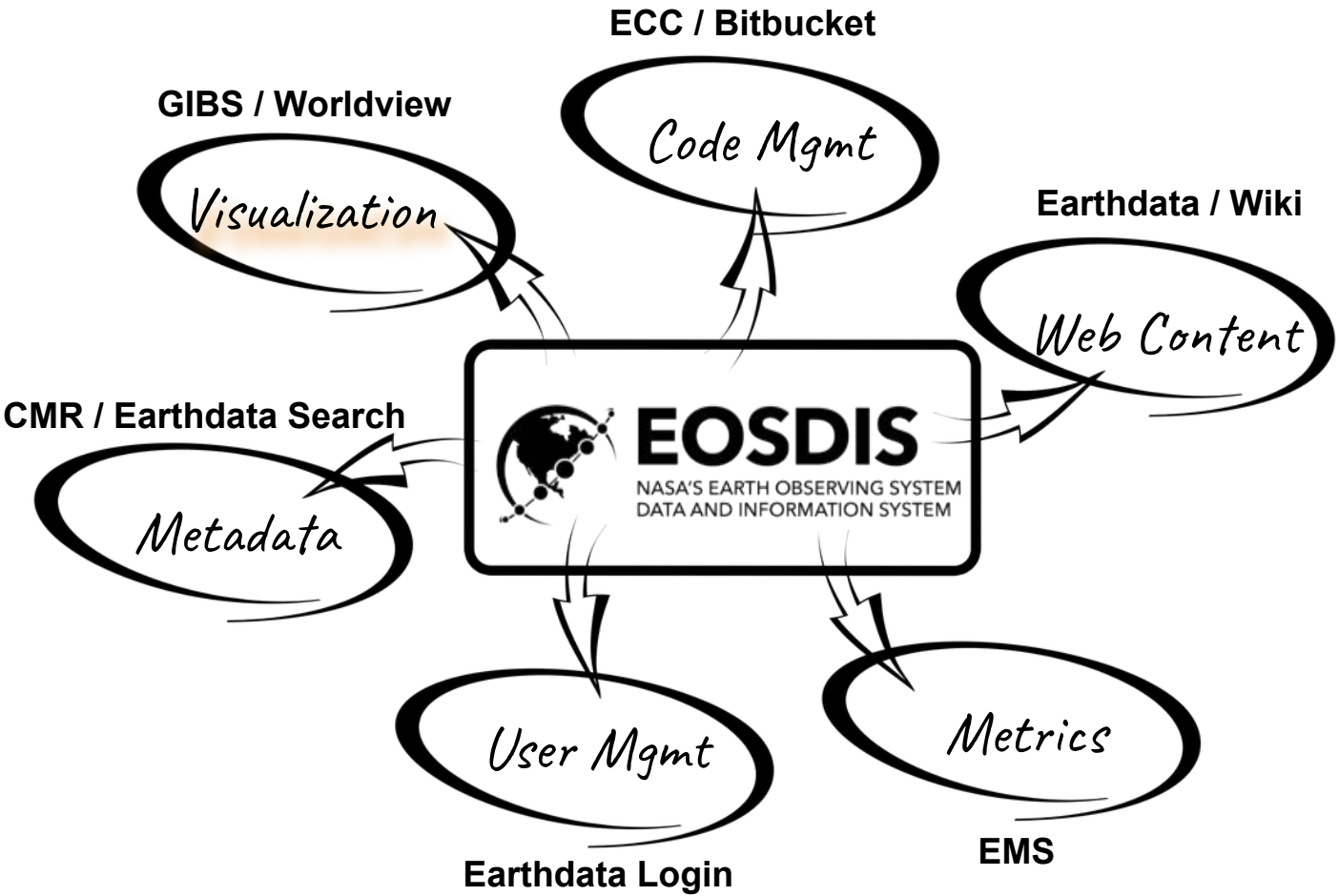
1 - Science Systems and Applications, Inc., 2 - NASA Goddard Space Flight Center, 3 - NASA Jet Propulsion Laboratory, 4 - ASRC Federal Holding Company



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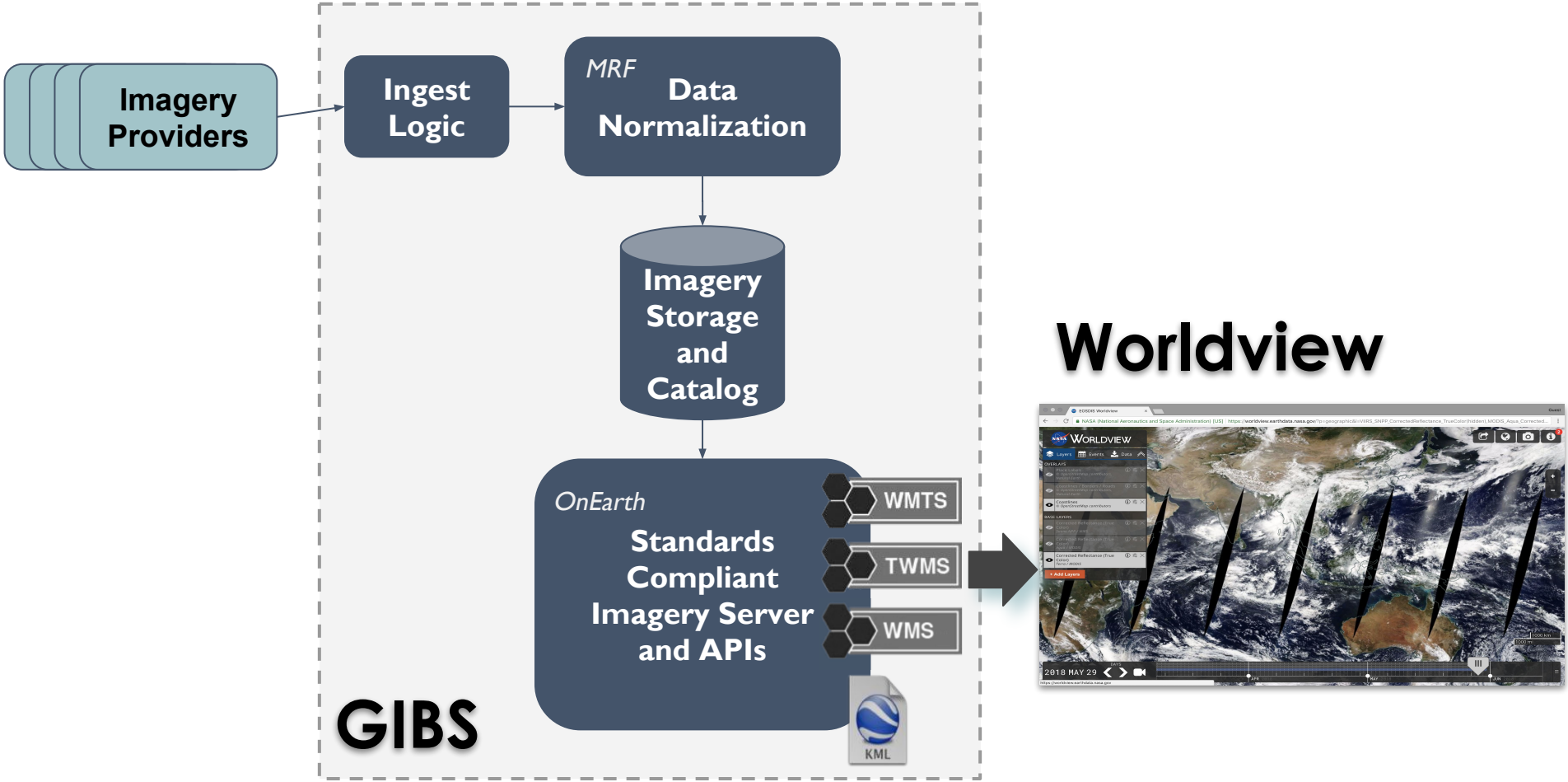
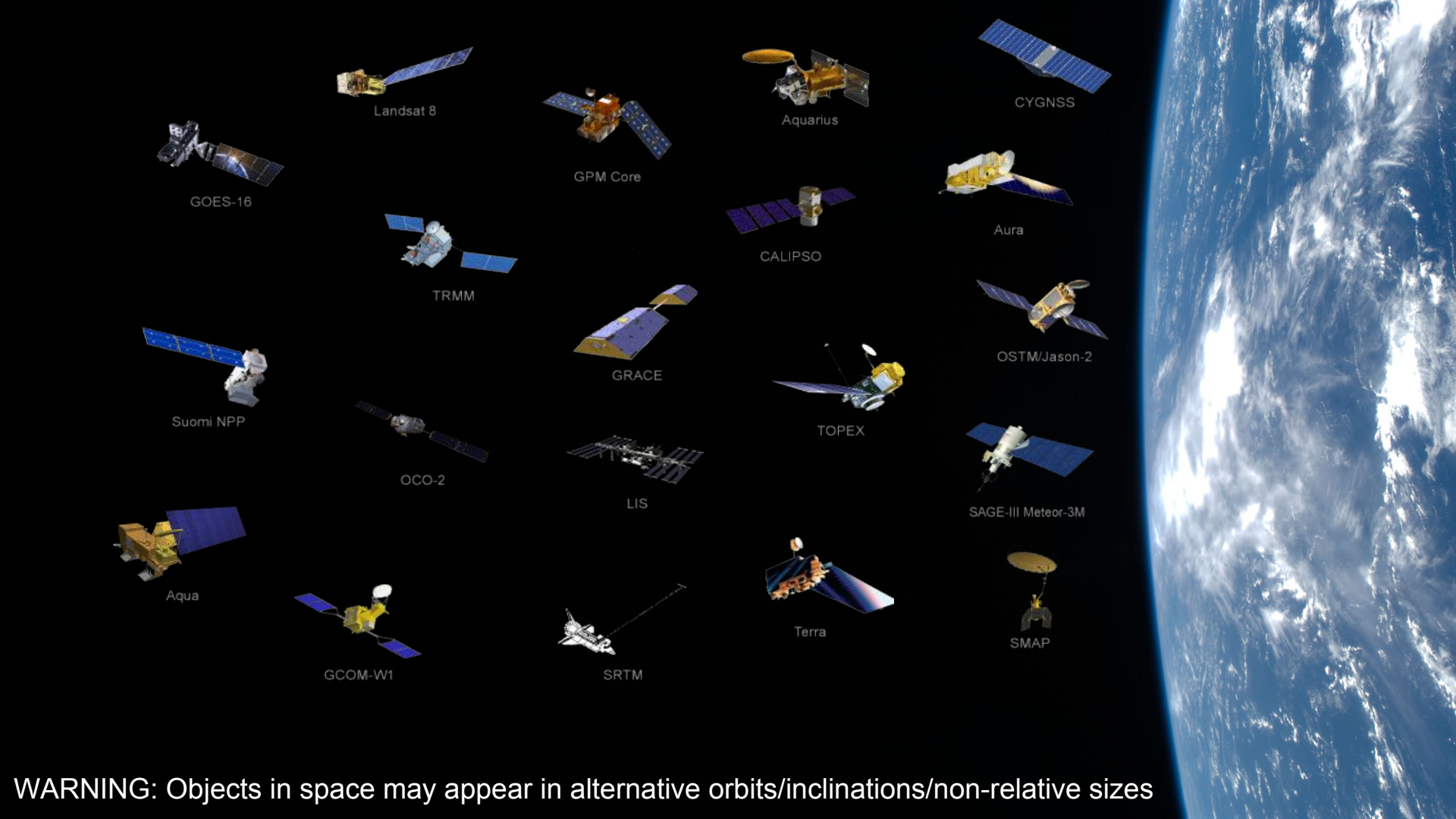

Imagery Providers
Ingest Logic
MRF
Data Normalization
Imagery Storage and Catalog
OnEarth
Standards Compliant Imagery Server and APIs
WMTS
TWMS
WMS
KML
GIBS
Worldview
WORLDVIEW
2018 MAY 29

Cross-Discipline Discovery


Landsat 8
Aquarius
CYGNSS
GOES-16
GPM Core
Aura
CALIPSO
TRMM
OSTM/Jason-2
GRACE
Suomi NPP
TOPEX
OCO-2
LIS
SAGE-III Meteor-3M
Aqua
Terra
SMAP
GCOM-W1
SRTM
WARNING: Objects in space may appear in alternative orbits/inclinations/non-relative sizes

All

- Absolute Dynamic Topography
- Aerosol Index
- Aerosol Optical Depth
- Aerosol Albedo
- Amphibian Richness
- Areas of No Data (mask)
- ...

Atmosphere

- Aerosol Albedo
- Aerosol Index
- Aerosol Optical Depth
- Cloud Albedo
- Carbon Dioxide
- Carbon Monoxide
- ...

Biosphere

- Amphibian Richness
- Forests, Mangrove
- Gross Primary Productivity
- Heterotrophic Respiration
- Human Footprint
- Land Cover
- ...

Cryosphere

- Freeze/Thaw
- Frozen Area
- Ice Surface Temperature
- Sea Ice
- Sea Ice Brightness Temperature
- Sea Surface Temperature
- ...

Human Dimensions

- Cyclone Hazard
- Dams
- Drought Hazard
- Earth at Night
- Fires and Thermal Anomalies
- Flood Hazard
- ...

Land Surface

- Blue Marble
- Corrected Reflectance
- DHR Reflectance
- Evaporation
- Fires and Thermal Anomalies
- Global Digital Elevation Map
- ...

Oceans

- Absolute Dynamic Topography
- Chlorophyll a
- Liquid Water Equivalent
- Cloud Liquid Water
- Open Water Latent Energy Flux
- Precipitation Rate
- ...

Spectral/Engineering

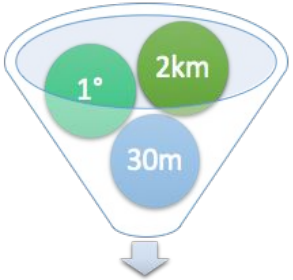
- Brightness Temperature
- Sigma0
- Faraday Rotation Angle
- Outgoing Radiation
- Radiation
- Surface Flux
- ...

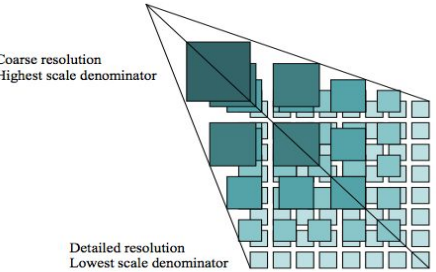
Terrestrial Hydrosphere

- Flood Hazard
- Freeze/Thaw
- Frozen Area
- Reservoirs
- Sea Ice
- Snow Cover
- ...

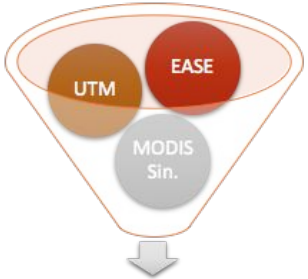
WORLDVIEW MOVIE

Spatial Resolutions

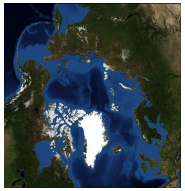


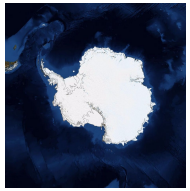


Projections



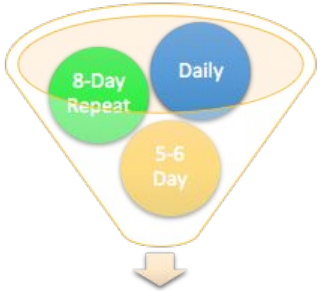


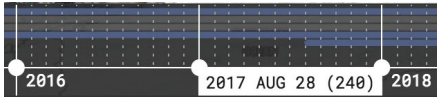




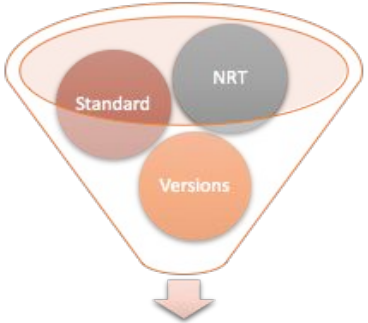


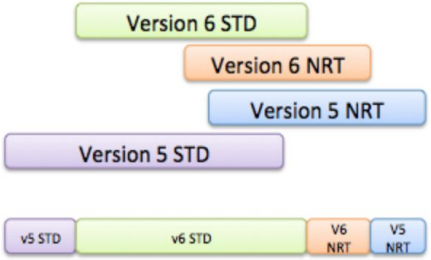
Temporal Resolution





Latencies and More





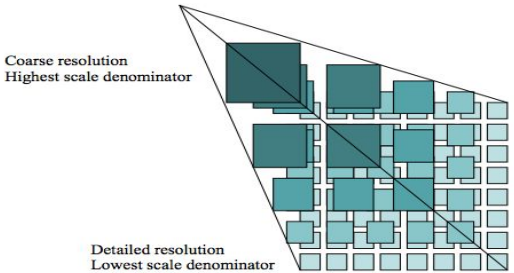
Reduced time and effort to discover, visualize, and analyze

Data Normalization and Storage Format

Meta Raster Format (MRF)

High performance, flexible imagery tile container format

https://github.com/nasa-gibs/mrf

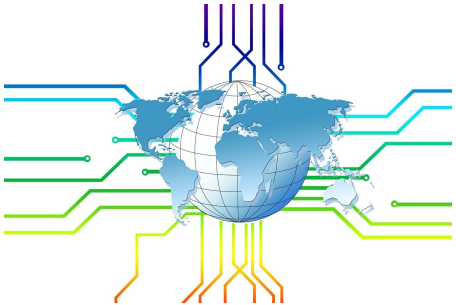


Visualization Access Services

OnEarth

High performance tile server optimized to use MRF

https://github.com/nasa-gibs/onearth

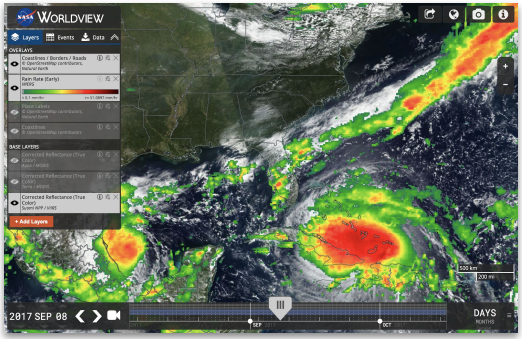


Worldview

Satellite imagery browsing web app

Built upon open source mapping libraries, this interface is optimized

https://github.com/nasa-gibs/worldview



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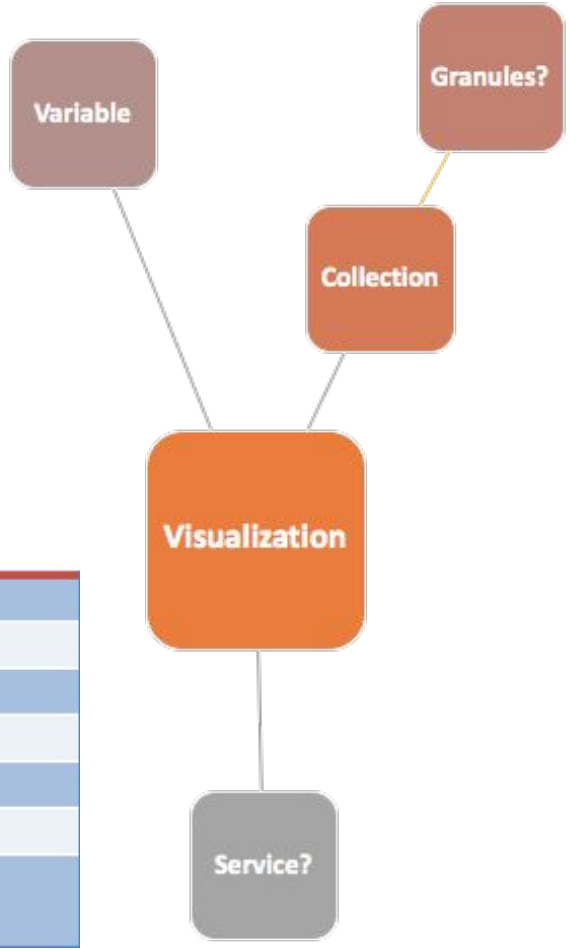
Visualization Metadata

Facilitate discovery of …

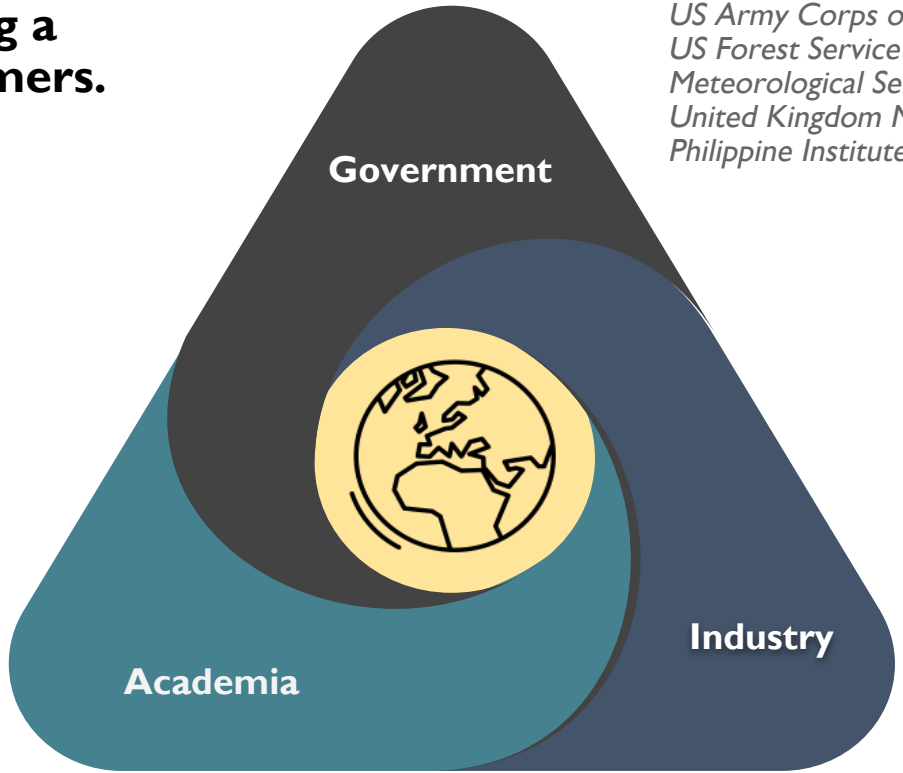
- Visualizations based on collection…
- Data based on visualization

EOSDIS Concepts	UMM Profiles	Profile Short Name
Collections	Collection	UMM-C
Granules	Granule	UMM-G
Services	Service	UMM-S
Variables	Variable	UMM-Var
Visualizations	Visualization	UMM-Vis
Meta-metadata	Meta-metadata	UMM-M
Elements Common to multiple UMM Component Models	Common	UMM-Common



Assisting broader communities to discover and visualize

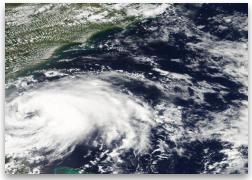
Worldview / GIBS has seen a wide range of users from all over the globe, serving a broad range of consumers.



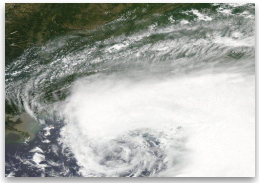
National Weather Service
US Army Corps of Engineers
US Forest Service
Meteorological Service of Canada
United Kingdom Met Office
Philippine Institute of Volcanology & Seismology

Ohio State University
Stanford University
University of Oxford
University of Tasmania
University of Zurich

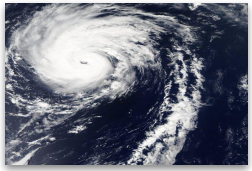
Nationwide Investments
BBC
Reuters
DigitalGlobe
NYTimes



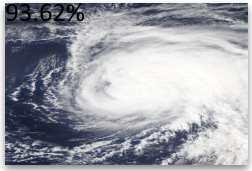
Beryl -



Debby – 93.62%



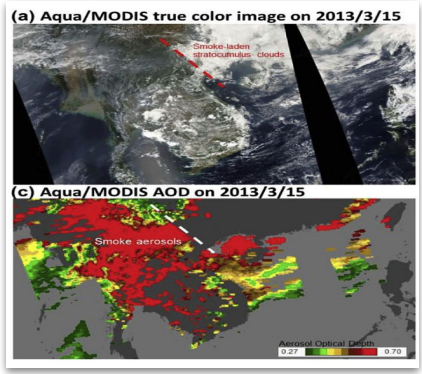
Michael – 98.55%



Nadine – 99.41%

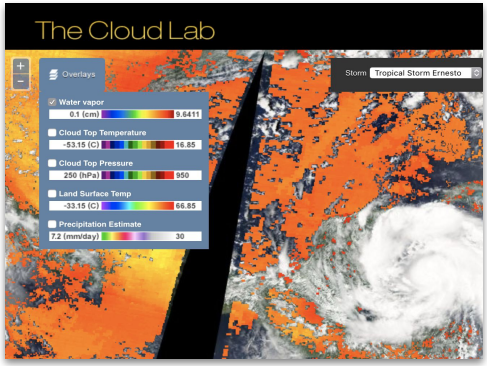
Machine Learning

Scientific Inquiry



Worldview and GIBS

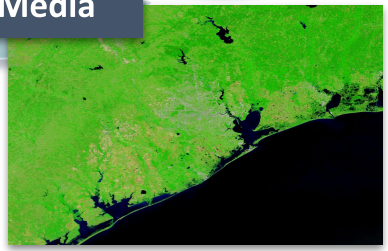
Educational Material

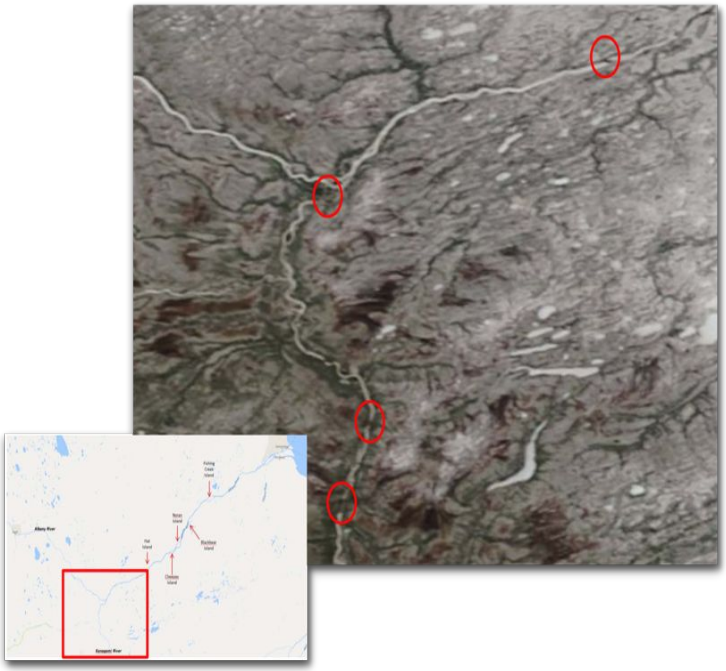


Commercial Application

RipCharts

News and Social Media





“This site is *fantastic*!

If you are curious to know, our centre is using the site to **monitor river ice breakup** in the Far North of Ontario where there are several remote fly-in only First Nations communities that are **highly susceptible** to nearly annual ice induced flooding that has substantial financial and social cost. Your site is a **very useful tool** for this purpose.”

- *Andy Beaton*
  Hydrometric Specialist
  Surface Water Monitoring Centre
  Ontario Ministry of Natural Resources and Forestry





“**The daily image, because of its true color, and coverage in scale gives us the BEST SIMULATION of seeing the Earth currently available**.

Allow me to quote Leland [Melvin], **"...that was the closest I've been to being up there since being up there"**.

Again, thank you for this, as **it is *astounding***.”

- *Carter Emmart*
  Director of Astro-visualization
  Rose Center for Earth and Space
  American Museum of Natural History, New York City

Picture of data from WV

"...I use it a dozen times a day as I try and sort out field campaign data, quickly look for aeronet site locations, or generally figure out "what happened?". It is probably the biggest productivity enhancers you folks have ever done for me personally."

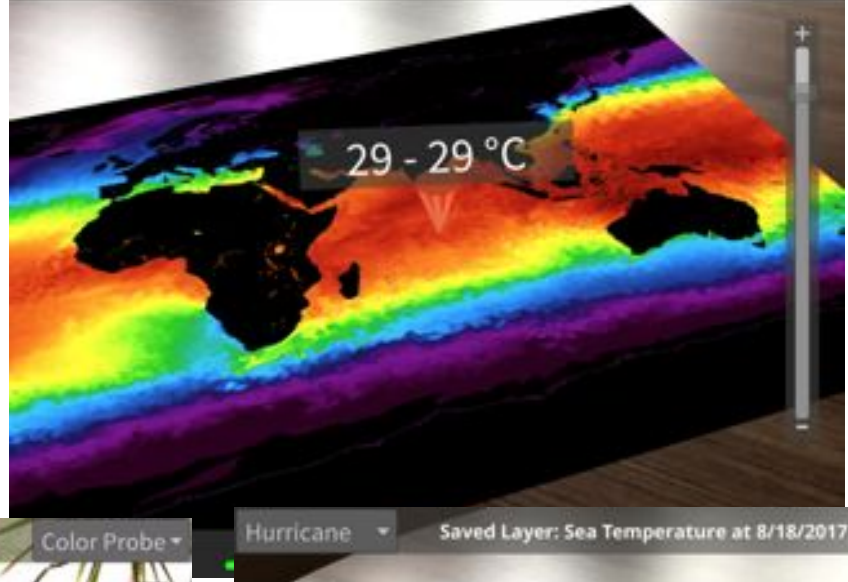
- *Jeffrey S. Reid, Ph.D.*
  Naval Research Laboratory

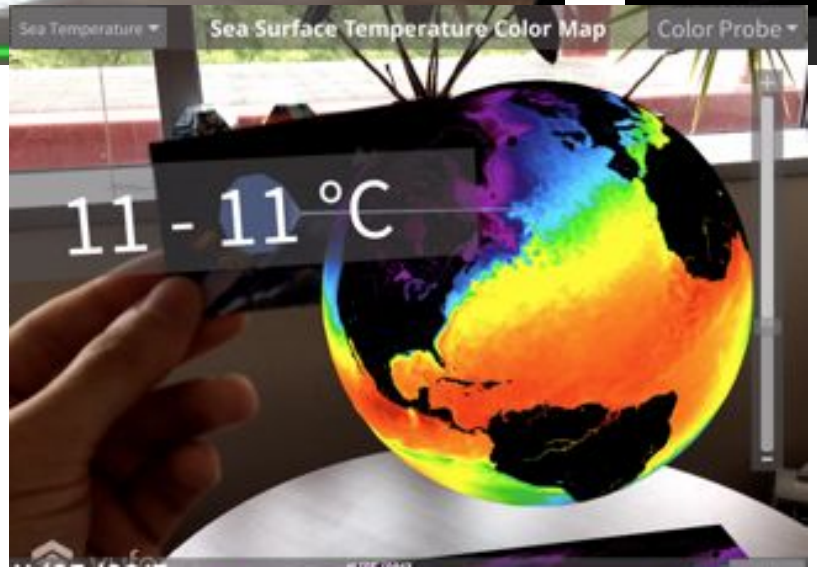
"I can't thank you enough for this wonderful tool that makes us aware of earth processes in near-real time. It is of immense help to my ongoing research on the effects of mineral dust and aerosols on ocean productivity."

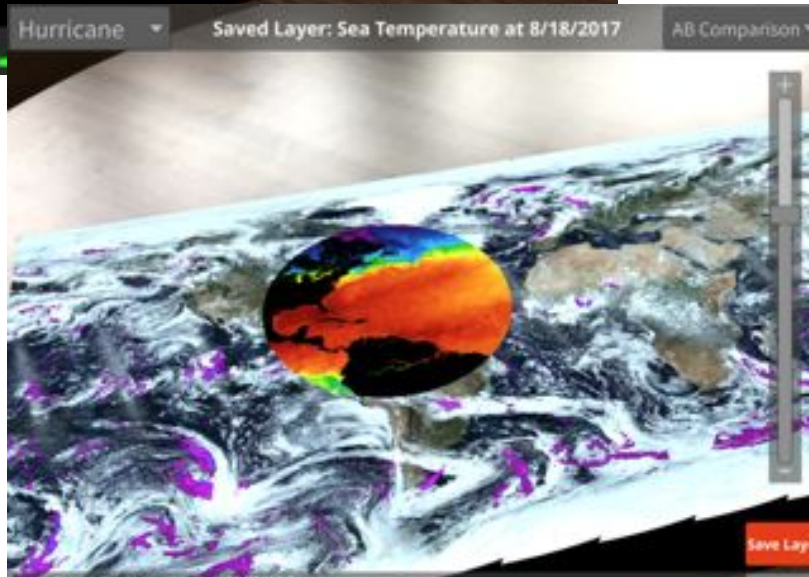
- *Dr. V. Ramaswamy*
  Chief Scientist
  National Institute of Oceanography
  Goa, India.

Picture of data from WV


10/20/2017


29 - 29 °C

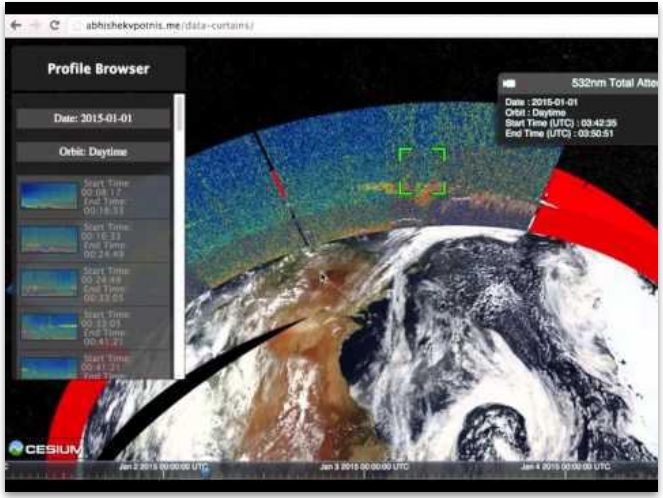

Sea Temperature
Sea Surface Temperature Color Map
Color Probe
11 - 11 °C


Hurricane
Saved Layer: Sea Temperature at 8/18/2017
AB Comparison

Conclusion

Future Work

1. Vector-based visualizations
2. Geostationary data visualizations
3. Cross-discipline search relevancy
4. Catalog management
5. Dynamic data visualization







Contact us … support@earthdata.nasa.gov

Learn more about GIBS … https://earthdata.nasa.gov/gibs

Learn more about Worldview … https://earthdata.nasa.gov/worldview

Participate … https://github.com/nasa-gibs/

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