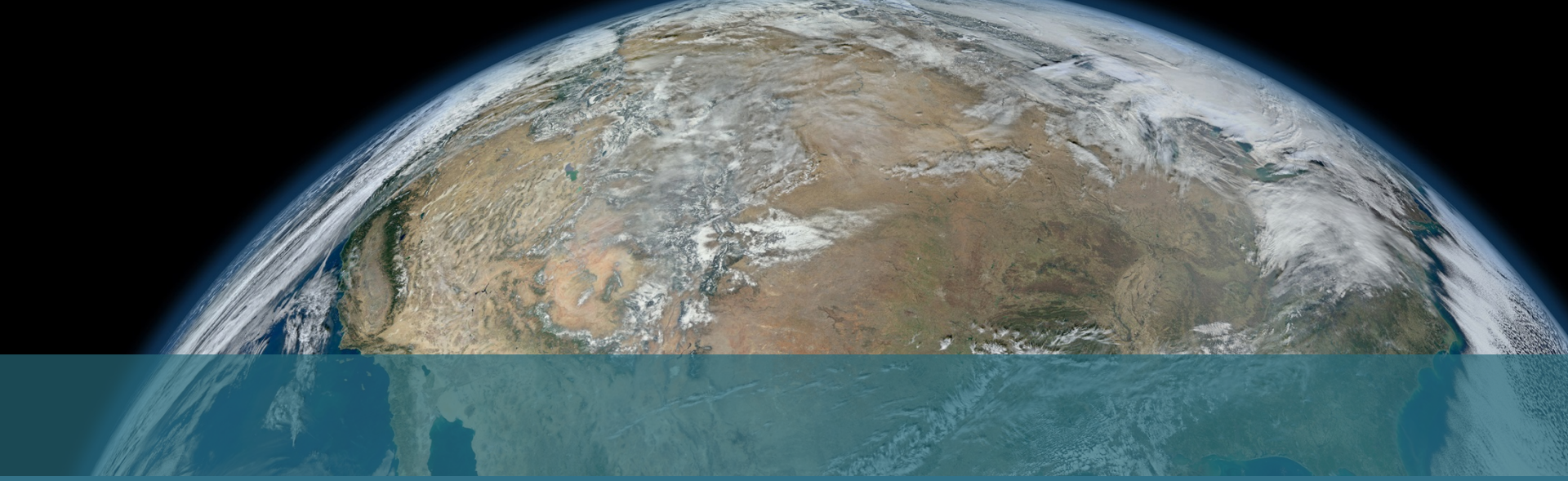

Expanding the NOAA CDR User Base: Obs4MIPs and USGS EarthExplorer

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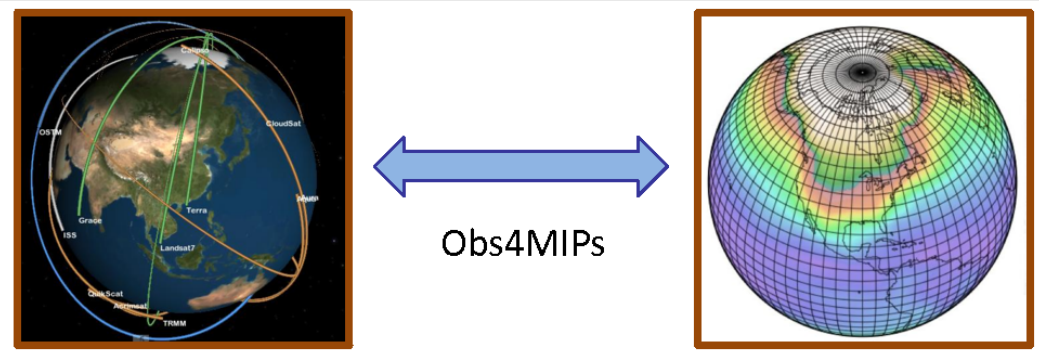
Motivation

- CDRs are the highest quality and longest duration datasets available
- Established user communities in various disciplines are working with different data formats
- Changing the CDR data format allows these communities to use CDRs

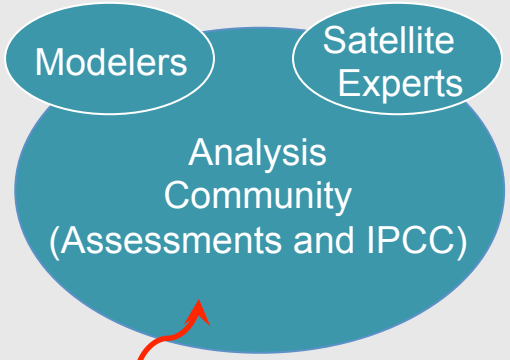
What is Obs4MIPs?

- Obs4MIPs is an effort to compare model and observational data
  - Initially launched by NASA and U.S. DoE
  - Purpose is to take satellite measurements and make them accessible for CMIP5 validation
  - John Bates is the lead representative for NOAA
  - To widen the scientific contribution to this effort
    - Handed over to the WCRP Data Advisory Council (WDAC), co-chaired by Otis Brown, CICS-NC Director
- Geared for analysis community
  - IPCC
  - Other assessments
- Documentation requirement (Technical Note)
  - User's manual (can be taken mostly out of C-ATBD)
  - ~1 day commitment to write up
  - Caveats regarding comparisons with models
  - Uncertainties (CICS-NC is helping us to define this better)



Why is CDRP pursuing these projects?

- Users
  - NOAA CDRs can support assessments and climate projections.
- A gap in the record
  - Most NASA mission datasets PoR: 2000-present
  - Most CDR period of records PoR: 1980s-present
- Provide more value to the Nation
  - CDRs will be used for the assessment of Earth's Climate
  - Bringing observational and model data together will improve input data for climate prediction models



Target audience are the model-evaluation community

Measure of success

- Expanded CDR user base
- CDRs are cited in IPCC and other assessments
- NCEI capable of producing other Obs4MIPs datasets

Project scope

- Selection of 3 CDRs
  - Pilot project to plan for future efforts

- CDRs may be changed to fit the temporal resolutions for Obs4MIPs observational datasets.
  - Preserve native spatial resolution
  - No major change in the input data allowed, just aggregation and temporal averaging of data

- Writing a Technical Note

CDRs selected for conversion

- Pilot of 3 gridded CDRs
  - **OISST** – Optimal interpolation SST (**Viva Banzon, NCEI**)
  - **Daily OLR** – HIRS multichannel (**Carl Schreck, CICS-NC**)
  - **Sea Ice** – Sea ice concentration over the poles (**Ge Peng, CICS-NC**)

- Why these three climate variables?
  - Communicated directly to CDRP by Obs4MIPs leadership

- Wrote a CDR to Obs4MIPs conversion utility/software that will be used for future CDR conversions

- Produced static period of record
  - Will consider systematic updates based on user requests

Timeline

- Project start
  - May 2014 Project charter approved
  - July 2014 Project started
- Major milestones
  - Sep 2014 WDAC Obs4MIPs Task Team approves proposed CDRs
  - Nov 2014 Produced and tested 1 month of Obs4MIPs-compliant products with original CDR
  - Jan 2015 Produced Obs4MIPs CDRs for entire period of record using the current conversion utility
  - Feb 2015 Obs4MIPs documentation (Technical Note) written
  - May 2015 Data and documentation made available online
  - Aug 2015 Served data on an ESG node
- Future plan
  - Expand beyond satellite CDRs
  - Will include in-situ datasets and non-CDRs for future efforts

Earth System Grid (ESG) data hosting plan

- Federation of distributed data servers (nodes) with an agreed protocol for sharing data through a portal
- Leverage existing resources
- NOAA Geophysical Fluid Dynamics Laboratory (GFDL)
  - Data submitted to the GFDL ESG node
  - Model (e.g. CMIP5) and observational data hosted side by side
  - ~110 GB transferred for publishing
- NCEI
  - NCEI/CICS-NC ESG node is in development

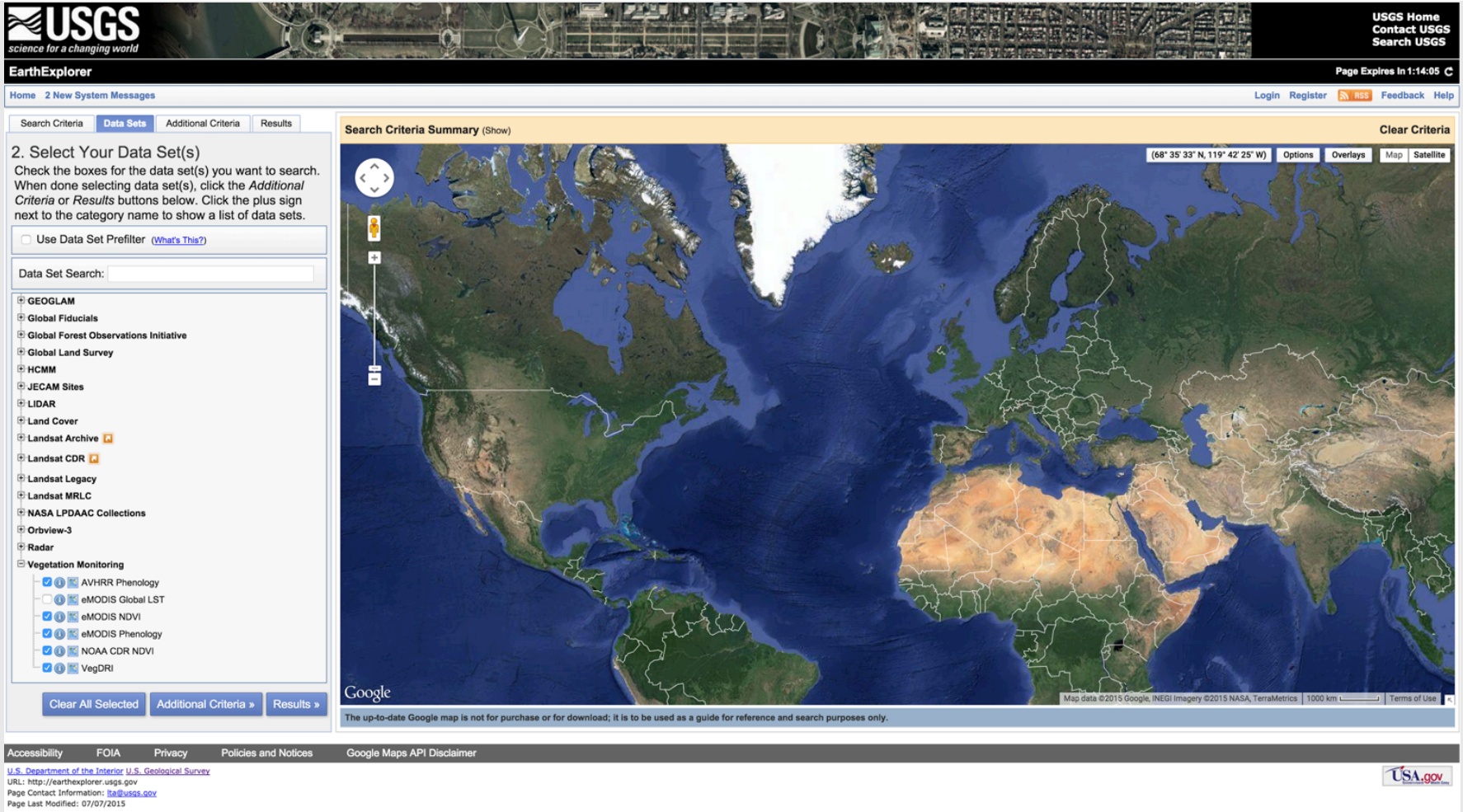
GeoTIFF at USGS

- Background
  - Opportunity to broaden our reach through partnership with the United States Geological Survey (USGS)
  - USGS maintains the Landsat image archive, which is:

    > Four decades of imagery (providing) a unique resource for those who work in agriculture, geology, forestry, regional planning, education, mapping, and global change research.

  - Their user communities typically access data as GeoTIFF images within GIS software packages
  - Normalized Difference Vegetation Index (NDVI) is a CDR that members of their user communities are interested in
  - The primary USGS data portal is EarthExplorer (http://earthexplorer.usgs.gov/)

USGS EarthExplorer



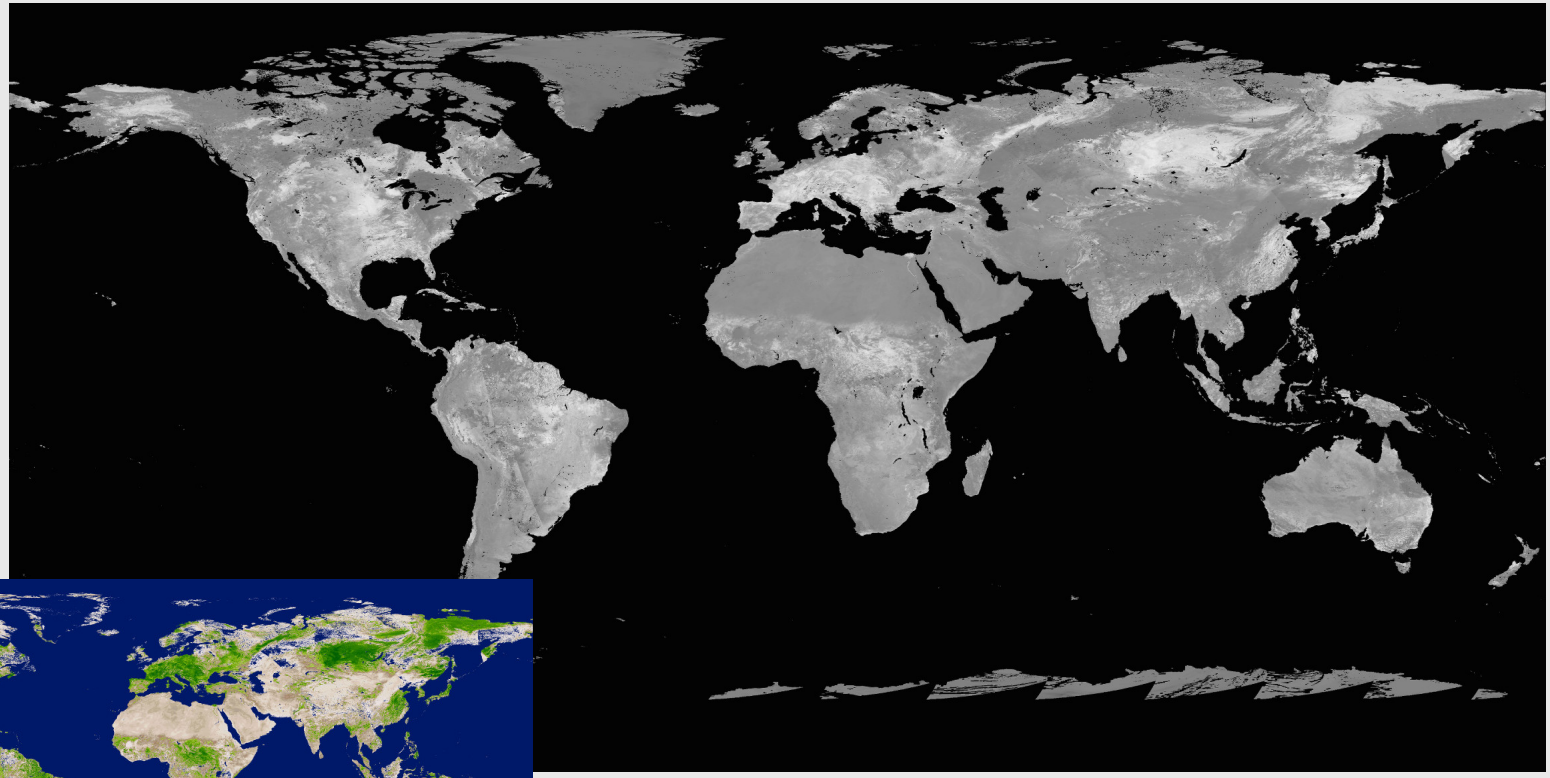
USGS EarthExplorer

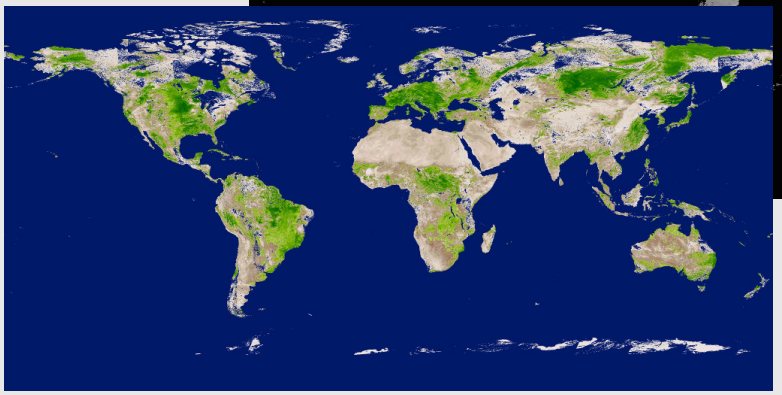
- An Overview
  - Primary data format served is GeoTIFF
  - Also serves data in other formats
  - Holdings include a wide variety of datasets of interest to their user communities (LIDAR, Radar, aerial photographs, …)
  - Includes some AVHRR and MODIS products (swath and grid)

NDVI CDR in EarthExplorer

- Initial Results
  - Transferred NDVI CDR netCDF files to USGS
  - USGS personnel generated 16-bit grayscale GeoTIFF images from each netCDF file for the NDVI, QA, and Time of Day variables
  - USGS personnel also generated NDVI browse images and ASCII metadata files for each netCDF file
  - netCDF files also available
  - Went online June 4, 2015
  - In the process of getting the browse images redone with an NDVI colormap

NDVI CDR in EarthExplorer





NDVI for 2010-08-21 from EarthExplorer GeoTIFF

Summary

- Obs4MIPs
  - Project complete
    - Cross-agency effort
    - Available to analysis community
  - Make use of existing data distribution points (ESG nodes)
  - Efforts are expandable to other NCEI datasets
  - Further reformatting is planned with new charter
- NDVI CDR @ USGS
  - Expand CDR user base to a different community
  - Great collaboration with USGS
  - Investigating other candidates

Backup Slides

WCRP Data Advisory Council

What role could WDAC play for Obs4MIPs?

- General oversight on the advancement of Obs4MIPs

  e.g., via annual updates to WDAC, similar to AMIP/CMIP panels established by the WGNE and WGCM to guide climate model intercomparisons.

WDAC establish an Obs4MIPs panel to:

- Ensure that datasets contributed to Obs4MIPs are appropriate for model evaluation
- Advance guidelines that are used to recommend, select and document the data
- Identify the highest priority observations for model diagnostics and evaluation
- Encourage additional contributions to Obs4MIPs and promote activity

WDAC Obs4MIPs panel membership and organization

- NASA volunteer to chair the group and provide some support for annual meetings, PCMDI volunteers continued support, membership and/or co-chair responsibilities
- Membership should consist of a mix of observation providers and model experts
- WDAC/WCRP to recommend members
- Obs4MIPs to report annually to WDAC and WMAC

Technical Note

Each Dataset has an accompanying Technical Note

Target audience is modeling and model-evaluation community members who often have little experience with the given dataset of interest.

Content

Intent of the Document/POC

Data Field Description

Data Origin

Validation and Uncertainty Estimate

Considerations for Model – Observation Intercomparison

Instrument Overview

References

Revision History