# Selected Activities Overseen by the WDAC

- Some background
- obs4MIPs
- ana4MIPs
- CREATE-IP (in planning stage)

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Data accessibility for Climate Model Intercomparions (MIPs):

- For CMIP3 (circa IPCC AR4) and earlier, data from CMIP and several other MIPs were centralized (at PCMDI)

- Since CMIP5, data is now distributed via the Earth System Grid Federation (**ESGF**)

- CMIP5 data ~5Pb
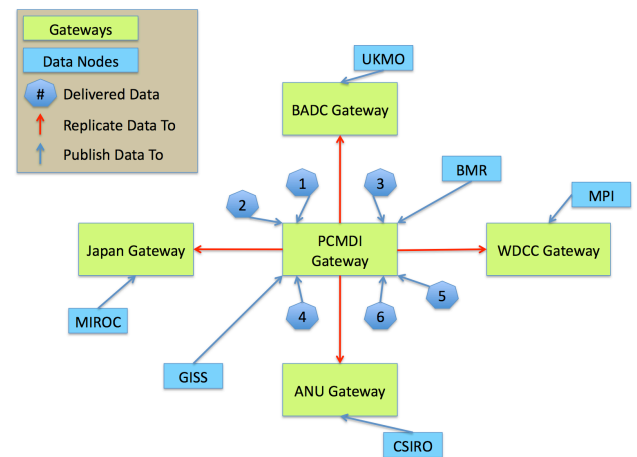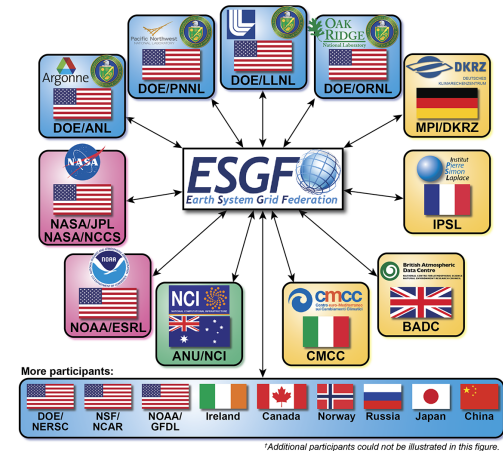
The conventions for **CF** (Climate and Forecast) metadata are used in the organization of all CMIP data

# Common goals of obs4MIPs, ana4MIPs and CREATE-IP*

- Making observational data and reanalysis more accessible for evaluation of CMIP class simulations
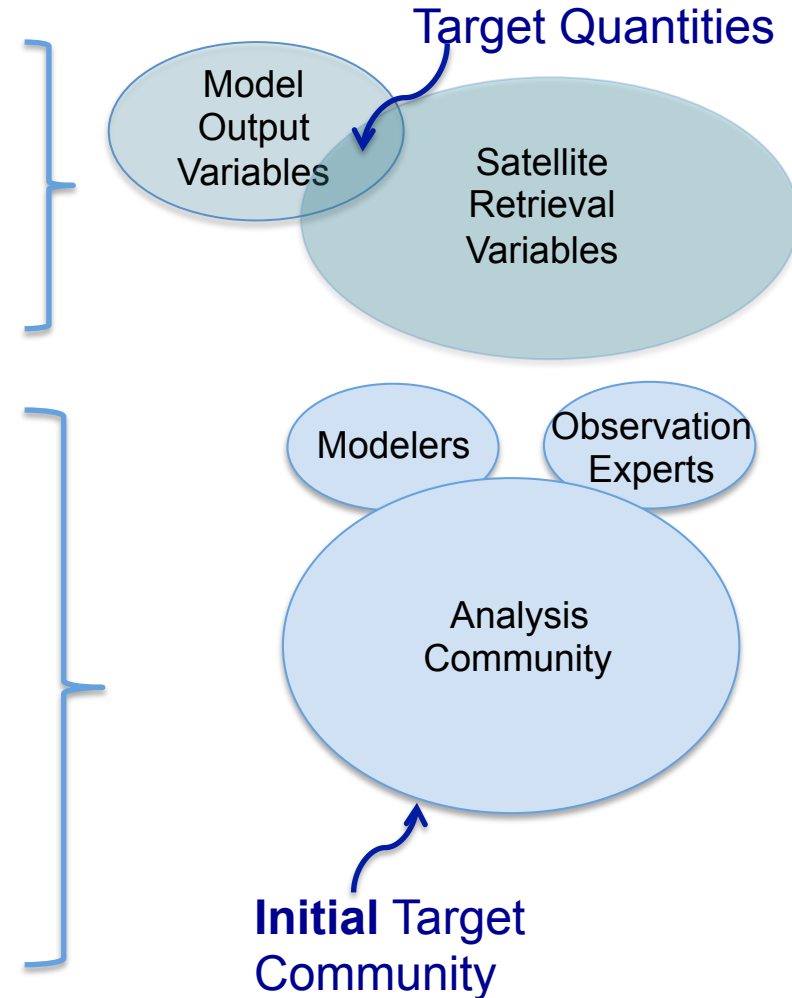
The data:
  - Match fields included in the CMIP5 standard model output
  - Technically aligned with CMIP data conventions
  - Available through the ESGF

- Provide high level data quality information of particular relevance to climate model evaluation

*CREATE-IP has additional goals to be discussed shortly

obs4MIPs: The 4 Commandments

Obs4MIPs

Target Quantities
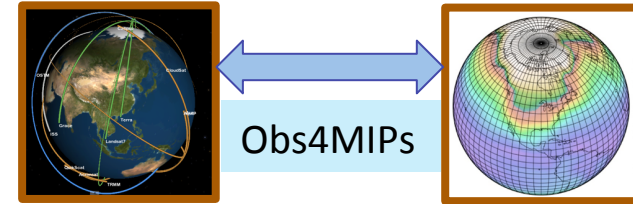
1. Use the CMIP5 simulation protocol (Taylor et al. 2009) as guideline for selecting observations.

Model Output Variables

Satellite Retrieval Variables

2. Observations to be formatted the same as CMIP Model output (e.g. NetCDF files, CF Convention)

3. Include a Technical Note for each variable describing observation and use for model evaluation (at graduate student level).

4. Hosted side by side on the ESGF with CMIP model output.

Modelers

Observation Experts

Analysis Community

Initial Target Community

…. **and growing!**

WCRP
World Climate Research Programme

obs4MIPs: Current Set of Satellite Observations

Sorted by CF Variable *Long Name*

Air Temperature
Ambient Aerosol Optical Thickness at 550 nm
CALIPSO 3D Clear fraction
CALIPSO 3D Undefined fraction
CALIPSO Clear Cloud Fraction
CALIPSO Cloud Fraction
CALIPSO High Level Cloud Fraction
CALIPSO Low Level Cloud Fraction
CALIPSO Mid Level Cloud Fraction
CALIPSO Scattering Ratio
CALIPSO Total Cloud Fraction
Cloud Fraction retrieved by MISR
CloudSat 94GHz radar Total Cloud Fraction
CloudSat Radar Reflectivity CFAD
Fraction of Absorbed Photosynthetically Active Radiation
ISCCP Cloud Area Fraction (Joint histogram of optical thickness and CTP)
ISCCP Mean Cloud Albedo (Cloud-fraction weighted & daytime)
ISCCP Mean Cloud Top Pressure (Cloud-fraction weighted & daytime)
ISCCP Mean Cloud Top Temperature (Cloud-fraction weighted & daytime)
ISCCP Total Cloud Fraction (daytime only)
Leaf Area Index
Mole Fraction of O3
Near-Surface Wind Speed
PARASOL Reflectance

Precipitation
Sea Surface Height Above Geoid
Sea Surface Temperature
Specific Humidity
Surface Downwelling Clear-Sky Longwave Radiation
Surface Downwelling Clear-Sky Shortwave Radiation
Surface Downwelling Longwave Radiation
Surface Downwelling Shortwave Radiation
Surface Upwelling Clear-Sky Shortwave Radiation
Surface Upwelling Longwave Radiation
Surface Upwelling Shortwave Radiation
TOA Incident Shortwave Radiation
TOA Outgoing Clear-Sky Longwave Radiation
TOA Outgoing Clear-Sky Shortwave Radiation
TOA Outgoing Longwave Radiation
TOA Outgoing Shortwave Radiation
Total Cloud Fraction
Water Vapor Path

obs4MIPs planning for CMIP6

Meeting held at NASA HQ in April 2014, structured to promote discussion between experts in model development and evaluation, and experts in satellite data products

Selected consensus recommendations that applied to all of the meeting topic areas:

- Expand the inventory of included datasets

- Include higher frequency data and model output. High frequency model output could be limited to an observationally-rich "golden period"

- Reliable and defendable error characterization/estimation of observations is a high priority, and obs4MIPs should press harder for the inclusion of these estimates as part of each dataset

- Include datasets in support of off-line simulators (prime example: COSP—Cloud Feedback Model Intercomparison Project [CFMIP] Observation Simulator Package)

- Collocated observations, including sparser in-situ datasets, are particularly valuable for diagnosing certain processes and their inclusion in obs4MIPs should therefore be encouraged

- Precise definitions of data products (what's actually being reported), including biases, and precise definitions of the model output variables are required. In some cases, it is not clear how closely the observations correspond to the model output, even though they have the same names and units

Data access and project connectedness

- ana4MIPs and obs4MIPs data are available through the CoG

- CoG is directly connected to ESGF

- CMIP6 is expected to be hosted on the CoG, as is CREATE-IP

Reanalysis for model intercomparison and more…

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Reanalysis for model intercomparison projects (Ana4mips)

- Collection of variables from selected major reanalysis efforts that are underway today

- Follow-on effort to obs4MIPs, supporting the CMIP model intercomparison and validation exercise.

- Each dataset is reformatted similarly to facilitate comparison with each other, observations and with the CMIP models

- Selected variables included directly in obs4MIPs

Purpose of ana4MIPs

- Provide data for CMIP evaluation that is not directly observable
- Selected variables with high potential for model evaluation
  - List is currently under consideration by obs4MIPs panel
  - Including, but not limited to monthly mean:
    - Standard CMIP5 pressure level Temperature, winds and geopotential height
    - 2m surface temperature and specific humidity
    - Mean sea level pressure and surface winds
  - Possibly some higher frequency data

Current reanalysis sources converted to the CMIP5 standard format

Name	Source	Time Range	Assimilation	Resolution Available
MERRA	NASA	1979-present	3D-VAR, with incremental update	2/3 lon x1/2 lat deg 3d Analysis and 2d variables; 1.25 deg 3d Diagnostics
ERA-Interim	ECMWF	1979-present	4D-VAR	0.75x0.75
CFSR	NCEP	1979-present	3D-VAR	.5x.5 and 2.5x2.5
JRA25	JMA	1979-present	3D-VAR	T106
JRA55	JMA	1958-2012	3D-VAR	1.25x1.25
20CR	NOAA/ESRL	1871-2012	Ensemble Kalman Filter	2x2

Currently transitioning to an expanded project

- The scope of ana4MIP limited
  - Variables
  - Levels
  - Temporal resolution
- In order to provide data for a reanalysis intercomparison – new project was envisioned

Collaborative REAnalysis Technical Environment – Intercomparison Project (CREATE-IP)

- Expanded reanalysis intercomparison
  - Up-to-date (annually if not monthly)
  - Monthly data
  - High frequency (1hr, 3hr, 6hr) for limited number of variables
  - All available levels
  - Include increments (O-A and O-F)
  - Include observations as available
  - Part of a total environment – science cloud, analytics, ontology, visualization, API
  - Interaction with reanalysis and outside user communities

Purpose of CREATE-IP

- Improve reanalyses and access
- Co-location and improved data discovery
- Common data formats
- Broader use by other communities
  - Biodiversity, water supply, agriculture, wind power, pandemics
- Uncertainty quantification - assessing appropriate use of reanalysis
  - Study inhomogeneity

Current Typical monthly averaged data holdings – expansion is underway

Current CREATE-IP Monthly Average Variables Available	
Air Temperature	Specific Humidity
Condensed Water Path	Surface Air Pressure
Convective Precipitation	Surface Downward Eastward Wind Stress
Eastward Near-Surface Wind	Surface Downward Northward Wind Stress
Eastward Wind	Surface Downwelling Longwave Radiation
Evaporation	Surface Downwelling Shortwave Radiation
Geopotential Height	Surface Temperature
Ice Water Path	Surface Upward Latent Heat Flux
Near-Surface Air Temperature	Surface Upward Sensible Heat Flux
Near-Surface Wind Speed	Surface Upwelling Longwave Radiation
Northward Near-Surface Wind	Surface Upwelling Shortwave Radiation
Northward Wind	TOA Incident Shortwave Radiation
Precipitation	TOA Outgoing Clear-Sky Longwave Radiation
Relative Humidity	TOA Outgoing Longwave Radiation
Sea Level Pressure	Total Cloud Fraction
Snowfall Flux	Water Vapor Path
	omega (=dp/dt)

WDAC oversight

- The WDAC has established a task team that provides guidance for obs4MIPs and currently also ana4MIPs

- A WDAC white paper is under discussion for the advancement of CREATE-IP

- It is anticipated that a second task team will be established for CREATE-IP (and its connections with ana4MIPs and obs4MIPs)