An update on obs4MIPs and CREATE

Peter J. Gleckler
LLNL/PCMDI

Both efforts strive to bring reference data closer to the CMIP model evaluation community

WDAC Observations for Model Evaluation Task Team (2016-2020)

Peter Gleckler, co-chair, PCMDI
Simon Pinnock, incoming co-chair, ESA replacing Duane Waliser (JPL)
Mike Bosilovich, GSFC/NASA
Helene Chepfer, IPSL
Carol Anne Clayson, WHOI
Veronika Erying, DLR
Robert Ferraro, JPL/NASA
Pierre-Phillipe Mathieu, ESA
Jerry Potter, GSFC
Roger Saunders, UKMO
Jörg Schulz, EUMETSAT
Karl Taylor, PCMDI
Jean-Noël Thépaut, ECMWF

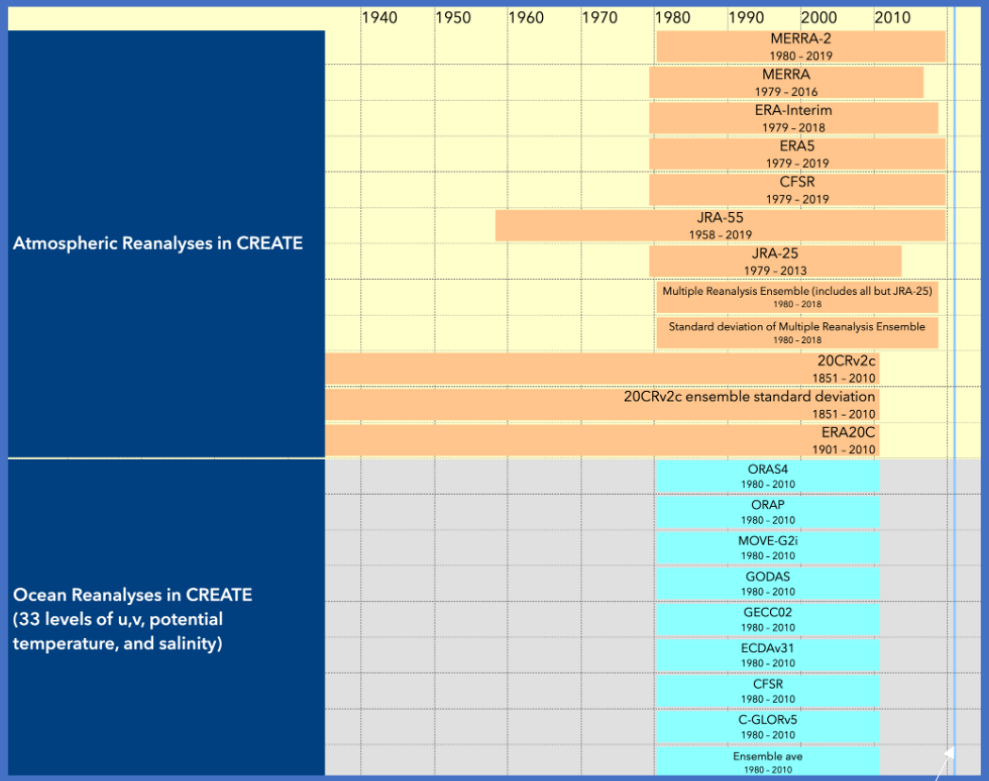
Additional regular contributors: Otis Brown, Michel Rixen
Tsengdar Lee (NASA) and Renu Joseph (DOE)
Luca Cinquini (JPL) – CoG technical support
Denis Nadeu (PCMDI) – CMOR development
Paul Durack (PCMDI) – Data specifications
Sophie Cloché (IPSL) – CFMIP archive
Jim Biard (NCEI) and Matthias Tuma (WCRP) – beta testers
… and many others

LLNL-PRES-1027981 This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under contract DE-AC52-07NA27344. Lawrence Livermore National Security, LLC. The efforts is supported by the Regional and Global Model Analysis (RGMA) program of the United States Department of Energy's Office of Science.

Collaborative Reanalysis Technical Environment (CREATE) Current Status

- Ana4MIPs is superseded by CREATE
- CREATE includes monthly and 6hr data for standard CMIP5 variables
  - Subset of daily precipitation
- Monthly multiple reanalysis ensemble (MRE3)
- Discontinued: JRA-25, MERRA, and ERA-Interim
- Other projects: monthly ocean reanalysis on the same grid

Available in ESGF and on NASA THREDDS server



Potter, G. L., Carriere, L., Hertz, J., Bosilovich, M., Duffy, D., Lee, T., & Williams, D. N. (2018). Enabling Reanalysis Research Using the Collaborative Reanalysis Technical Environment (CREATE), *Bulletin of the American Meteorological Society*, *99*(4), 677-687. https://journals.ametsoc.org/view/journals/bams/99/4/bams-d-17-0174.1.xml

Courtesy Jerry Potter

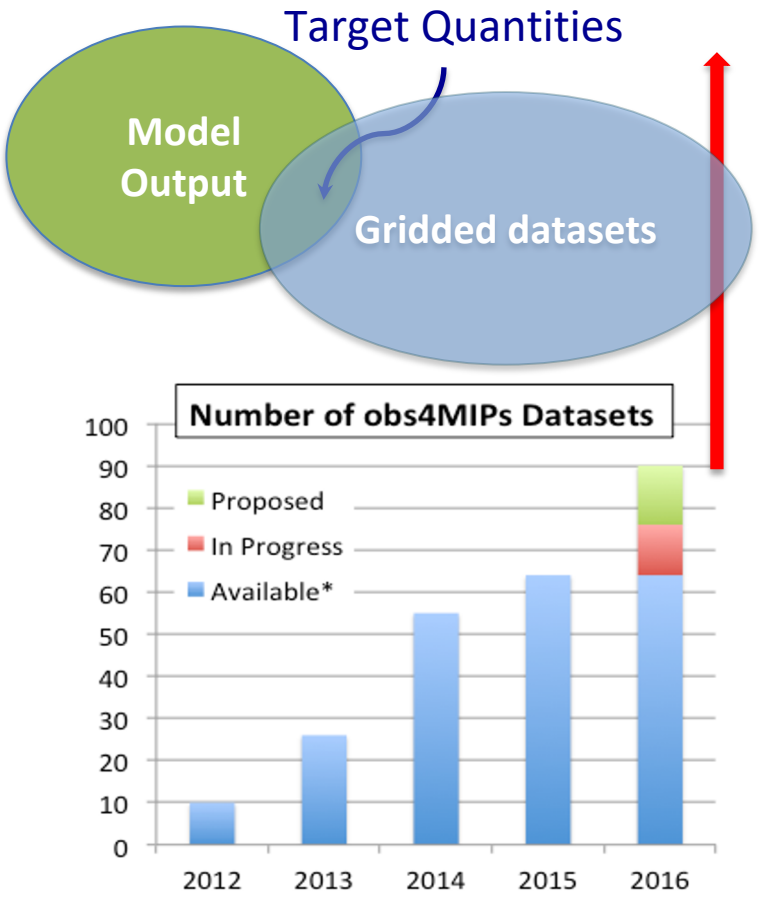
CREATE Future Plans

- Bi-annual updates of atmospheric reanalyses and MRE3 ensemble
- Improve automation for preparation of reanalyses
- Further research into the value of the ensemble
  - Produce set of ensembles minus each individual ensemble
  - Research paper in progress about values of multiple reanalysis ensemble
- Support for possible future coupled model reanalysis

obs4MIPs

https://www.earthsystemcog.org/projects/obs4mips

- A project for identifying, documenting and disseminating observations for climate model evaluation in WCRP model intercomparisons, notably CMIP.
- Data (and tech notes) accessible with the distributed CMIP model output via ESGF, adhering to same conventions
- Guided by the WCRP Data Advisory Council obs4MIPs Task Team



Progress in 2020

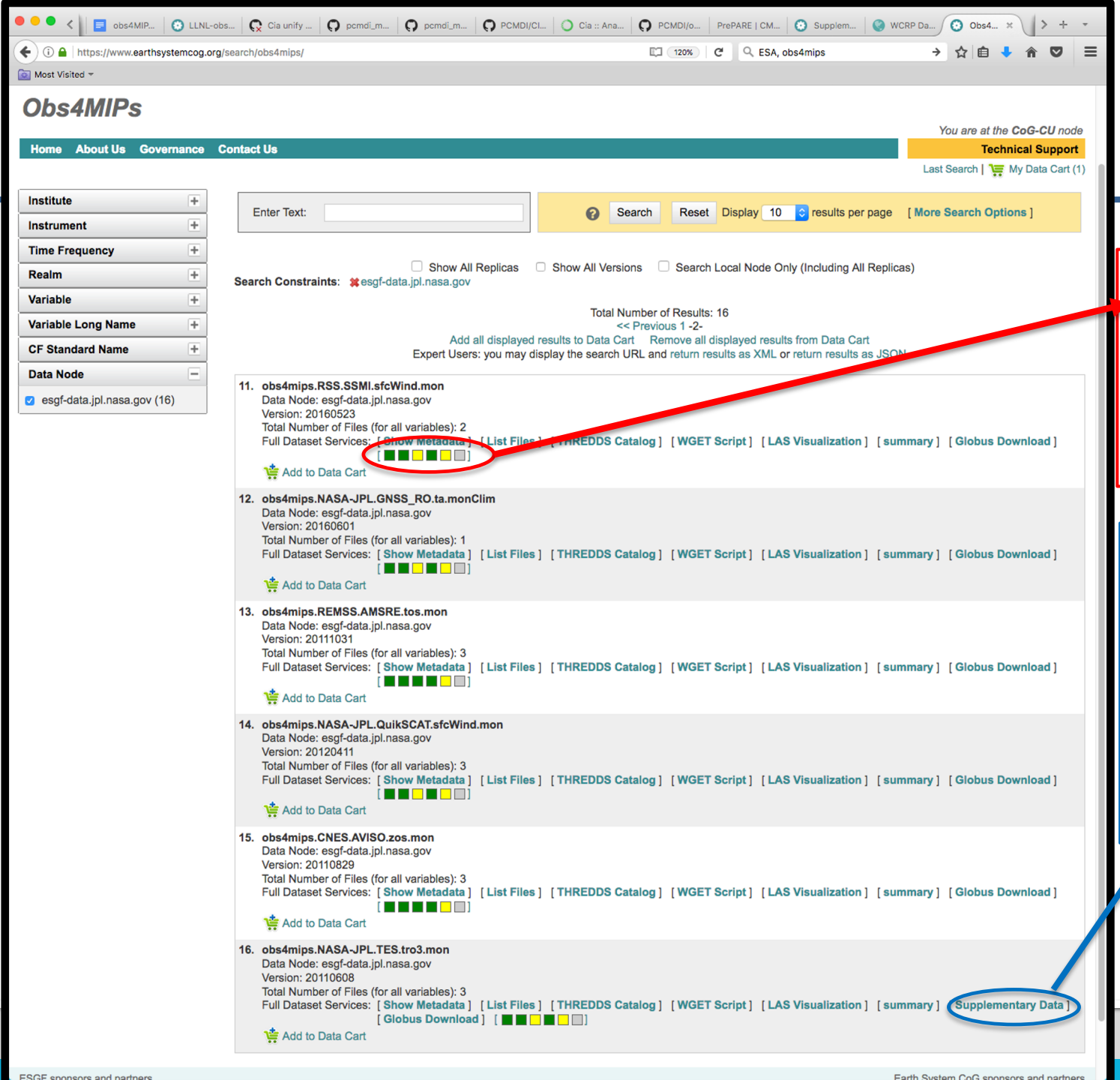
- Waliser et al: Obs4MIPs for CMIP6, GMD 13, 2945–2958, 2020 doi.org/10.5194/gmd-13-2945-2020
- Management of obs4MIPs metadata conventions now unified on Github and upgraded from python 2.7 to python 3
- Some NASA datasets updated on GSFC node
- Substantial progress advancing ESA CCI dataset preparation
- Several telecons with representatives from multiple agencies.

obs4MIPs Dataset Suitability & Maturity Indicators

Waliser et al., 2020

Enables us to expand what data gets included in obs4MIPs

Technical Requirements		***Dataset Suitability and Maturity***			***Comparison Complexity***
Meets obs4MIPs data technical requirements	Includes obs4MIPs technical note information	Closeness or robustness of measurement to observed reference quantity	Maturity with respect to climate model evaluation	Provision for robust uncertainty information	Complexity of Model Observation Comparison
Data suitably processed with CMOR and/or consistent with obs4MIPs standards	Complete technical note information provided	Measurement approach provides a very close relationship to observation quantity	Multiple peer-reviewed examples of application to climate model evaluation	Uncertainty information provided per retrieval/grid point	Comparison can be made directly with CMIP model output variable
Largely complete with minor metadata inconsistencies	Technical note information incomplete and/or could be improved	Measurement approach requires complex and/or non-linear retrieval methods and/or subjective inferences/definitions	One peer-reviewed example of application to climate or component model evaluation.	General uncertainty information given relative to the methodology and dataset as a whole - backed by actual field/in-situ validation exercises	Comparison requires some simple post processing of CMIP output variable(s) (e.g. vertical integral or ratio of two variables)
Non-compliant. Should be removed from database!	Technical note not provided	Measurement approach requires significant use/influence from complex or weakly constrained model and/or has significant ambiguity in definition(s)	No peer-reviewed xamples of application to model evlauation	No uncertainty information provided	**Comparison requires complex processing of CMIP output (e.g. "simulator", budget calculation)**



Color coded **suitability indicators** To be monitored by the task team

Supplemental Information is "free form", accessible from "best estimate" but not searchable independently

Prototyped with JPL data

7

Obs4MIPs Summary

- obs4MIPs was established with the expectation that like CMIP the work required (to prepare and publish datasets) would be distributed
- The effort to prepare/publish a single dataset is in most cases too onerous. This scales better with agency commitments, but it is still difficult and in any case is limiting

Despite setbacks, interest in obs4MIPs remains strong

- An effort to improve the process is being explored, involving centralizing processing codes into a unified github repository.
- NASA has expressed interest to contribute more data that is relevant to process-level studies (i.e., daily and sub-daily)
- A revitalization of the task team is in underway

Links to related material

- CMIP6 data specifications (google docs)
- obs4MIPs data specifications
- obs4MIPs tables controlled vocabulary (github)
- Climate Model/obs Output Rewritter, CMOR (website)