

TIRA Report to WDAC 8: Initial plan for Earth System Reanalyses Intercomparison and Evaluation

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With Input from the TIRA team

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Need for international collaboration regarding reanalyses

- WCRP Data Advisory Council (WDAC) generally organizes a regular (every 4-5 years) international conference on reanalyses
- WDAC reviews reanalyses activities at annual meeting
- Reanalysis.org is a grass roots community effort to provide a knowledge base for all things reanalysis
- Other than TIRA, GSOP considering ocean reanalyses, SRIP for stratosphere, and WGNE considers the data assimilation in atmosphere reanalyses
- However, reanalyses data play a role across the WCRP spectrum of panels and working groups

Main Objectives of TIRA

The primary charge to the TIRA is to **develop a reanalysis intercomparison group for WCRP** with the following objectives.

- 1) To foster understanding and estimation of **uncertainties in reanalysis** data by intercomparison and other means
- 2) To **communicate** new developments and best practices among the **reanalyses producing centers**
- 3) To enhance the **understanding of data and assimilation** issues and their impact on uncertainties, leading to improved reanalyses for climate assessment
- 4) To communicate the **strengths and weaknesses of reanalyses**, their fitness for purpose, and best practices in the use of reanalysis datasets by the scientific community

Objectives of the new *Group*

- Group – need to determine if it is a group, committee or panel AND a name (which should reflect what will be done)
- Provide a conduit between reanalysis developers and users to better understand and utilize the many forms of **Earth system** reanalyses
- Provide a resource for best practices and standards in reanalysis intercomparison and evaluation (maintaining **history/legacy** at *reanalysis.org*)
- Manage and guide reanalysis intercomparison projects and resources for WCRP science communities
 - May develop new projects or **collaborate** with WCRP communities to develop new projects
- Promote and encourage the use of reanalyses with the **diverse disciplines related to societal interests and needs, climate services and decision making**

Organization

- Membership – **NWP Centers** developing reanalyses, discipline specific community members (e.g. Ocean reanalysis), **WCRP panel** representatives, at-large scientific community members
 - 2-3 co-chairs, spread the work and meetings
 - 3 year terms, renewable but finite, to promote innovation and energy (may be challenging in a smallish community)
- Will manage projects, committee may also participate/lead
 - **Reanalysis Intercomparison Projects (RIPs)** for evaluating intercomparing various reanalyses
 - **Working Groups (WGs)** for addressing targeted issues or providing guidance or position statements

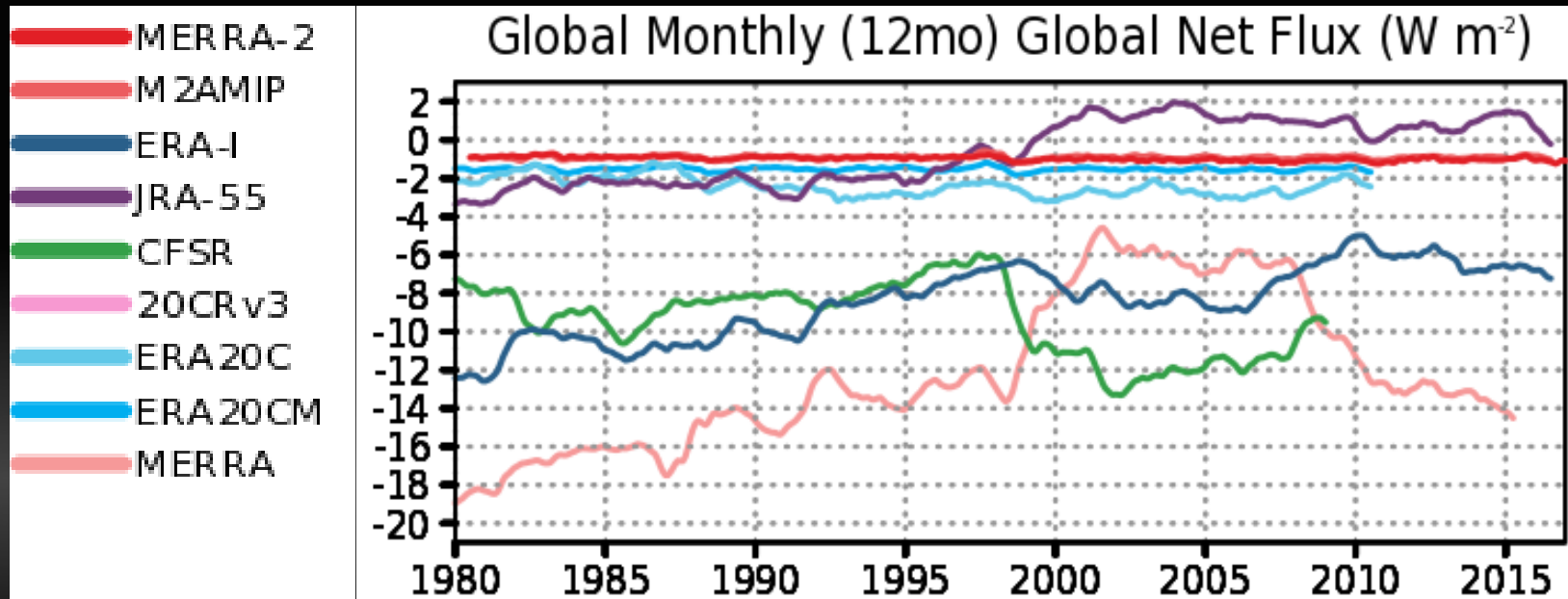
WCRP Implementation

- Regarding WCRP's new **strategic plan**, the organizational structure may be changing substantially
- Within the new Strategic Plan the proposed reanalysis group fits
 - Objective One, Fundamental Understanding of the Climate System (reanalyses as an observation-based tool for Earth System science)
 - Objective Four, Bridging Climate Science and Society
 - Critical Infrastructure through Simulation Tools, Observations and High-end Computing / Data Management
- TIRA proposal provides more details for consideration in the new implementation of WCRP

Pilot Intercomparison: Initial project

- At ICR5 (Rome, Nov 17) group discussion on next steps needed to define a WCRP Project for the Intercomparison of Reanalyses
- Document – develop a document that highlights best practices and terms of reference
- Somewhat more interest: Develop one (or more) **Pilot Intercomparison Project(s)** that some in the team can start, with a goal of real world experience interacting in group activities that have some direct affect on TIRA and the participants
- Regional Project - Precipitation
- Possible Global Topics
 - [1] Surface temperature
 - [2] **Ocean surface fluxes**
 - [3] **Precipitation**
 - [4] Radiation
 - [5] **Energy budget**
 - [6] **Water cycle**
 - [7] Surface Winds (Wind Energy)

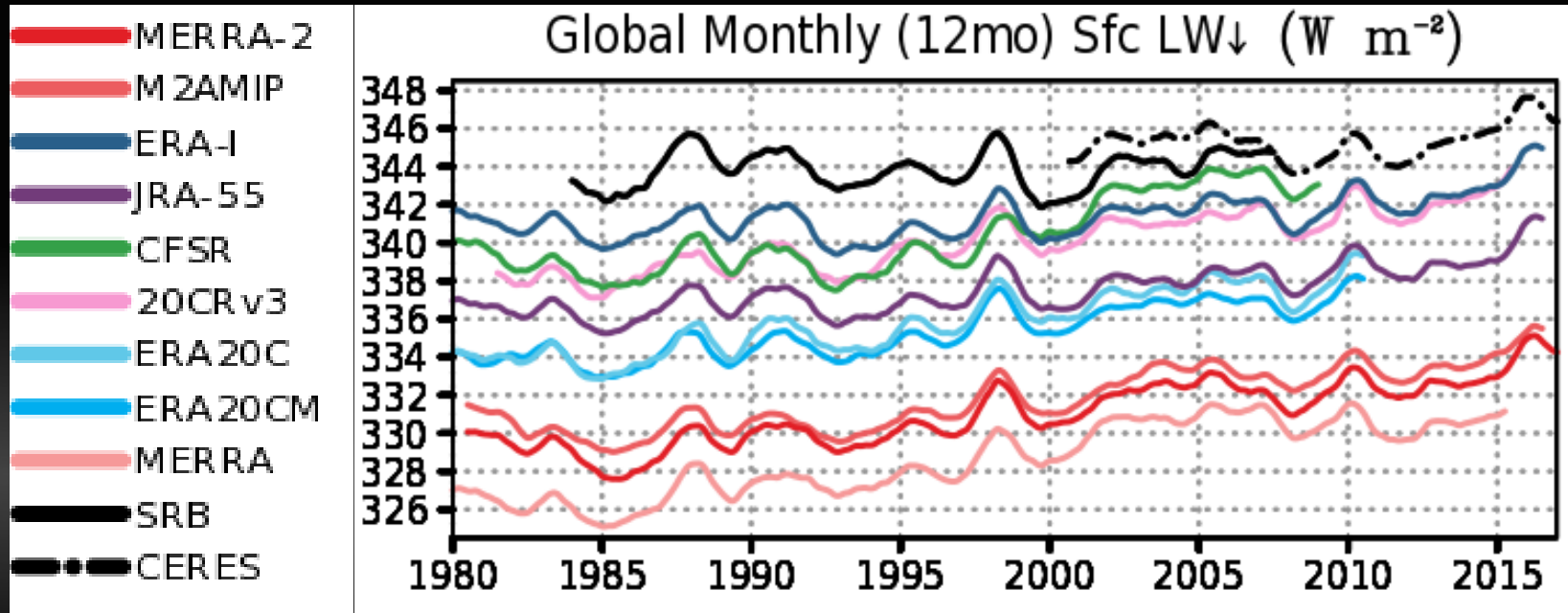
Energy Budget Pilot Study



Net Global Heating: TOA minus Sfc Net

- Model and Reduced observing reanalyses have smallest most consistent net atmospheric heating
- Changing observing system affects the energy budgets of all satellite data reanalyses
- Significant improvements going from MERRA to MERRA-2
- MERRA-2 includes the heating due to the analysis, adding that into the budget brings the net heating to nearly the same value as the MERRA-2 AMIP model.

Energy Budget Pilot Study



Downward Longwave Radiation at the Surface

- MERRA, MERRA-2 and M2AMIP use Chou Suarez radiation parameterization. This underestimates cloud effects, so the LW down is biased low. This is being addressed for future reanalyses.
- GEWEX Surface Radiation Budget - a new version is coming "soon"
- This is determined by the atmospheric temperature and cloud effect

Possible Initial Projects and Working Groups

- Earth System Reanalysis Intercomparison and Evaluation
 - Energy Budget: In collaboration with GDAP Global Energy observations
 - Collaborate with WGNE on their MJO Task Force (promising initial telecon)
 - Working Group on Intercomparison Data Systems (e.g. CREATE and WRIT)
 - Working Group on Climate Services, Decision Making and Applications
- Within the 10 years of this strategic plan, expect to see several Earth System Reanalyses produced

Thanks!

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<http://reanalyses.org/atmosphere/wcrp-task-team-intercomparison-reanalyses-tira>