
A CESM+DART Atmospheric Reanalysis for Forcing Ocean, Land, and Other Surface Models.

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Abstract

Ensemble reanalyses of the ocean, sea ice and land are crucially dependent on both the mean and variability of atmospheric forcing. An ensemble atmospheric reanalysis using the Community Earth System Model with the Data Assimilation Research Testbed generated a unique dataset of ensembles of surface fluxes and other variables required by non-atmosphere component models. These data can force reanalyses and hindcasts with CESM component models; CLM5 (land), CICE5 (sea ice), POP2 and MOM6 (ocean), MOSART (atmospheric chemistry), and CISM (land ice). They can also force non-CESM Earth system models. This presentation describes the generation and quality of the reanalysis and how to access and use the dataset for reanalyses with other models.

This reanalysis used a 1 degree CAM6-FV configuration of CESM to assimilate millions of observations per day for 2011-2019.

Data saved include 80-member ensembles of:

- 1) High-frequency atmospheric forcing for non-atmospheric models of CESM,
- 2) Weekly CAM6, CLM and CICE restart files,
- 3) 6 hourly prior estimates of the assimilated observations,
- 4) 6 hourly land model plant growth variables,
- 5) 6 hourly ensemble mean atmospheric analyses.

The reanalysis' ensemble spread and agreement with observations vary with atmospheric field, location, and time. These can be evaluated in great detail using 3), above.

This 120 Tb dataset has a combination of a large ensemble, high frequency, and multiyear time span providing opportunities for statistical analysis and use as a training dataset for machine learning.

It is freely available from the Research Data Archive at NCAR.

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