

Reanalysis at NCEP

Recent Developments, Current Efforts, Future Plans

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Representing EMC and CPC Staff, Contractors, and Visiting Scientists

At the Third WCRP International Reanalysis Conference in 2008, the previously conducted atmospheric reanalyses at National Centers for Environmental Prediction (NCEP) were reviewed, namely, the NCEP/NCAR Global Reanalysis (R1), NCEP/NCAR/DOE Global Reanalysis (R2) and North America Regional Reanalysis (NARR), as well as ancillary historical retrospectives. In a second presentation the latest NCEP reanalysis was presented, the Climate Forecast System (CFS) Reanalysis (CFSR), and was framed as a prerequisite as the initial conditions to the reforecast (hindcast) calibration for the replacement of the operational CFSv1. In the 4 years hence, the full CFSRR, i.e. Reanalysis and Reforecast, was completed, documented and the data streamed to the National Climatic Data Center (NCDC). The new CFSv2 became operational in April 2010 including a Climate Data Assimilation System (CDAS) based on CFSR and a new seasonal forecast model.

NCEP Climate Prediction Center (CPC) staff members have thoroughly evaluated the strengths and weaknesses of the atmospheric fields of CFSR as a climate reanalysis in comparison with R1, R2 as well as the Modern ERA Retrospective-Analysis for Research and Applications (MERRA), the European Centre for Medium-Range Weather Forecasts (ECMWF) Reanalysis - Interim (ERA-I), as well as the semi-coupled ocean compared to the CFSv1 predecessor Global Ocean Data Assimilation System (GODAS). Many of those evaluations will be presented at the conference, while others are available from previously held workshops and in reviewed publications.

One of the strengths of CFSR, its high temporal and spatial resolution, presents a challenge in remedying its identified weaknesses given the recent constricted computational environment. Accepting this constraint, we have developed a lower resolution T126 follow-up system to CFSR coined CFSRL(Lite). We negotiated and were granted dedicated resources on a National Oceanic and Atmospheric Administration (NOAA) shared research and development (R&D) system as a vehicle for our ongoing reanalysis development. The CFSRL will be described, and some of the remedial and development results will be presented, while complementary results will be shown by Environmental Modeling Center (EMC) and CPC colleagues. One of the key developments in CFSRL is the adoption of the CFSv2 seasonal prediction model as the data assimilation model.

One immediate plan is to develop CFSRL as a replacement for R1. The complications and challenges facing this goal will be outlined along with our current thinking on a path forward. Highlighted among these are the new landscapes of NOAA R&D computing, and recent developments in the operational Global Data Assimilation System (GDAS) that have implications for CFSRL and future reanalyses.

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