The NCEP Climate Forecast System Reanalysis (CFSR) was completed over the 31-year period of 1979 to 2009 in January 2010. The CFSR was designed and executed as a global, high resolution, coupled atmosphere-ocean-land surface-sea ice system to provide the best estimate of the state of these coupled domains over this period. The current CFSR will be extended as an operational, real time product into the future.

The CFSR relative to most, if not all, previous reanalyses include (1) coupling of atmosphere and ocean during the generation of the 6 hour guess field, (2) an interactive sea-ice model, and (3) assimilation of satellite radiances by the Grid-point Statistical Interpolation scheme over the entire period. The CFSR global atmosphere resolution is ~38 km (T382) with 64 levels extending from the surface to 0.26 hPa. The global ocean is 0.25^o at the equator, extending to a global 0.5^o beyond the tropics, with 40 levels to a depth of 4737m. The global land surface model has 4 soil levels and the global sea ice model has 3 levels. The CFSR atmospheric model contains observed variations in carbon dioxide (CO_2) over the 1979-2009 period, together with changes in aerosols and other trace gases and solar variations. With these variable parameters, the analyzed state will include estimates of changes in the Earth system climate due to these factors.

All available conventional and satellite observations were included in the CFSR. Satellite observations were used in radiance form and were bias corrected with "spin up" runs at full resolution, taking into account variable CO_2 concentrations. This procedure enabled smooth transitions of the climate record due to evolutionary changes in the satellite observing system.

CFSR atmospheric, oceanic and land surface output products are available at an hourly time resolution and 0.5^o horizontal resolution. This reanalysis will serve many purposes, including providing the basis for most of NCEP Climate Prediction Center's operational climate products by defining the mean states of the atmosphere, ocean, land surface and sea ice over the next 30-year climate normal (1981-2010) ; provide initial conditions for historical forecasts required to calibrate operational NCEP climate forecasts (from week 2 to 9 months); and provide estimates and diagnoses of the earth's climate state, over the satellite data period, for community climate research.

Preliminary analysis of the CFSR output indicates a product far superior in most respects to the reanalysis of the mid-1990s. The previous NCEP reanalyses have been one of the most used NCEP products in history; there is every reason to believe the CFSR will supersede these older products both in scope and quality, because it is higher in time and space resolution, covers the atmosphere, ocean, sea ice and land, and was executed in a coupled mode with a more modern assimilation system and forecast model.