
A synoptic to decadal evaluation of the 20th Century Reanalysis Version 3

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Abstract

The performance of a new historical reanalysis, the NOAA–CIRES–DOE Twentieth Century Reanalysis version 3 (20CRv3), is evaluated via comparisons with other reanalyses and independent observations. This dataset provides global, 3-hourly estimates of the atmosphere from 1806 to 2015 by assimilating only surface pressure observations and prescribing sea surface temperature, sea ice concentration, and radiative forcings. Comparisons with independent observations, other reanalyses, and satellite products suggest that 20CRv3 can reliably produce atmospheric estimates on scales ranging from weather events to long-term climatic trends. Not only does 20CRv3 recreate a “best estimate” of the weather, including extreme events, it also provides an estimate of its confidence through the use of an ensemble. Surface pressure statistics suggest that these confidence estimates are reliable. Comparisons with independent upper-air observations in the Northern Hemisphere demonstrate that 20CRv3 has skill throughout the twentieth century. The skill of analyzed 500-hPa geopotential heights from 20CRv3 for 1979–2015 is comparable to that of modern operational 3–4-day forecasts.

Keywords: reanalysis, sparse, input, surface pressure, synoptic, climate

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