

Feasibility of reanalysis before the radiosonde era

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We have investigated the feasibility of using surface pressure observations to create a daily analysis of the tropospheric circulation from the late 19th century to present. We have performed parallel assimilation experiments for November 2001-February 2002 using surface data at observational densities expected for 1893 to 1935. Three systems were compared: statistical optimal interpolation (OI), NCEP-NCAR reanalysis climate DAS (CDAS), and an ensemble square root filter (EnSRF). We have found that OI, using climatology as a first-guess, is extremely competitive with CDAS in the northern hemisphere, with both producing high-quality daily surface pressure fields in our test period. The CDAS is also able to produce realistic lower-tropospheric analyses through the model's dynamics. The EnSRF produces higher quality analyses of the lower troposphere than either OI or CDAS. Surprisingly, the EnSRF is also able to produce useful analyses of the large-scale flow up to 300mb using only surface pressure observations.