



Development of a 20th-century climate reanalysis at ECMWF

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As part of the EU-funded ERA-CLIM project, ECMWF is producing a new global atmospheric reanalysis spanning the entire 20th century. The purpose of this presentation is to describe the anticipated final product, the nature of the model and observations used, and some aspects of the data assimilation methodology.

Once complete, the ECMWF reanalysis of the 20th century (ERA-20C) will comprise gridded estimates of a comprehensive set of atmospheric parameters, at 3-hourly intervals for the period 1900-2010, at a global resolution of approximately 125 km and extending from the surface to the mesosphere. Information about uncertainties in the reanalysis, as a function of parameter, time and location, will be provided in the form of an ensemble of alternative reanalyses based on perturbed input data. The entire ERA-20C data set (approximately 1 petabyte) will be accessible via the internet by early 2014.

As a preliminary step, an ensemble of 10 climate integrations (ERA-20CM) was produced using the ECMWF forecast model supplied with 10 different but equally plausible estimates of global sea-surface temperature and sea-ice evolution, taken from the Met Office Hadley Centre's new HadISST2 product. The ensemble approach used in constructing the HadISST2 estimates is intended to represent a key aspect of uncertainty in the observed 20th-century climate. Additional boundary conditions and atmospheric forcing data for these climate integrations were specified as in Phase 5 of the international Coupled Model Intercomparison Project (CMIP5). Low-frequency variability of ERA-20CM temperature and humidity throughout the century is realistic, as compared with independent estimates from near-surface climate observations.

The ERA-20C reanalysis, currently in production at ECMWF, assimilates surface pressure and marine wind observations from the International Surface Pressure Databank (ISPDv3.2.6) and the International Comprehensive Ocean-Atmosphere Data Set (ICOADSv2.5). Early results indicate realistic representation of weather events, consistent with observations where available.