



Historical upper-air data rescue for a new 20th century atmospheric reanalysis

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The NCEP/NCAR and ERA-40 reanalyses are the two most widely used atmospheric datasets nowadays. However, both datasets span relatively short periods of about 60 and 40 years, respectively, too short to analyse climate variability on multidecadal time scales and to reliably assess climatic extremes with larger return periods. Additionally, the period covered by both reanalyses is considered to be already significantly influenced by anthropogenic climate change.

The EU FP7 project ERA-CLIM is planned to produce the input data for the first complete global atmospheric reanalysis back to 1900 assimilating all available upper-air observations (besides terrestrial and oceanic observations). Because the new reanalysis will produce states of the atmosphere which are physically consistent with all the additional upper level observations, it is expected to significantly improve the quality and consistency of the climate record of the 20th century.

Here, we present an overview of the data rescue activities performed at the Oeschger Centre for Climate Change Research in the framework of ERA-CLIM. These activities will take place in close coordination with ongoing data recovery work under the umbrella of the Atmospheric Circulation Reconstructions over the Earth (ACRE) project. A variety of new sources of upper-air data from the first half of the 20th century, additional to the 5.3 mio pre-1948 profiles already contained in the Comprehensive Historical Upper Air Network (CHUAN), have been looked up, catalogued, collected and photographed (with a focus on the Tropics, the southern hemisphere, and the early decades of the 20th century in general) and are now being digitised. These upper-air data comprise many wind observations from pilot balloons as well as temperature and pressure data obtained by registering balloons, kites and (from the early 30s on) the first radiosondes. They originate from all around the globe and include the aerological material from many scientific expeditions performed by various nations during the first half of the 20th century (e.g. to East Africa, the Russian Arctic, Greenland, Antarctica, the North and South Atlantic, ...), data from the Second International Polar Year (1932/33), early data from the observatory of Batavia (Jakarta), Indian upper wind data, and sources downloaded from the NOAA Central Library Foreign Data website. The latter consist mainly of weather reports from European countries and their former colonies in Asia and Africa, from South and Central America, and records from different observatories (e.g. Helwan, Egypt). The digitised data will be rigorously quality checked and possibly corrected (radiosondes) before being submitted to ECMWF for further processing. Finally, the assimilation process at ECMWF is expected to deliver estimates of potentially existing residual observational errors, resulting in a feedback for further quality improvement of the observational data. All observations collected for ERA-CLIM will be made available to existing public data archives coordinated by the Global Climate Observing System (GCOS) World Climate Research Programme (WCRP) working group on Observational Datasets for Reanalysis.