



Assessment of hydrological characteristics of ERA-40 and ERA-Interim reanalysis

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Precipitation and other elements of the surface hydrological budget from atmospheric reanalysis are very important to study long-term hydrological characteristics (eg. drought events).

The European Center for Medium-Range Weather Forecasts (ECMWF) ERA-40 is a set of global analyses describing the state of the atmosphere and land from mid-1957 to mid-2002. ERA-I is an "interim" reanalysis of the period 1989-present in preparation for the next-generation extended reanalysis to replace ERA-40. A key element of ERA-I is the availability of data in near-real time. The ERA-I period overlaps the earlier ECMWF 45 year re-analysis and both datasets provide 3-hourly information.

A recent observation-based product is the GPCC Full Data Reanalysis v4 dataset, a gridded monthly precipitation product at 0.5° resolution, is available for all months of the time period 1901-2007.

In order to obtain precipitation series of ERA-interim quality but starting in 1958, ERA-40 precipitation was rescaled to statistically match ERA-interim climate. Verification is performed with the help of GPCC precipitation. The new precipitation is based on rescaled ERA-40 data from 1958 to 1989 and on ERA-I reanalysis from 1989 to present. Systematic errors were removed via a multiplicative (seasonal) scaling factor based on the ratio of ERA-Interim monthly precipitation to ERA-40 (computed for the overlapping period).

ERA-40 and ERA-I are validated over the Iberian Peninsula, using high-resolution dedicated datasets produced by Meteorological Services of Portugal and Spain. Based on the dataset produced, Standardized Precipitation Index (SPI) values are computed to estimate drought characteristics, allowing for the computation of a global continuous drought index since 1958.

The precipitation dataset presented here will be part of a globally dataset of near-surface meteorological variables based on corrected ERA-40 (1958-1988) and ERA-I 1989-present. Such dataset can then be used to drive hydrological, ecological, and land surface models in stand alone mode and will allow long term analysis of hydrological processes such as droughts. The homogenized precipitation, on its own, can be used to produce a drought index (SPI) since 1958 with near real-time update.