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Assessment of ERA-20C reanalysis monthly precipitation totals on the basis of GPCC in-situ measurements

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The ERA-20C reanalysis was developed during the projects ERA-CLIM and ERA-CLIM2. These projects focus on multi-decadal reanalyses of the global climate system.

To ensure data quality and provide end users with information about uncertainties in these products, the 4th workpackage works on quality assessment of the products including quality control and error estimation.

This paper focuses on assessment of monthly precipitation. For that purpose the ERA-20C reanalysis is compared to the GPCC observational product “Full Data Reanalysis Version 7.0” The ERA-20C reanalysis was produced based on the ECMWF forecast model IFS model version Cy38r1 with a spatial resolution of about 125 km. It covers a one century time period. The surface forcings are the same as will be in the final product. The specialty of this run is that only surface observations are assimilated namely marine winds and pressure. This allows the comparison with independent, not assimilated data. This paper uses the monthly precipitation totals, which are not yet released.

The GPCC Full Data Reanalysis Version 7.0. comprises monthly land-surface precipitation from rain-gauges from 1901-2013. The resulting gridded data product is provided at 1° resolution. For further reading on methodology see Schneider et al., 2014.

For spatial and temporal evaluation of ERA-20C global scores temporal scores on monthly, seasonal and annual time scales are calculated. These include contingency table scores, correlation and differences in trend, along with spatial scores such as the fractional skill score.

Unsurprisingly regions with strongest deviations are those of data scarcity, mountainous regions with their luv and lee effects, and monsoon regions. They all exhibit strong biases throughout their series and severe shifts in the means. For these regions particular assessments are made to explain the deviations. In doing so also other climate variables shall be included to characterize the deviation conditions as comprehensive as possible.

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