Data set of key hydrological variables at hourly resolution for the development of hydrological models and data assimilation procedures for operational forecasts in the Rhine basin

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One of the difficulties in large-scale hydrological modeling and data assimilation is the acquirement of relevant in-situ measurements across the domain, especially in the case of basins spanning multiple countries. Luckily, more and more providers of data switch to an open data policy and make their measurements accessible to the research community. A number of cross-boundary data sets are available for the Rhine basin, such as the HYRAS dataset (Rauthe, 2013). However, these data sets are only available at daily resolution. Secondly, those data sets are produced off-line and therefore cannot be used in operational forecasting. Here we present a data set at hourly resolution which can also be maintained in near real-time.

We collected precipitation, temperature and discharge measurements at hourly or sub-hourly time-step from the different providers across the Rhine basin for the period 1990 – 2016. Due to the low density of stations reporting hourly in the early '90s we decided to preprocess the data from 1998 onwards. The precipitation measurements were interpolated using the REGNIE procedure (Weerts, 2008) and compared with the HYRAS daily precipitation product. Temperature measurements were interpolated using inverse distance interpolation after normalizing the measurements for height with a standard lapse rate. Then, a reference evaporation product was calculated from these temperature fields combined with gridded global radiation data from LSA SAF using the Makkink formula. The product was validated with FLUXNET measurements. The results have been stored together with the raw measurements and the discharge measurements in a Delft-FEWS database. The derived gridded products are also available as netcdf files.

Unfortunately, the database is not yet freely available as the data was obtained under several separate agreements on data usage. The derived gridded products are available upon request. Separate projects are underway to further validate, and where necessary improve, the methods used in constructing this data set for future versions.

Rauthe, M., Steiner, H., Riediger, U., Mazurkiewicz, A., Gratzki, A. 2013: A Central European precipitation climatology – Part 1: Generation and validation of a high-resolution gridded daily data set (HYRAS). Meteorologische Zeitschrift, 22(3), 235 256

Weerts, A.H., D. Meißner, and S. Rademacher, 2008. Input data rainfall-runoff model operational system FEWS-NL & FEWS-DE. Technical report, Deltares.