Geophysical Research Abstracts
Vol. 19, EGU2017-19027, 2017
EGU General Assembly 2017

Downscaling global precipitation for local applications – a case for the Rhine basin

Frederiek Sperna Weiland, Willem van Verseveld, and Jaap Schellekens
Deltares, Delft, Netherlands (frederiek.sperna@deltares.nl)

Within the EU FP7 project eartH_2Observe a global Water Resources Re-analysis (WRR) is being developed. This re-analysis consists of meteorological and hydrological water balance variables with global coverage, spanning the period 1979-2014 at 0.25 degrees resolution (Schellekens et al., 2016). The dataset can be of special interest in regions with limited in-situ data availability, yet for local scale analysis particularly in mountainous regions, a resolution of 0.25 degrees may be too coarse and downscaling the data to a higher resolution may be required. A downscaling toolbox has been made that includes spatial downscaling of precipitation based on the global WorldClim dataset that is available at 1 km resolution as a monthly climatology (Hijmans et al., 2005). The input of the down-scaling tool are either the global eartH_2Observe WRR1 and WRR2 datasets based on the WFDEI correction methodology (Weedon et al., 2014) or the global Multi-Source Weighted-Ensemble Precipitation (MSWEP) dataset (Beck et al., 2016).

Here we present a validation of the datasets over the Rhine catchment by means of a distributed hydrological model (wflow, Schellekens et al., 2014) using a number of precipitation scenarios. (1) We start by running the model using the local reference dataset derived by spatial interpolation of gauge observations. Furthermore we use (2) the MSWEP dataset at the native 0.25-degree resolution followed by (3) MSWEP downscaled with the WorldClim dataset and final (4) MSWEP downscaled with the local reference dataset.

The validation will be based on comparison of the modeled river discharges as well as rainfall statistics. We expect that down-scaling the MSWEP dataset with the WorldClim data to higher resolution will increase its performance. To test the performance of the down-scaling routine we have added a run with MSWEP data down-scaled with the local dataset and compare this with the run based on the local dataset itself.

- Beck, H. E. et al., 2016. MSWEP: 3-hourly 0.25° global gridded precipitation (1979–2015) by merging gauge, satellite, and reanalysis data, Hydrol. Earth Syst. Sci. Discuss., doi:10.5194/hess-2016-236, accepted for final publication.
- Hijmans, R.J. et al., 2005. Very high resolution interpolated climate surfaces for global land areas. International Journal of Climatology 25: 1965-1978.
- Schellekens, J. et al., 2016. A global water resources ensemble of hydrological models: the eartH_2Observe Tier-1 dataset, Earth Syst. Sci. Data Discuss., doi:10.5194/essd-2016-55, under review.
- Schellekens, J. et al., 2014. Rapid setup of hydrological and hydraulic models using OpenStreetMap and the SRTM derived digital elevation model. Environmental Modelling&Software
- Weedon, G.P. et al., 2014. The WFDEI meteorological forcing data set: WATCH Forcing Data methodology applied to ERA-Interim reanalysis data. Water Resources Research, 50, doi:10.1002/2014WR015638.