Identification of precipitation extremes from gridded data sources in the Hindukush-Karakoram-Himalaya region

*Wolfgang Bogacki[1], Michaela Kahl[2], Muhammad Fraz Ismail[1,3]

1. Department of Civil Engineering, Koblenz University of Applied Sciences, Germany, 2. Weinand Consulting Engineers, Kadenbach, Germany, 3. Chair of Hydrology and River Basin Management, Department of Civil, Geo and Environmental Engineering, Technical University of Munich, Germany

Snow- and glacier melt contribute to the major parts of annual flow volume in the rivers originating from the Hindukush-Karakoram-Himalaya mountain ranges, but occasionally extreme precipitation events especially during monsoon season may lead to severe and devastating floods as e.g. the 2010 flood in the Indus river or the 2014 flood in Jhelum river. For the skill of hydrological flow forecast models, an appropriate spatial representation of high precipitation events with at least daily resolution is essential. Major obstacles in obtaining proper information on daily precipitation distribution from climatological stations in high altitude mountain ranges are the usually the sparse data network, their typical location at the valley bottoms and the morphological variability of the terrain that makes a straightforward spatial interpolation highly unreliable. Gridded precipitation products from different sources like satellite based precipitation estimates, global climate models, or station based datasets that i.e. consider orographic effects, are promising alternatives.
The present study compares gridded daily precipitation data from different sources like RFE, TRMM, CMORPH remote-sensing estimates, JRA-55 and ERA-INTERIM re-analysis results, and the APHRODITE datasets with climate station data from the Upper Chenab catchment and parts of the Upper Indus Basin. Special focus is laid on the identification of extreme precipitation events but also monthly and annual averages are evaluated both at the climate stations and for the catchments.
First results show, that probability of detection and equitable threat score directly compared to station data is, not surprisingly, best for the APHRODITE data-set, followed by the RFE South and Central Asia products. Regarding annual means on catchment level however, the RFE products do reflect the best correlation in terms of average precipitation depth, while the other datasets tend to underestimate the annual precipitation.

Keywords: Extreme Precipitation Events, Hindukush-Karakoram-Himalaya, APHRODITE , RFE, TRMM, ERA-INTERIM

