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Lessons learnt from quality-checking observed and simulated river flow data worldwide

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Advances in open data science serve large-scale model developments and, subsequently, hydroclimate services. Local river flow observations are key in hydrology but data sharing remains limited due to unclear quality, or to political, economic or infrastructure reasons. This presentation provides methods for quality checking openly accessible river-flow time series. Availability, outliers, homogeneity and trends were assessed in 21 586 time series from 13 data providers worldwide. We found a decrease in data availability since the 1980s, scarce open information in southern Asia, the Middle East and North and Central Africa, and significant river-flow trends in Africa, Australia, southwest Europe and Southeast Asia. We distinguish numerical outliers from high-flow peaks, and integrate all investigated quality characteristics in a composite indicator.

Some 5338 gauges from these river flow time series (> 10 years) were used in the evaluation of the Worldwide-HYPE (WWH) hydrological model at the global scale (half for calibration and half for independent validation), resulting in a median monthly KGE of 0.4. However, WWH performance varies widely spatially and with the target flow signature. The model performs best (KGE > 0.6) in Eastern USA, Europe, South-East Asia, and Japan, as well as in parts of Russia, Canada, and South America. It also shows overall good potential to capture flow signatures of monthly high flows, spatial variability of high flows, duration of low flows, and constancy of daily flow. Nevertheless, there remains large potential for model improvements and we suggest both redoing the parameter estimation and reconsidering parts of the model structure for the next WWH version.

References:

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