



Global trend and drought analysis of near-natural river flows: The ROBIN Initiative

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With hydrological extremes becoming more frequent and intense in a changing world, the impact on livelihoods, infrastructure, and economies is crucial. River flow data is a valuable resource and can be used to understand and analyse trends in both flow and extreme events. It is essential to systematically examine trends and anomalies within river flow across the globe. To capture the true natural trends, the river flow data should be from natural catchments and free from anthropogenic influences, such as the construction of dams, alterations in land use, and extraction of water from rivers. Special attention must be directed towards delineating these factors to enhance our understanding of the complex dynamics governing river systems.

Existing challenges in attributing trends in river flows to climate change demands for a comprehensive, worldwide Reference Hydrometric Network (RHN) with minimal human impacts, to ensure integrity of climate change signals in river flow data. This global initiative, the Reference Observatory of Basins for INternational hydrological climate change detection (ROBIN) is a global collaboration to bring together the first global RHN. Currently consisting of partners from almost 30 countries spanning every continent, the first iteration of the ROBIN dataset is now available – a consistently defined network of over 3,000 near-natural catchments.

The ROBIN team estimated the first truly global analysis of trends in river flows using near-natural catchments for periods of 40 (1975-2016) and 60 (1956-2016) years. This research showcases the first global drought assessment using the subset of ROBIN network, investigating variations in river flow trends and their impact on drought events, and trends at a global scale. The research focused on the spatial and temporal variability of trends and drought characteristics in different countries and hydro-belts across the ROBIN network. It also shows the great potential of serving as benchmark for future hydrological trend assessments.

Efforts are ongoing to broaden the ROBIN network to bring together more countries, incorporating additional catchments representing diverse geographical characteristics. With the

support of international organizations such as WMO, UNESCO, and IPCC, ROBIN establishes the groundwork for a sustainable network of catchments, enabling comprehensive assessments of climate-induced trends, variability, and occurrences of drought on a global scale. This initiative makes a substantial contribution to enhancing our understanding of the impact of climate change on river flows and the corresponding global patterns of drought.