

## Hydrometeorological monitoring of transboundary basins through multi-source precipitation datasets: assessments and extreme events characterization

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Multi-source quantitative precipitation estimates and forecasts (QPE and QPF), as part of integrated spatial hydrological monitoring systems, have substantially enhanced our understanding of the spatio-temporal structure of recent floods and drought episodes, which tend to intensify and become more frequent due to climate change. High resolution gridded-based precipitation products (e.g., satellite-based, reanalysis, models) play a crucial role by providing long-records and short-latency observations of the physical origin of those extreme episodes. In this sense, low earth orbit and geostationary satellite missions contribute to the expansion of our ability to understand the dynamics of different precipitation systems (e.g., MCS) in the formation of precipitation, especially those that trigger extreme floods. Short and medium range forecasts (e.g., ECMWF IFS/AIFS versions and GFS numerical models), as well as distinct future climate scenarios (e.g., GFDL model), can provide a great support to various actors, for instance, providing important information to local communities and regional basin centers/agencies, as well as to decision makers. However, substantial and continuous efforts are still required, especially in regions with a significant lack of surface measurement data and that are routinely affected by extreme events (e.g., Amazon, west and central Africa). In this regard, artificial intelligence/machine learning techniques and new approaches based on microwave links (from Rain Cell [Rain Measurement from Cellular network] project-initiative) has been a valuable manner of providing near-real-time information, especially over urban centers, in complementarity with radars and EO-based QPE. Therefore, regional analyses, for instance focusing on transboundary basins, are a great opportunity for local and regional agencies to better understand and accompany particular events, especially the extremes, as well as preparing them for different future scenarios, taking into account the role of climate change. We present an overview of our operational and research activities with a focus on the precipitation-discharge simulation experiments over different transboundary basins, by revisiting recent impactful extreme hydrometeorological events, such as over Niger and French Guyana basins.