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Hydroclimatic variability in West and Central Africa by mid-21st Century

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Climate warming is expected to significantly impact hydrological systems, through changes in rainfall, temperature and evapotranspiration over West and Central Africa. Understanding these changes over this part of the world, where surface water is fundamental for economic activity and ecosystem services, is of paramount importance. In this study, we investigate the main modes of hydroclimatic variability and the potential impacts of climate change on water resource availability by the mid-21st century in West and Central Africa.
Climate simulations from the Rossby Centre Regional Climate model (RCA4) driven by 9 Global Climate Models available within the CORDEX initiative are evaluated and bias corrected using a nonparametric trend preserving quantile mapping approach. We then make use of two conceptual hydrological models (GR2M and IHACRES) and a regression-based model built upon multi-scale sea surface temperatures and streamflow teleconnections to understand hydrological processes at the subcontinental scale and provide future hydrological predictions for the near-term (2020-2050) under RCP45 emission scenario.
The results highlight a zonal contrast in future precipitation between western (dry) and eastern (wet) Sahel and a clear signal of increasing potential evapotranspiration induced by rising temperatures for all models. Overall mild ($\pm$5%) changes in discharge are expected by mid-21st century over the region with however high uncertainties reported over most of Central Equatorial Africa inherent to climate model scenarios and observation datasets quality.