HISAR: Hydrologic Indices of South American Rivers

Larissa Ribeiro[1], Rodrigo Paiva[2], Walter Collischonn[3], Mino Sorribas[4], and Leonardo Paul[5]
[1]Instituto de Pesquisas Hidráulicas (IPH), Universidade Federal do Rio Grande do Sul (UFRGS), Porto Alegre, Brazil
(larissa.ribeirocr@gmail.com)
[2]Instituto de Pesquisas Hidráulicas (IPH), Universidade Federal do Rio Grande do Sul (UFRGS), Porto Alegre, Brazil
(rodrigo.paiva@ufrgs.br)
[3]Instituto de Pesquisas Hidráulicas (IPH), Universidade Federal do Rio Grande do Sul (UFRGS), Porto Alegre, Brazil
(collischonn@iph.ufrgs.br)
[4]Instituto de Pesquisas Hidráulicas (IPH), Universidade Federal do Rio Grande do Sul (UFRGS), Porto Alegre, Brazil
(mino.sorribas@gmail.com)
[5]Instituto de Pesquisas Hidráulicas (IPH), Universidade Federal do Rio Grande do Sul (UFRGS), Porto Alegre, Brazil
(leonardorpaul@gmail.com)

Effective water resources management for environmental conservation requires a proper understanding of the behavior of rivers. Rivers can be understood through the analysis of the flow regime synthesized by hydrologic indices. While the density of in situ river observation networks is heterogeneous across several continents, such as South America, recent advances in continental scale hydrologic modeling bring new opportunities for systematic characterizations over large domains. We build the HISAR (Hydrologic Indices of South American Rivers) dataset to study the natural flow regime of South American rivers. It is composed of 73 hydrological indices computed from observed and modeled discharge datasets. We evaluated the performance of the continental-scale hydrological model (MGB, Modelo de Grandes Bacias), comparing the hydrological indices computed from modelled and observed discharges. The results allow the identification of patterns in the flow regime of rivers and evidence relationships between climate and hydrology and between different indices. The indices of modelled discharges regarding magnitudes had more agreement with indices of observed data (e.g., mean flow and runoff ratio), while indices representing temporal variability were more different. Despite the disagreement of some indices (baseflow recession constant, hydrograph skewness, and number of hydrologic reversals), the simulated discharges dataset can be utilized in hydrologic indices for understanding rivers' flow regimes and behaviors on a continental scale. The relative error median modulus varied from approximately zero to 99.4%, with a mean of 15.4%. The HISAR dataset is freely available at https://doi.org/10.5281/zenodo.7296577.