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Global hydro-environmental catchment and river reach characteristics at high spatial resolution

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Hydrologic researchers, water managers, governments, and conservation organizations around the world face the challenge of developing innovative strategies to alleviate increasing pressures on freshwater resources. Many of these approaches and solutions require large amounts of data describing catchment and river characteristics at large scales, from regional to global, encompassing major river basins or multiple countries which may suffer from incompatible or differing data conventions among them. Seamless global hydrological data can provide a consistent and homogeneous coverage that allows for standardized analyses, and can establish baseline information in remote areas where little monitoring is available yet stakeholders need to address urgent issues in a timely manner.
To enhance global spatial coverage and standardization of catchment and river reach information, we here introduce the HydroATLAS database. HydroATLAS provides a single comprehensive, consistent and organized, fully-global data compendium that gathers and presents a wide range of hydro-environmentally relevant characteristics at both sub-basin and river reach scales at high spatial resolution. The hydro-environmental attributes are compiled from publicly available data sources and are organized in six categories: hydrology; physiography; climate; land cover & use; geology & soils; and anthropogenic influences.
Version 1.0 of HydroATLAS offers a total of 271 individual attributes grouped in 51 attribute classes. At the sub-basin scale, the information is associated with catchment polygons offered at 12 levels of nested subdivisions; at the highest level of subdivision HydroATLAS contains 10.4 million sub-basins with an average area of 130.6 square-km, representing all global land areas (excluding Antarctica). At the river reach scale, HydroATLAS encompasses information for 8.5 million line segments with an average length of 4.2 km, representing a total of 35.9 million km of rivers globally.
HydroATLAS creates novel opportunities for large-scale model-based hydrological analyses or multi-variable statistical assessments of catchment and river characteristics. It is expected to be particularly useful in remote or data-poor areas. In a first application, a global river reach classification was produced which differentiates 127 river types globally.