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Synchronising data sources and filling gaps by global hydrological modelling

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The advances in remote sensing in the last decades combined with the creation of different open hydrological databases have generated a very large amount of useful information for global hydrological modelling. Working with this huge number of datasets to set up a global hydrological model can constitute challenges such as multiple data formats and big heterogeneity on spatial and temporal resolutions. Different initiatives have made effort to homogenize some of these data sources, i.e. GRDC (Global Runoff Data Center), HYDROSHEDS (SHuttle Elevation Derivatives at multiple Scales), GLWD (Global Lake and Wetland Database) for runoff, watershed delineation and water bodies respectively. However, not all the related issues are covered or homogenously solved at the global scale and new information is continuously available to complete the current ones.
This work presents synchronising efforts to make use of different global data sources needed to set up the semi-distributed hydrological model HYPE (Hydrological Predictions for the Environment) at the global scale. These data sources included: topography for watershed delineation, gauging stations of river flow, and extention of lakes, flood plains and land cover classes.
A new database with approximately 100 000 subbasins, with an average area of 1000 km2, was created. Subbasin delineation was done combining Global Width Database for Large River (GWD-LR), SRTM high-resolution elevation data and a number of forced points of interest (gauging station of river flow, lakes, reservoirs, urban areas, nuclear plants and areas with high risk of flooding). Regarding flow data, the locations of GRDC stations were checked or placed along the river network when necessary, and completed with available information from national water services in data-sparse regions. A screening of doublet stations and associated time series was necessary to efficiently combine the two types of data sources. A total number about 21 000 stations were considered as forced point. In the case of lakes, some updating relating with location and area, of GLWD was done using esa (European Space Agency) gridded water bodies dataset. Many of the original lakes were shifted in relation with topography and some of them change their extension since the creation of the database. Moreover, the location of the outlet of all these lakes was also calculated. A new definition of global floodplain areas was also included. The land covers provided by ESA and some elevation criteria were used to define elevation land classes (ELC) using for the definition of the properties of each one of the proposed subbasin.
All these new features: a) the inclusion of river width in the delineation of the subbasin, going further in the consideration of river shape; b) the merging of several data bases of gauging stations of river flow into an extended global dataset; c) coherent location of the lakes, river networks and floodplains; and d) a new definition of hydrological response units also considering elevation of the subbasins, will contribute to a better implementation of global hydrological models. The first results of world-wide HYPE will be shown but the model will yet not be fully calibrated using multi-sources of observed data and information. The ambition is to receive a global scale model which can also be useful at local scales. Starting with the global picture and then going into the details.