Global data for local applications: how useful are global data for river basin modelling?

G. Sterk[a], P. Lopez Lopez[a], S. Moges[b], M. Karrou[c]

[a] Utrecht University, Dept. of Physical Geography, Utrecht, The Netherlands
[b] Addis Ababa Institute of Technology, Addis Ababa, Ethiopia
[c] International Centre for Agricultural Research in the Dry Areas (ICARDA), Rabat, Morocco
Email: g.sterk@uu.nl

Abstract:

Many countries lack information about the water resources, which is especially the case in developing countries. The EU-funded project eartH2Observe is trying to gather, improve and provide better hydrological information, especially for areas that are poor in in-situ hydrological data. This is done by combining Earth Observation (EO) data with global hydrological modelling. The aim of the project is to develop a 30-year global Water Resources Re-analysis (WRR) database, and make it freely available through its data portal. In March 2015 the project has released the Tier 1 Water Resources Re-analysis, which provides all components of the water cycle at daily resolution and 0.5° global spatial scale. In one of the work packages of the project it is tested how useful the eartH2Observe data are for basin scale water resources assessments. Specific case studies were initiated in eight different countries (Colombia, Morocco, Spain, Estonia, Ethiopia, Australia and New Zealand) with a variety of climates, topography, soils, land use and water resources. In each case study there is close collaboration with end-users. At the start of the project a series of workshops was held to identify hydrological problems and needs of those end-users. This has resulted in a variety of basin scale problems to be studied in the different case studies. The ultimate goal of the case studies is to evaluate the added value of the EO and WRR data from the eartH2Observe project to solve these problems and help the end-users with the national water management.

In this presentation the first results of basin scale applications of the eartH2Observe data will be presented. The examples are from three case studies with variable amounts of available in-situ hydrology data. Results from the Australia case study are representative for a data rich country. Several models with global as well as local forcing have been run for the Murrumbidgee basin to quantify river discharges. The best results were obtained when in-situ data were used as input to a locally calibrated hydrological model. Using the PCR-GLOBWB model with global forcing data resulted in a poor performance, which only improved when assimilation of discharge and EO soil moisture data was used. The second example is from the Upper Blue Nile basin of Ethiopia, where there is some in-situ data available, but also a general lack of accurate rainfall data. The CREST model was used for a sub-basin, and forced with both in-situ rainfall data and satellite derived rainfall products. The results showed that the model forced with global rainfall data reproduced the shape of the hydrograph reasonably well, but that the volumes of runoff as well as the peak discharges are underestimated. The third example comes from the Moroccan case study, where there are almost no in-situ measurements available. Two models, SWAT and PCR-GLOBWB, were used to simulate discharge in the Oum Er Rbia basin. The models were forced with the eartH2Observe forcing data and with data from a WMO database (GSOD). Model results were compared and showed some similarities and also discrepancies between simulated runoff amounts. Two main problems for hydrological modelling is the lack of climatic data in the higher part of the basin (Atlas Mountain range), and the many reservoirs in the basin. SWAT is capable of simulating reservoirs, but needs information about the actual operation of the dams.

Apart from the first results in the three case studies, the presentation will also highlight the wishes of the end-users in the case studies. It will be shown how the eartH2Observe project will try to assist these end users, but also make clear some of the discrepancies that exist between hydrological scientists and water managers.

Keywords: *eartH2Observe, global hydrological data, river basins, modelling, end-users*