New tool to share data and models in hydrological forecasting, based on the ESA TEP

David Gustafsson (1), Jafet Andersson (1), Fabrice Brito (2), Bernat Martinez (3), and Berit Arheimer (1)

(1) Swedish Meteorological and Hydrological Institute (SMHI), Norrköping, Sweden (berit.arheimer@smhi.se), (2) Terradue, Roma, Italy, (3) IsardSat, Barcelona, Spain

The ESA Thematic Exploitation Platform (TEP) provides a shared virtual environment for finding and using Earth Observation data. So far, it has been set-up for a number of societal sectors with pilots in different regions across the globe. The TEP for Hydrology (Hydro-TEP) brings together a heterogeneous community of scientific users, river basin organisations and service providers. The aim of this community is to exchange data, services and knowledge through a common collaboration framework. The Hydro-TEP provides customised hydrology services based on EO data. Examples of these services are flood mapping/forecasting, water quality and level monitoring, hydrology modelling and small water bodies mapping based on EO data.

This poster will describe the Service on Hydrological forecasting, which provides a platform for assimilation of EO data in hydrological models. It includes processing services for running a hydrological model in hindcast and forecast mode with or without satellite and in-situ data assimilation, accessing meteorological data from external data services, preparing EO data for assimilation in the hydrological models, basic visualization and statistical analysis of model results.

The pilot of the Hydrological Modelling Application is co-designed with users in West Africa and implemented using the Niger-HYPE (Andersson et al. 2017a,b) model (v2.21) providing simulations of river discharge, lake water level and outflow, as well as land surface water balance components (precipitation, evapotranspiration, runoff, and soil water content) for the Niger river basin. The HYPE model code is available as open source at http://hypecode.smhi.se. The service collects meteorological forcing data from the Hydrological Global Forcing Data (Berg et al., 2017), which is based on bias adjusted ERA products ad forecasts from ECMWF. The pilot includes simulations of historical periods from 1979 until current time, and short to medium range forecasts (1-10 days) from 2016-06-01 until today. The following four Processing services are included in the application: (i) Niger-Hype simulation of historical period, (ii) Niger-HYPE forecast, (iii) EO-data pre-processing, (iv) Return Period magnitude Analysis.

This poster of the Hydrological modelling service of Hydro-TEP show how to:
1. Access to the thematic application.
2. Select the Area of Interest based on drainage basins and upstream area.
3. Select a sub-basin and it's upstream area in the Geobrowser.
4. Spatially filter EO data using the hydrological model sub-basins.
5. Run the Niger-HYPE historical simulation Processing Service.
6. Run the Niger-HYPE Forecast Processing Service.
7. Run the EO Data Pre-processing Processing Service.
8. Run the Return Period Magnitude Analysis Processing service.

References:
Andersson et al (2017a). Process refinements improve a hydrological model concept applied to the Niger River basin, https://doi.org/10.1002/hyp.11376

Andersson et al. (2017b). Providing peak river flow statistics and forecasting in the Niger River basin. Phys. Chem. Earth, http://dx.doi.org/10.1016/j.pce.2017.02.010

Berg et al. (2017): Near real-time adjusted reanalysis forcing data for hydrology, Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2017-326, in review