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Setup, calibration and testing of the Lisflood model for the Upper Danube River basin on 1km

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The Pan-European EFAS is set-up on a 5km grid and runs with an hourly time step. For a number of selected pilot catchments it is also set-up on a 1 km grid to test the benefit of higher resolution data and modelling. The Danube has been selected as one of the pilot catchments. It is a challenging catchment in the sense that is one of the biggest catchments in Europe and shares borders with 18 countries. For the Danube, the European Flood Alert System activity contributes also to the basin-wide improvement of flood forecasting as defined in the Danube Flood Action Plan of the ICPDR. This poster shows some technical aspects of Lisflood model setup (one of the core elements of EFAS system) and the first preliminary results of simulations for Upper Danube river basin.

General information about the catchment "Upper Danube"

Upper Danube: Upstream Bratislava

Length [km]: **1020** (ex spring in Furtwangen, Germany)

Catchments [km^2]: **131.338** (within river Morava River)

Danube River km [km]: **1869** (Bratislava, international gauging station)

LQ/MQ/HQ$_{30}$/HQ$_{100}$ [m^3/s]: **700/2035/9800/11000**

Hydropower plants: 9 Great Hydropower Plants (HP) and 57 Small Hydropower Plants (SHP) on the Danube, more than 100 other Hydropower Plants on tributaries

Special hydraulic constructions: some special flood bypass systems exists on the Austrian Danube section; flood reservoirs in some tributaries in Germany, Austria and Czech Republic

Shared countries**: Germany, Switzerland, Austria, Czech Republic, Slovakia**

Data collection

The Danube catchment area comprises eighteen countries, of which fourteen covering the major part of the basin have been contacted for data collection. Relevant authorities that hold necessary data are usually the national meteorological and hydrological services, administrations responsible for landuse, soil and geological data as well as authorities of national and regional water resources management. Some of these branches are divided again into federal and regional or even local administrations with different tasks so that sometimes it has been difficult to get in contact with the actually responsible person. These problems have been encountered especially in countries with a distinct federal administrative structure. Consequently it has been necessary to get in touch with more than 40 administrations altogether. In addition, experience has shown that data delivered are usually very different in format and content of the respective files; some data are not available in digital format at all.

Data transformation pre-processing

Information on discharge gauging stations, rainfall stations, cross sections and reservoirs as well as polders usually arrives with co-ordinates according to each country's standards. The definition of the corresponding projection systems and the precision of coordinates vary considerably among the countries, and often even within one country or within one authority (e.g. different dates of measurement, methodologies, geodetic surveys). Hence it is necessary to convert these data to a common altitude and co-ordinate reference system before feeding them into the LISFLOOD model. Regarding altitude, the European Altitude reference system has been chosen (Altitudes of Amsterdam), while for the horizontal projection the Lambert Azimuthal Equal Area reference system has been adopted.

As precipitation is the most important input to a hydrological model, the precipitation data received are processed carefully before being submitted to the modelling system. However, a filtering of the time series has to be performed prior to the spatial interpolation of the station data, in order to identify anomalies in the received precipitation data. The rain gauge measuring network dataset includes observations from 1199 German stations, 882 Austrian stations, 590 Czech stations, 13 Slovak stations and 4 Hungarian stations. It sum data from 2688 stations were used. For the interpolation of precipitation the new KLAM interpolation algorithm (Szabo et al. 2004) was used. Besides precipitation, both sources of data usually provide air temperature and sometimes the parameters horizontal wind speed, air humidity and/or solar radiation input as well. Because of very high variability in availability and quality of these meteorological variables, temperature and evapotranspiration were taken from the MARS database (EC 1998).

Preliminary results of model set-up and calibration for time period 01/01/1996-31/10/1998 in some selected sub-catchments upstream to Bratislava will be demonstrated