

SETUP OF A FLOOD FORECASTING SYSTEM FOR THE ENNS RIVER IN STYRIA (AUSTRIA)

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SUMMARY

Flood forecasting systems belongs to the non-structural measures that can be setup at relatively low costs compared to the economic losses due to flood events. Such a system is actually in a test modus in Styria (Austria) for the Enns River. The structure and the characteristics of the flood forecasting system for the Enns River are illustrated and commented.

ABSTRACT

The flooding event from August 2002 has severely affected Austria and especially the regions: Upper Austria, Lower Austria, Styria, Salzburg and Tirol (StartClim9, 2003). In Styria, damages were relatively limited compared to the four other regions. However, large flooding occurred in the catchment from the Enns River. The consequence was that flood management in Styria had to be updated and large efforts were undertaken to enhance flood defence measures. Today, both structural and non-structural measures, adequately related in time and space, represent the cornerstones of a unified contemporary flood management concept. Structural measures are related to the physical control of the basin drainage by means of constructions or devices such as dams, dikes, channel canalisation and planting forests. Non structural measures are those in which floods are mitigated by procedures such as insurances, flood zoning, and flood forecasting.

The present paper illustrates the Flood Forecasting System for the Enns River in Styria. The project initiated from the “Amt der Steiermärkischen Landesregierung - FA19A“ has started in 2006 and the system is actually in an operational test modus. The different steps implemented during the setup as well as the software structure and some calibration results are presented. It must be pointed out that the main river channel is used for hydro-power production and that water derivation structures are present in the catchment area, i.e. the hydrological cycle and the natural flow are man modified. However, these anthropogenic interventions influence mainly low and mid flow and have not been retained in the overall flood forecasting setup.

The Enns has its source in the “Radstädter Tauern” in the region Salzburg at an altitude of 1735m. The river reaches the region Styria at the “Mandlingpass” flowing from West to East in a narrow valley between the “Kalkalpen” and the “Zentralalpen”. The Enns River penetrates the “Ennstaler Alpen” and flows during 15 km in a gorge landscape between the cities of Admont and Hieflau. After that, the River flows to the North where its main affluent in

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Styria, the River Salza, is inflowing. All in all, after around 250 km, the River Enns is inflowing the Danube River. The total watershed area is around 6100 km² whereas in Styria the area is around 4000 km².

The Flood Forecasting System for the river Enns in Styria is based on a continuous (hourly) and automatic setup, i.e., the simulations are initiated without human interventions. The lead time is actually limited to 48 hours using the meteorological forecasts issued from the “Zentralanstalt für Meteorologie und Geodynamik” (ZAMG) in Vienna as input. The meteorological forecasts are built with results from (1) the Nowcasting system INCA (Haiden et al., 2005) for the 6 first hours and (2) the Aladin model for the next 42 hours. The data are made available via ftp each hour in a grid format with a spatial resolution of 1x1 km. The online measurement network consists of 12 precipitation and air temperature stations plus 8 gauging stations.

Simulations are done with a hydrological model (NAM) calibrated at the sub-catchment scale. The rainfall-runoff modelling is done for 16 sub-catchments. The results are then transferred to the hydrodynamic model MIKE11 (DHI – Water and Environment (2005) where discharge and water levels are simulated. Also flooding areas are calculated for each model run using a quasi 2D approach. This technology should support the warnings release and the protection and evacuation of the population at risk during flood events. Finally, all the results, in form of table and graphics, are published on a web page that is password protected at the moment.

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