

# THE 2005 FLOOD EVENT AT THE RIVER INN IN TYROL: A TEST CASE FOR THE FLOOD FORECASTING SYSTEM

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A prototype of the flood forecasting system for the river Inn in Tyrol has been developed within an interdisciplinary research project. The goal of this system is to provide reliable information on predicted discharge and water level for gauges along the river Inn up to 48 hours in advance.

Based on this information, important decisions on the announcement of warning levels, on the initiation of protective measures or on the need for evacuation can be made in time.

The system is currently running in trial operation and tested for the operational use by means of continuous evaluation of ongoing and the analysis of past flood events.

As a hybrid approach was chosen for the forecast system, it consists of several modules as follows:

- It is the task of the hydrometeorological pre-processing to check the recorded data from 80 observation stations for plausibility and prepare them as input for the hydrological models of the tributary-catchments. To obtain a forecast-period of 48 hours, the output of numerical weather prediction models is also prepared as input for hydrological modelling.
- Hydrological models compute the inflow into the river Inn from the tributaries. The observed meteorological data as well as the forecast data are used as input and the current variable disposition in the catchments is considered.
- A one-dimensional hydrodynamic model was chosen to compute the flood wave propagation in the river Inn. This model enables to consider a rule based operation of the run-of-river power stations in the forecast system. A prerequisite to set up a hydrodynamic model was the availability of sufficient channel-geometry-data.
- An automated data flow management and a central database provide the communication between the different modules as well as the visualisation of the results.

The flood event on August 22/23 2005 caused a lot of damage along the river Inn in Tyrol due to extensive inundation. The peak discharge at the gauge in Innsbruck exceeded 1500m<sup>3</sup>/s which accords to a return period of significantly more than 100 years.

Such extreme floods are a great challenge for a forecast system. Especially under meteorological conditions like in August 2005, and under consideration of the resulting runoff which can be expected, early and reliable flood warnings are of great importance.

Amongst other events, the flood in August 2005 was simulated for testing purposes. In doing so flood forecasting was based on restricted data which had been available at the time of prediction prior to the event. These were discharge measurements of selected gauging stations, meteorological measurements as well as weather forecasts based on the Numerical

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Weather Prediction Model ALADIN-AUSTRIA. A new flood forecast, predicting discharge and water level for the following 48 hours, was calculated on an hourly basis.

The modelling results show strengths and deficits of the individual modules of the system as well as the effect of result-variation on the quality of predicted discharge and water levels. Major flood events like the one in summer 2005 also provide valuable data for model calibration. The workflow of the flood forecasting system (e.g. data-assimilation) can only be optimized based on such model-validation tests.

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