Development of a Physically Based Flood Forecasting System "MIKE Flood Watch" in the Piemonte Region, Italy

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ABSTRACT:
In October 2000 the northwest of Italy experienced one of the largest floods on record. The heavy and prolonged rainfall that fell across the entire Po river basin, starting from the Piemonte Region's ones, which is located in the upstream, elevated river levels which inundated vast areas of floodplain causing widespread damage. During the flood it was decided to evacuate about 20,000 people. This decision was partly based on information provided by MIKE Flood Watch, a flood forecasting system which was installed at the Piemonte Region's Flood Forecasting Centre in Turin, Italy, only 2 weeks prior to the event.

This paper describes the implementation of the Flood Forecasting System, MIKE Flood Watch, on the Upper Po River basin in the Piemonte Region, a catchment of approximately 37,000 km^2 (including territories in the Valle d'Aosta Region and Switzerland). The Upper Po River basin is characterised by a number of fast responding mountainous tributaries from the Alps, which flow into the upper part of the Po River which is flat and contains wide floodplains. There is a large number of bridges and hydroelectric structures in the basin. The development of a fast, accurate and reliable forecasting system for this complicated and very large river basin required careful balance between accurate representation of the flood wave movement and its extent, and the need for rapid forecasts.

A detailed MIKE 11 rainfall-runoff model and river model were developed and connected into the real time flood forecasting system "Flood Watch", which was then installed at the Piemonte Region, Flood Forecasting Centre. Flood Watch is linked directly to the existing telemetric system, which provides measured data every 10 minutes from more than 200 meteorological stations (rainfall and temperature) and about 70 water level gauging stations. In addition, Flood Watch uses quantitative precipitation forecasts which are obtained from a meteorological model. Flood Watch issues forecasts of water level and discharge at more than 50 locations for up to 48 hours. The system issues new forecasts every hour, which are carried out automatically without the need for human intervention.

The set-up of the System will be completed with further calibration activities and will be extended to the ordinary hydrological regime also for river management purposes.

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