

Real-time decision making based on ensemble flood forecasts - MINERVE project

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The main goal of the 3rd Rhône Correction project is to improve the flood protection in the Upper Rhone River basin. In this context, the MINERVE project aims contributing to a better flow control during flood events, taking advantage from the existing multireservoirs system in the Canton Valais (Figure 1). For this purpose, a hydrometeorological forecast model has been developed as well as a decision support tool for the hydropower plants preventive management.

The main goal of the PhD project is the achievement of a new Decision Support System (DSS) taking into account the concept of risk management. It will be based on the analysis of the new ensemble hydrological forecasts, considering the current state of the hydropower plant reservoirs to propose the optimal management of the hydropower plants (HPP). The aim is the reduction of the peak flow along the Rhone River.

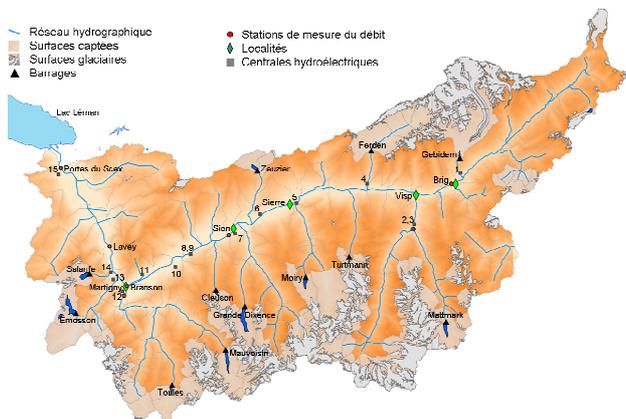


Figure 1: Upper Rhone River basin with the most important hydropower plants.

The MINERVE system will exploit the flow measurements (Figure 2), the data from reservoirs and hydropower plants and the ensemble meteorological forecast from MeteoSwiss. The hydrologic simulation tool will provide hydrological predictions in the most important locations on the Rhone River basin. It will be the input for the DSS which will propose a real-time management of the hydropower plants, taking into account all restrictions and current conditions of the system. Another important input will be the associated costs due to hydropower preventive operations. Finally, the

recommendations issued from the DSS will be provided to the Scientific Crisis Cell of Canton Valais for decision.

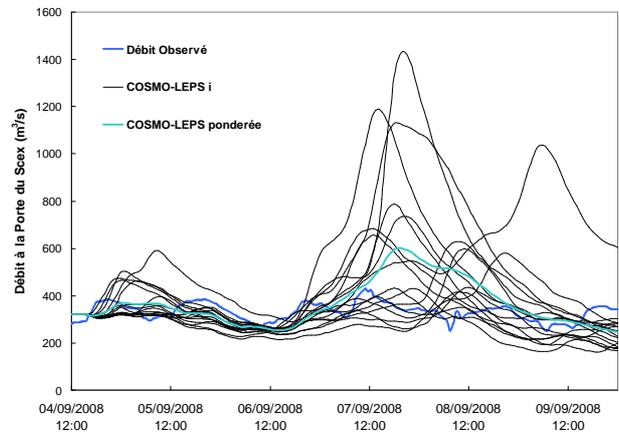


Figure 2: Ensemble hydrological forecast from the COSMO-LEPS forecast (04.09.2008 12h) in the Porte du Scex location

An operational scheme for the new developments of the MINERVE project is presented in Figure 3. After a “water alert” of MeteoSwiss, an analysis of the meteorological and hydrological forecast is done as well as the actual situation in the HPP. A first danger evaluation is realized with the aim of knowing if the system presents an overflowing risk somewhere and if the HPP management is necessary. In positive case, DSS will propose an optimal solution always taking into account the risk, cost functions as well as the uncertainties linked to the hydrological forecasts. When a new weather forecast is provided or new data is available, a new situation analysis is done and a new management will be proposed.

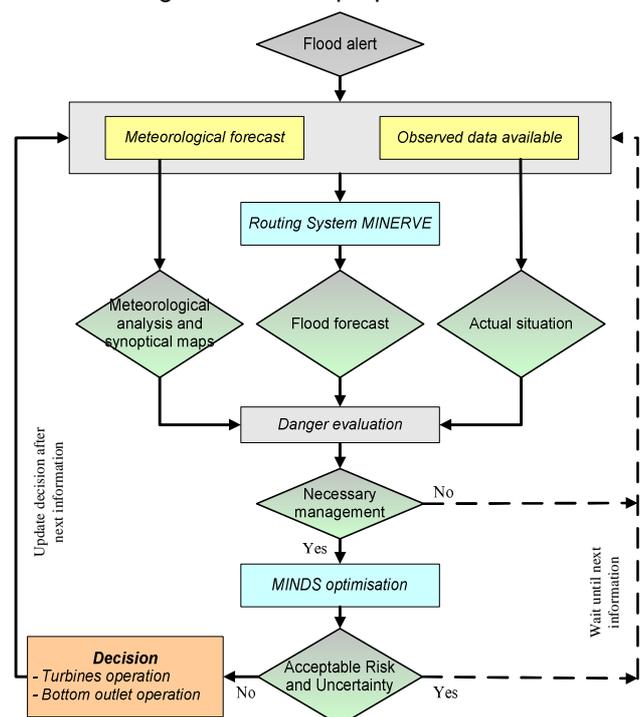


Figure 3: MINERVE operational scheme