Toward an Ensemble Streamflow Forecast Over the Entire France

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Since the year 2003, the French National Weather Service (Meteo-France) uses an operationnal real-time system that provides a daily monitoring of the water budget, streamflows and aquifer levels over the entire France : the SAFRAN-ISBA-MODCOU (SIM) system. This coupled model is composed of the ISBA surface scheme and of the distributed hydrological model MODCOU. The system is used in a forced mode, with the atmospheric forcing derived from observations through the use of the SAFRAN analysis system. Such a system has been validated over 3 large french basins˜: the Rhone, the Adour-Garonne and the Seine basins. It was shown that the system satisfactorily reproduces the water and energy budgets, as well as the observed streamflows, aquifer levels and snow-packs. In particular, the main long-duration floods of the Seine are well simulated.

The SIM system is also used for streamflow forecasting. As a first step, experiments of determinist forecasts have been performed over the Rhone basin, using 2- and 3-day quantitive precipitation forecast. The encouraging results showed the potential of SIM for flood forecasting. As a next step, an ensemble streamflow prediction system is now being built. The forecasts from the Ensemble Prediction System of the ECMWF are used to force the system. The initial conditions of soil moisture, aquifer levels, etc. are given by the operationnal run of SIM, and the results are analysed for each forecast day. This system is expected to give 10-day forecasts of the streamflow of the main french rivers with a measure of the associated confidence, which is greatly valuable for flood warning and water management.