Ensemble stream flow predictions, a way towards better hydrological forecasting

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The hydrological forecasting division at SMHI has been using hydrological EPS and hydrological probabilities forecasts operationally since some years ago.

The inputs to the hydrological model HBV are the EPS forecasts from ECMWF. From the ensemble, non-exceedance probabilities are estimated and final correction of the ensemble spread, based on evaluation is done.

Ensemble stream flow predictions are done for about 80 indicator basins in Sweden, where there is a real-time discharge gauge. The EPS runs are updated daily against the latest observed discharge.

Flood probability maps for exceeding a certain threshold, i.e. a certain warning level, are produced automatically once a day.
The flood probabilistic forecasts are based on a HBV- model application, (called HBV-Sv, HBV Sweden) that covers the whole country and consist of 1001 subbasins with an average size between 200 and 700 km2. Probabilities computations for exceeding a certain warning level are made for each one of these 1001 subbasins. Statistical flood levels have been calculated for each river sub-basin.

Hydrological probability forecasts should be seen as an early warning product that can give better support in decision making to end-users communities, for instance Civil Protections Offices and County Administrative Boards, within flood risk management.

The main limitations with probability forecasts are: on one hand, difficulties to catch small-scale rain (mainly due to resolution of meteorological models); on the other hand, the hydrological model can't be updated against observations in all subbasins.

The benefits of working with probabilities consist, first of all, of a new approach when working with flood risk management and scenarios. A probability forecast can give an early indication for Civil Protection that "something is going to happen" and to gain time in preparing aid operations.

The ensemble stream flow prediction at SMHI is integrated with the national forecasting system and the products are available to specialized end-users via Internet.