Performance of a coupled lagged ensemble weather and river runoff prediction model system for the Alpine Ammer River catchment

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The Ammer River catchment located in the Bavarian Ammergau Alps and alpine forelands, Germany, represents with elevations reaching 2185 m and annual mean precipitation between1100 and 2000 mm a very demanding test ground for a river runoff prediction system. Large flooding events in 1999 and 2005 motivated the development of a physically based prediction tool in this area. Such a tool is the coupled high resolution numerical weather and river runoff forecasting system AM-POE that is being studied in several configurations in various experiments starting from the year 2005.

Corner stones of the coupled system are the hydrological water balance model WaSiM-ETH run at 100 m grid resolution, the numerical weather prediction model (NWP) MM5 driven at 3.5 km grid cell resolution and the Perl Object Environment (POE) framework. POE implements the input data download from various sources, the input data provision via SOAP based WEB services as well as the runs of the hydrology model both with observed and with NWP predicted meteorology input. The one way coupled system utilizes a lagged ensemble prediction system (EPS) taking into account combination of recent and previous NWP forecasts.

Results obtained in the years 2005-2011 reveal that river runoff simulations depict high correlation with observed runoff when driven with monitored observations in hindcast experiments. The ability to runoff forecasts is depending on lead times in the lagged ensemble prediction and shows still limitations resulting from errors in timing and total amount of the predicted precipitation in the complex mountainous area.

The presentation describes the system implementation, and demonstrates the application of the POE framework in networking, distributed computing and in the setup of various experiments as well as long term results of the system application in the years 2005 - 2011.