Geophysical Research Abstracts
Vol. 13, EGU2011-12803, 2011
EGU General Assembly 2011


# A filtering approach for updating a hydrologic forecast model

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The aim of this study was to test whether updating of a hydrologic forecast model using a particle filtering approach will improve streamflow forecast. The test case was 4 catchments in a system of hydropower reservoirs in Ulla-Førre in western Norway. This is a mountainous area with a seasonal snow cover. As a first step a posterior distribution of parameter uncertainty was estimated using a Bayesian approach by conditioning the hydrological parameters on 4 years of data from all catchments. This posterior was used as the prior distribution in the particle filtering by letting the particles be a random sample from this distribution. When drawn from the prior, the particles had equal weight. The likelihood in the particle filter used observations from a short time window before the forecast time, i.e. the filter was successively applied using a sliding window. Based on the likelihood, the particles got new weights that defined the posterior distribution of model internal states for each time step. The particle filter was applied for a period that was not used for calibration. The sensitivity to uncertainties in precipitation and temperature inputs were investigated by letting each particle have a random temperature and precipitation fields. The uncertainty in temperature was assumed to mainly originate from uncertainty in the temperature lapse rate. For precipitation the interpolation uncertainty was accounted for using conditional simulations. The forecast distribution was evaluated using 1-day ahead forecast approximated by using weather observations in stead of forecasts. The performance was evaluated measuring the reliability, resolution and efficiency of the forecasts.