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Multimodel hydrological ensemble forecasts for the Baskatong catchment in Canada using the TIGGE database.

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Title :

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Abstract:

Adequate uncertainty assessment is an important issue in hydrological modelling. An important issue for hydropower producers is to obtain ensemble forecasts which truly grasp the uncertainty linked to upcoming streamflows. If properly assessed, this uncertainty can lead to optimal reservoir management and energy production (ex. [1]). The meteorological inputs to the hydrological model accounts for an important part of the total uncertainty in streamflow forecasting. Since the creation of the THORPEX initiative and the TIGGE database, access to meteorological ensemble forecasts from nine agencies throughout the world have been made available. This allows for hydrological ensemble forecasts based on multiple meteorological ensemble forecasts. Consequently, both the uncertainty linked to the architecture of the meteorological model and the uncertainty linked to the initial condition of the atmosphere can be accounted for. The main objective of this work is to show that a weighted combination of meteorological ensemble forecasts based on different atmospheric models can lead to improved hydrological ensemble forecasts, for horizons from one to ten days.
This experiment is performed for the Baskatong watershed, a head subcatchment of the Gatineau watershed in the province of Quebec, in Canada. Baskatong watershed is of great importance for hydro-power production, as it comprises the main reservoir for the Gatineau watershed, on which there are six hydropower plants managed by Hydro-Québec. Since the 70's, they have been using pseudo ensemble forecast based on deterministic meteorological forecasts to which variability derived from past forecasting errors is added.
We use a combination of meteorological ensemble forecasts from different models (precipitation and temperature) as the main inputs for hydrological model HSAMI ([2]). The meteorological ensembles from eight of the nine agencies available through TIGGE are weighted according to their individual performance and combined to form a grand ensemble. Results show that the hydrological forecasts derived from the grand ensemble perform better than the pseudo ensemble forecasts actually used operationally at Hydro-Québec.

References:

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