



The (cQ)² collaboration: assessing watershed scale hydrological changes for the province of Québec at the 2050 horizon

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The (cQ)² project is a collaboration of various managers of water resources in Québec. This joint effort aims at sharing best practices in hydrological impact studies in order to deliver a concerted message about the potential impact of climate change on Québec hydrology. The project brings together key actors of the hydrological field and climate research: Hydro-Québec, the provincial hydro-power company; the Centre d'expertise hydrique du Québec, a governmental agency accountable for provincial water management in terms of safety, equity and sustainability; Rio Tinto Alcan, an aluminium producer who also owns power-houses on Québec rivers; and Ouranos, a regional consortium on climatology and adaptation to climate change.

We provide an overview of the study framework adopted in the first phase of the project which includes the use of a large climatic ensemble based on simulations from global and regional climate models, different emission scenarios, and multiple post-processing methods. This ensemble is further described in a presentation by Marco Braun¹. The hydrological simulations are carried out using HSAMI, a lumped and conceptual model, applied to over 300 Québec river basins; and HYDROTEL, a distributed and physically-based hydrological model used for 40 watersheds of southern Québec. As an outcome to this study, the expected change in hydrological variables such as floods and droughts, seasonal flow, evapotranspiration, and snow water equivalent, is presented. The change in those variables is critical for mid-term and long-term planning of future water resources and reservoir management, as well as for future design criteria. The expected warmer winters with possible alternance of snow accumulation and melt, for example, represent a new challenge for reservoir planning. Finally, uncertainties in the projected changes are considered and discussed, as well as the impact of methodological choices along the modeling process.

¹"Building an ensemble of climate scenarios for decision-making in hydrology: benefits, pitfalls and uncertainties"