

Improving Snow Analyses for Hydrological Forecasting at Environment and Climate Change Canada (ECCC)

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ABSTRACT

As part of the National Hydrological Services Transformation Initiative, Environment and Climate Change Canada (ECCC) designed and implemented the National Surface and River Prediction System (NSRPS) to provide surface and river flow analysis and forecast products across Canada. Within NSRPS, the Canadian Land Data Assimilation System (CaLDAS) produces snow analyses that are used to initialize the land surface model, which in turn is used to force the river routing component. Originally, CaLDAS was designed to improve atmospheric forecasts with less focus on hydrological processes. When snow data assimilation occurs, the related increments remove/add water from/to the system, which can sometimes be problematic for streamflow forecasting, particularly during the snowmelt period. Recent modifications to the snow analysis method introduce multiple innovations that respond to the need for higher quality snow analyses for hydrological purposes, including the use of IMS snow cover extent data instead of *in situ* snow depth observations. Results show that the new snow assimilation methodology brings an overall improvement to snow analyses and substantially enhances water conservation, which is reflected in the generally improved streamflow simulations. This work represents a first step towards a new snow data assimilation process in CaLDAS, with the final objective of producing a reliable snow analysis to initialize and improve NWP as well as environmental predictions, including flood and drought forecasts.

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