P49 Coupling of a detailed snow model to Noah-MP in WRF-Hydro for glacier mass balance and glacier runoff studies.

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Studies of mass balance in glaciers in complex terrain show that elevation gradients and complex topography in many glaciated regions lead to large variations in temperature, precipitation, winds (and thereby wind deflection, transport and deposition of dry snow during the accumulation season) and net radiative exchange across the glacier. Therefore, proper simulation of the non-homogenous, non-stationary, evolution of a glacier requires much finer resolution of atmospheric processes than typical global or regional climate models can provide. Furthermore, regional 'atmosphere-only' models typically do not have the detailed information about runoff routing processes, which are important components in the hydrological cycle. Glacier melt contributes to discharge especially during summer when the magnitude of the summer peak river flow depends greatly on the contribution of melt water from snow and ice to the total river flow. This contribution from glaciers to total flow plays a key role in the glacier-fed rivers in populated regions where summer flows are crucial for irrigation, human consumption and energy production. We have incorporated the detailed Crocus snow model, as a glacier mass balance model, into the Noah-MP land model, within the Weather and Research Forecasting - Hydro (WRF-Hydro) modelling system. By linking a surface mass balance glacier model to the WRF-Hydro system (WRF-HydroGlac), the interactions between the energy, water and mass balance budgets over glaciated river basins can be better depicted and projected future impacts, better understood. We will demonstrate the WRF-HydroGlac model with a mass balance and snowpack/glacier runoff study of a highly observed Norwegian glacier (Hardangerjokulen).