[JJ] Evening Poster | A (Atmospheric and Hydrospheric Sciences) | A-CC Cryospheric Sciences & Cold District Environment

[A-CC28]Glaciology

convener:Takayuki Nuimura(Chiba Institute of Science), Ishikawa Mamoru(Hokkaido University), Kzutaka Tateyama(国立大学法人　北見工業大学, 共同), Hiroto Nagai(Japan Aerospace Exploration Agency)
Wed. May 23, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)
The cryosphere is a fundamental component of the earth system. It is a region where snow and ice exist in the form of glacier/ice sheet, snow cover and snowfall, frozen ground, sea ice and fresh water ice, and they play a critical role in the global environment under the interactions with atmosphere, ocean, ecosystem and others. In this session, research results on physical and chemical characteristics of snow and ice, variations and dynamics of cryospheric environment, roles of the cryosphere on the earth and other planets will be discussed broadly, regardless of the research method.

[ACC28-P06]Simulation of snow transport and sublimation in an agricultural river catchment, southern Quebec, Canada

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Hydrological responses in cold regions are often complex and variable (both spatially and temporally) due to the complex and multiple interactions between the hydrological processes at play. Thus, there is a need to better understand and represent cold region hydrological processes within hydrological models. In this study, a physicallybased hydrological model has been developed using the Cold Regions Hydrological Model (CRHM) platform for the L’Acadie River Catchment in southern Quebec (Canada). Almost 70 % of the catchment is occupied by agricultural fields, being representative of the intensive farming landscape of the southern St-Lawrence lowlands, while the rest is mostly forested. The physical processes including blowing snow, snow interception in canopies, sublimation and snowmelt were simulated over 35 years using the CRHM platform. Hydrologic response units (HRUs), the smallest simulation spatial unit within the catchment, were derived based on the combination of land use/cover and vegetation types. Over the simulation period, considerable spatial variability was detected between agricultural and forested sites. Snow accumulation and associated snow water equivalent (SWE) were found to be higher in forested sites than agricultural sites, which can be explained by blowing snow transport from agricultural sites to the forested sites where aerodynamic roughness is greater. Higher rates of blowing snow sublimation were detected over the agricultural sites compared to snow intercepted in the forest canopies. This can be explained by the fact that there is a great amount of blowing snow over the agricultural sites, and thus available suspended snow for sublimation, while over the forested sites the snow is more firmly retained by the canopies and thus there is less blowing snow and consequently less blowing snow sublimation. In addition, although snow cover duration shows variation over the simulation period, the snow generally lasts longer in forested fields than in agricultural fields. Our findings indicating more snow in forested fields than agricultural (open) fields are contrary to the usual notion that there is less snow accumulation on forest ground due to the high rates of canopy sublimation. However, this is true for the landscapes dominated by forests, while our study area is dominated by agricultural fields, so snow erosion of agricultural fields and snow deposition in forested fields seem to compensate canopy losses. Taken together, it is shown that land use exerts a critical control on snow distributions in this type of landscape, and perhaps on possible implications for future snow hydrology of the

catchment.