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HYDRO-RDI-Network final seminar

Wintertime flow and sediment transport processes

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The polar region is warming faster than any other region on Earth. A thorough understanding of the impacts on northern seasonally ice-covered rivers, their flow and sediment transport processes, is presently lacking. The observations and technical development are needed for being able to quantify the changes and assess their future impacts in riverine environments. The study relates to the Hydro-RDI-Network’s two themes: A) Riverine and catchment mapping: Creating combined measurement and modelling packages for the local and national level authorities, which are needed in river erosion, flood hazard mitigation and river restoration purposes; B) Integrated modelling: Creating new integrated modelling approaches that combine and applied new technologies for channel hydrodynamics and environmental modelling.

In particular winter-time/seasonal hydro-morphodynamics, and related spatially and temporally dense observations were done by testing photogrammetry from underwater drones and their applications in different seasons. These enable observing the river bed topography, and sediment transport in locations where it is otherwise impossible to measure, especially in ice-covered conditions. These also enable better calibration of models and environmental management from the perspective of erosion and flood risks. From boreal to sub-arctic environment, the modelling approaches enable detection of the impacts of different seasons and discharge events on fluvial systems. The studies have included ice-covered and open-channel measurements annually in February, May, September/October and November in different study sites. Here the results of HYDRO-RDI-Network are presented. However, the work still continues, and defrosting sedimentary systems are further studied in other on-going projects, especially concentrating on impacts of freeze-thaw cycles, river ice cover on hydraulics and bank erosion, and watershed scale sediment delivery, by using numerical models, direct field measurements (incl. remote sensing), flume experiments and watershed scale modelling. The methods developed in HYDRO-RDI-Network enable also application of further funding applications such as related to understanding changes in ice-covered season.