Editorial: Challenges of milder winters to northern hydrology

The 20th International Northern Research Basins (NRB) Symposium and Workshop took place in Kuusamo, Finland, August 16–21, 2015. NRB is the only international conference specifically addressing northern hydrology and related ecological issues.

The first NRB took place in Edefors, Sweden in 1975. At that time no one was talking about climate change, with the exception of some vague speculations on a new 'Little Ice Age' being ahead of us. Today no one can disprove climate change. Those who wish to try may start by disproving that smoking is not a health hazard.

In many northern regions, milder winters are one of the most evident manifestations of climate change. In Finland, the strongest signal has been the shortening of the duration of lake ice cover. In some lakes in southern Finland, the freezing date has shifted over 3 weeks later during the last 50 years, in Lapland 1–2 weeks. For breakup dates, the change towards an earlier date has been around 2 weeks in most of the country.

There are seven papers based on the presentations at NRB20 in this issue. Janowicz *et al.* (2017) deal with the everlasting challenge of measuring winter precipitation in cold and windy regions. Almost 2 decades have passed since the last comprehensive assessment of gauges was made. Since then, several new gauges have been developed or the old ones modified, each with its strengths and weaknesses.

Is precipitation falling as rain or snow? In addition to the accuracy of measurements, a misestimate can strongly affect many different aspects of human life such as transportation safety. According to Feiccabrino & Grigg (2017), automated GIS landscape classification can be used to decrease errors in estimation of the state of precipitation across the Scandinavian Peninsula.

In a two-part paper, O'Neil *et al.* (2017a, 2017b) deal with the trends and spatial variations in temperature, precipitation, snow accumulation, and snowmelt over western Canada. The first part discusses the period 1950–2010, the second one the period 2041–2070.

The occurrence of mid-winter break-ups in northern rivers has increased e.g. in southern Finland. What are the hydro-climatic triggers of these events? Newton *et al.* (2017) have analyzed these triggers in the milder parts of western Canada and Alaska.

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Mild winters tend to increase sediment transport and nutrient loading from agricultural fields. Koivusalo *et al.* (2017) modelled the water balances on two field sections in southern Finland over a 7 year period. The simulations were conducted with the FLUSH model, which divides the computational area into 2D overland and 3D subsurface domains.

Lake Kilpisjärvi (69°03'N) on the border of Finland and Sweden is one of the most extensively studied arctic lakes in the world. Leppäranta *et al.* (2017) analyzed the heat budget of the lake together with ice structure, growth and melting. The duration of ice cover on this lake is around 7 months.

It is believed that NRB's cooperation with *Hydrology Research* through the publication of special issues contributes to a wider dissemination of knowledge about northern hydrology. The editor also wants to thank all the reviewers for their meticulous work in evaluating the papers.

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