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Boreal forest carbon exchange and growth recovery after the summer 2018 drought

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In summer 2018, Northern Europe experienced an extreme summer drought in combination with unusually high temperatures, which had a substantial impact on agricultural yields as well as on forest growth conditions in various ways. An ongoing study, using ICOS and other forest ecosystem stations in the Nordic region, shows that the drought dramatically decreased NEP in the southern Scandinavian and Baltic region, almost nullifying the carbon sinks in some of the forests. However, some of the forests that not were exposed to the most extreme drought actually increased their NEP because of the high evaporative demand. Such severe conditions during a single year could be expected to influence a forest over several following years. Reduced tree storage of carbohydrates leads to a changed carbon allocation pattern in spring that may affect both the woody growth and the resistance to pests. It is thus important to reveal the impact of such climatic events over a longer period.

This study aims at assessing the carry-over effects of the extreme weather conditions on the carbon fluxes and the forest growth to the year after the event, 2019. The base of the analysis will be eddy covariance data combined with tree ring time series from measurement stations that has been shown to be significantly affected by the drought through reduced carbon fluxes: the spruce forests Hyltemossa and Skogaryd and the mixed forests Norunda, Svartberget, Soontaga and Rumperöd. The eddy covariance and tree ring data will be used to assess the forest ecosystem carbon fluxes and growth recovery in 2019 by comparisons to earlier normal years and extreme events.