Title:

Changes in -growing season length in northernmost Fennoscandia for the 1873 - 2008 period as measured from historical and recent phenology data

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Northern Fennoscandia is a climatic heterogeneous region and monitoring of the phenological development over time is complicated since the observation network is limited. To map the trends in onset, end and length of the growing season for birch (*Betula pubescens*) in the northernmost Fennoscandia, historical and recent phenological data from 18 observation stations and phenological metrics extracted from satellite data were used. The data cover, the period 1873 to 2008 and include four International Polar Years. The average date (day of the year: DOY) for the onset of leafing/budburst in Naimakka, Edefors and Vidsel (low land, Sweden) was 24, 11 and 9 days earlier in the period 1982-2008 compared with the period 1873-1924. For Tromsø (coastal, Norway) and Abisko (alpine, Sweden), the onset of leafing/budburst was 6 days earlier in 1982-2008 than in 1925-1939. For the International Polar Years, the maximal change in onset of leafing/budburst was observed in Naimakka and was 23 days earlier in 2007-8 compared with 1882-3. The end of the growing season (shedding of leaves), seem to start earlier (DOY: 254) in Abisko in the recent period (1982-2008) than in the earlier periods (DOY: 270-271) back to 1920. In Tromsø, the average shedding is 4 days earlier (DOY: 278) in the period 1982-2008 compared with the period 1940-1981 (DOY: 282). Altogether, a slight shift in the growing season length (GSL) seems to be the common trend for the most stations. The effects of an extended growing season may not only have consequences for plant and animal ecosystems, but persistent increases in GSL may lead to long-term increases in carbon storage and changes in vegetation cover with potential feedbacks to the climate system.

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