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Modeled seasonality changes during Dansgaard-Oeschger events

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Most quantities of the Earth system, such as temperature, precipitation, natural emissions of greenhouse gases from the terrestrial biosphere and the oceans, sources and transport of atmospheric chemistry, as well as sea ice cover in polar regions, are strongly influenced by seasonality. Additionally many paleo-datasets record seasonal rather than annual mean climatic conditions. For example, the amplitude of the seasonal cycle in temperature exceeds even the largest reconstructed climate shifts in most high latitudes, and small changes in the amplitude or phase of the seasonal cycle thus can strongly affect the reconstructed temperature.

Although seasonal changes can be more important than annual mean changes, few modeling studies of the most prominent abrupt climate changes of the last glacial period, the so-called Dansgaard-Oeschger (D-O) events, have focused on seasonal diagnostics. Here we present results from model simulations of abrupt glacial climate change with the 3D coupled global ocean-atmosphere-sea ice model ECBILT-CLIO. We investigate the abrupt climate events with regard to the timing of seasonal changes, their amplitudes and their potential to explain part of the proxy evidence from Greenland ice cores. Of particular interest are changes in the seasonality of temperature and precipitation during D-O events in Greenland and the rest of the northern hemisphere, and differences in the seasonal evolution of the warming and precipitation signals at the beginning of D-O events.