

Impact of snow cover on inter-annual variability of the NH winter circulation in an ensemble GCM simulation forced by satellite observations

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The impact of land boundary conditions on predictability from the seasonal to decadal time-scale and on the forcing atmospheric teleconnections is now the focus of renewed attention. In order to investigate the impact of the terrestrial cryosphere on the northern hemisphere winter circulation, we have performed a suite of ensemble simulations with the Meteo-France ARPEGE Climat (V3) GCM, spanning two decades (1979-2000), to attribute circulation anomalies to changes in snow cover extent. Observed snow cover derived from satellite data has been retrieved from the NISDC, and nudged weekly into the GCM. Control simulations with prognostic snow variables have been also performed. Anomalous snow cover extend over Eastern Eurasia is linked with anomalous circulation over the northern Pacific, in particular over the Aleutian sector, and this impacts also the North Atlantic in late winter. We find that nudging of realistic snow cover considerably improves the hindcast and the representation of the Aleutian-Icelandic Low Seesaw in the model.

We also discuss new coupled AOGCM ensemble forecasts aimed at better understanding the role of snow cover variability over Eurasia onto winter climate.