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Forcing and impact of the Northern Hemisphere continental snow cover in 1979–2014

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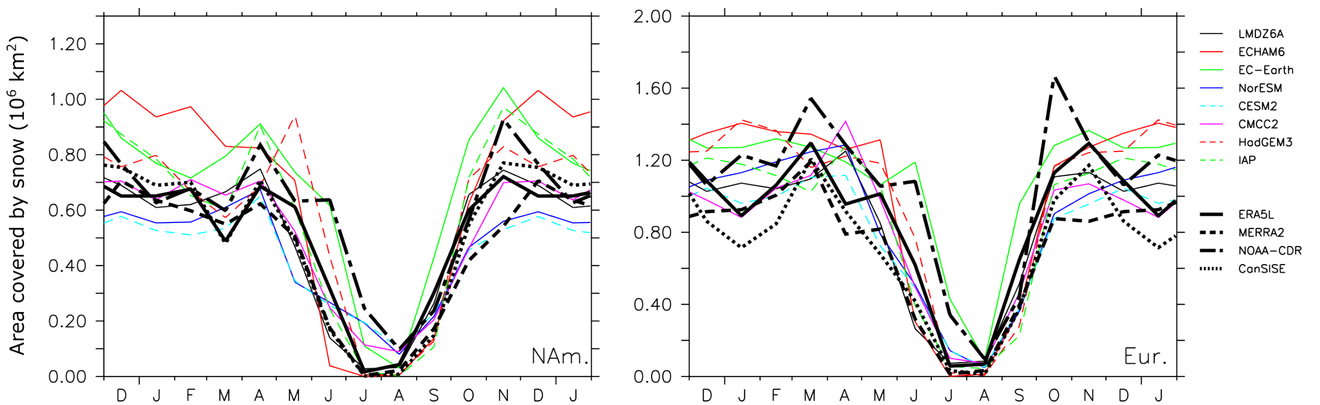

Figure S1: Seasonal cycle of the year-to-year standard deviation of the area covered by snow, in 10^6 km^2, in (left) North America and (right) Eurasia. Color curves show results from models. Thick black curves show observations.

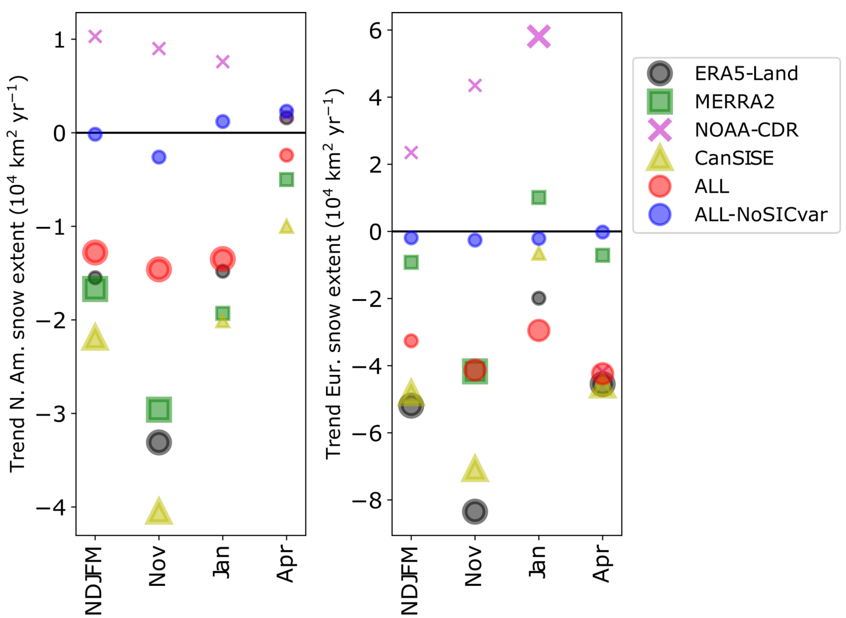

Figure S2: Northern Hemisphere trend in snow cover extent, in 10^4 km^2 yr^{-1} over (left) North America and (right) Eurasia. Red (blue) symbol circles denote the simulation ALL (ALL minus NoSICvar) for 1979-2014. Other symbols denote the ERA5-Land, CanSISE, NOAA-CDR and MERRA2 data for 1979-2010. The size of the symbol is large (small) if the significance of the trends is below (above) 5%.

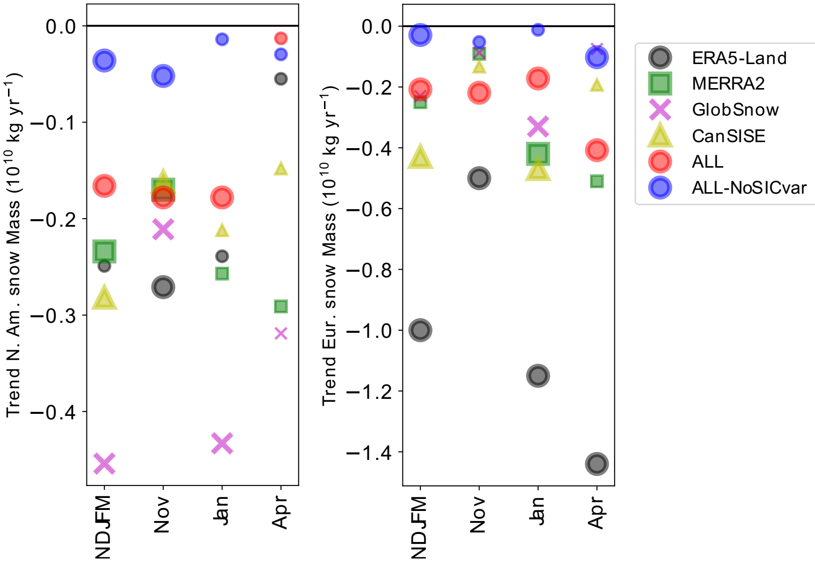

Figure S3: Same as Fig. S2, but for the Northern Hemisphere trend in snow mass, in 10^{10} kg yr^{-1} with the ERA5-Land, MERRA2, GlobSnow and CanSISE data.

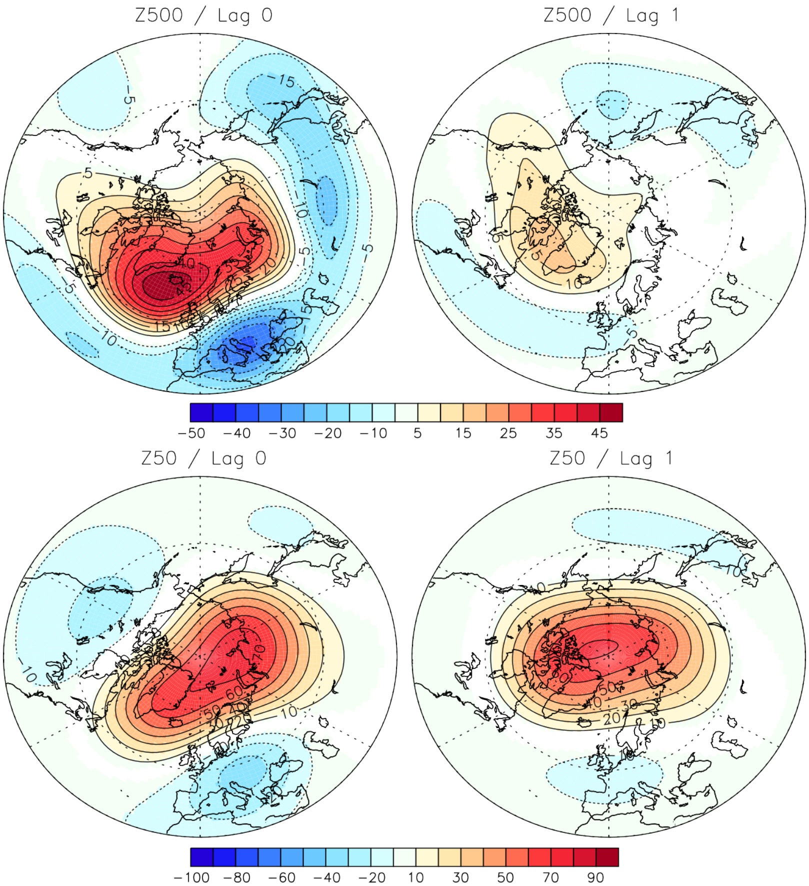

Figure S4: Regression of the 50-hPa and 500-hPa geopotential height, in m, on January $PC1_{Int}$ in LMDZOR6. The lag is in month and is positive when $PC1_{Int}$ lags. The regressions only use the anomalies associated with the internal atmosphere-land variability, after the removal of the corresponding ensemble mean. The color shades are masked if the significance of the regression is above 5%.

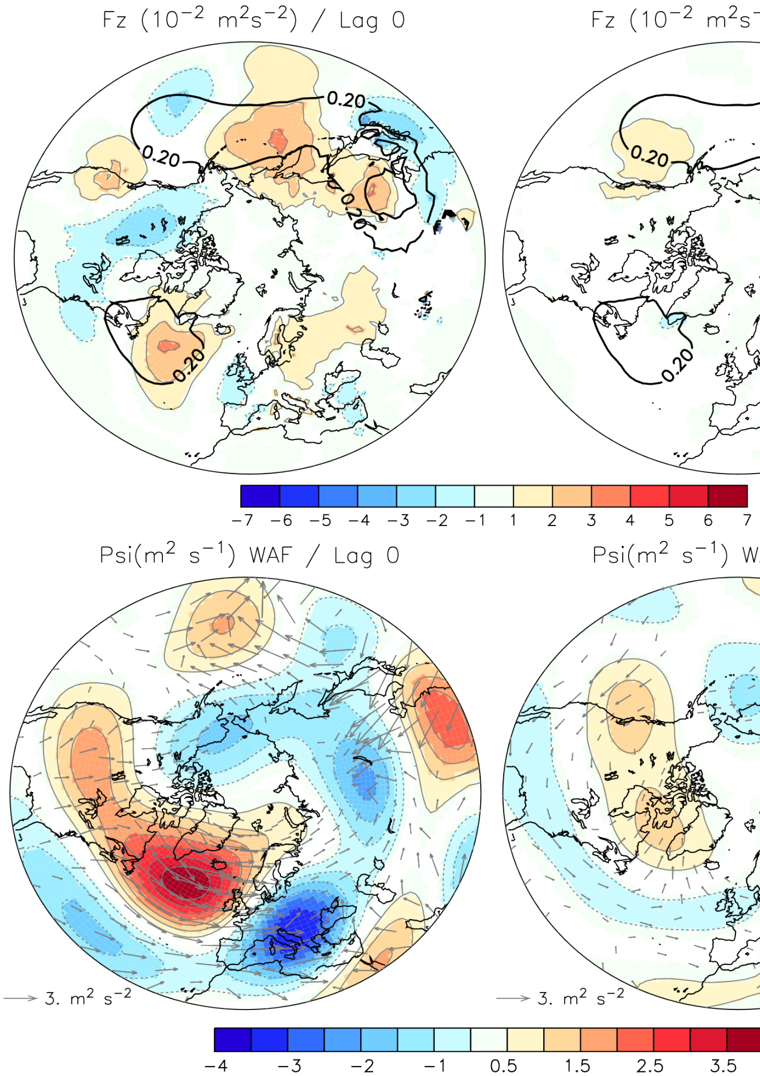

Figure S5: (Upper panels) Regression of the 500-hPa vertical component of the Plumb flux, in m^2 s^{-2}, on January PC1$_{Int}$ in LMDZOR6. The thick black contours indicate the climatological 500-hPa vertical component of the Plumb flux (contour interval 0.2 m^2 s^{-2}). (Lower panels, color shade) Regression of the 250-hPa quasi-geostrophic horizontal streamfunction anomalies, in m^2 s^{-2}, and (vectors, in m^2 s^{-2}) horizontal component of the 250-hPa Plumb flux on January PC1$_{Int}$ in LMDZOR6. The lag is in month and is positive when PC1$_{Int}$ lags. The regressions only use the anomalies associated with the internal atmosphere-land variability, after the removal of the corresponding ensemble mean.

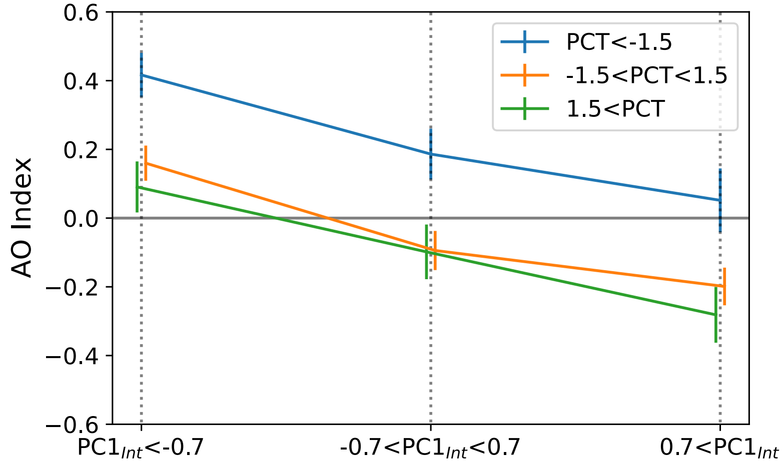

Figure S6: Composite of the February AO (first normalized PC of the sea level pressure north of 20°N) generated by averaging the February AO for January $PC1_{Int}$ value below -0.7, within -0.7 and 0.7 and above 0.7, and anomalous January PCT_{50} value (blue line) below -1.5°C, (yellow line) within -1.5°C and 1.5°C and (green line) above 1.5°C. The error bar shows one standard deviation.