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Interglacial dynamics: atmospheric teleconnections and climate response

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Large-scale atmospheric patterns are examined on orbital timescales using the ECHO-G climate model which explicitly resolves the atmosphere - ocean - sea ice dynamics. It is shown that in contrast to boreal summer where the climate follows mainly the local radiative forcing, the boreal winter climate is strongly determined by modulation of circulation modes linked to the Arctic Oscillation/North Atlantic Oscillation and the El Ni\~no Southern Oscillation. We find that a positive phase of the Arctic Oscillation/North Atlantic Oscillation is linked to below normal convection in the tropical Pacific. The related atmospheric circulation patterns induce non-uniform temperature anomalies, much stronger in amplitude than by the direct solar insolation. In concert with the direct solar insolation this provides for a temperature drop over the Northern Hemisphere continents for 115,000 years before present, also seen in the diagnosed vegetation cover. The spatial pattern of temperature changes induced by the atmospheric dynamics differ from a more hemispheric-wide cooling induced by oceanic freshwater in the northern North Atlantic which was possibly induced at the end of the last interglacial. It is argued that the large-scale teleconnection pattern are important for the interpretation of proxy data as well as for the mechanisms responsible for the last interglacial, glacial inception and millenial climate variability.