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Simulated change in storm track activity at the end of the last interglacial

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Time-slice experiments with the coupled ocean-atmosphere general circulation model ECHO-G (ECHAM4 atmosphere model at T30 resolution coupled to HOPE-G ocean model at T42) have been performed for the early phase of the Eemian interglacial at 125,000 years before present, the glacial inception at 115,000 years before present and the preindustrial phase. In these simulations orbital parameters have been adapted to the configuration at these dates. These dates represent periods with enhanced and weakened seasonal cycles of insolation on the northern hemisphere. Each simulation is run for several millennia. A long-term cooling trend occurs in the simulation of the glacial inception, which is associated with an expansion of permanently snow-covered areas in Northern Canada and an increase of the sea-ice volume of the northern hemisphere. The simulation shows that changes in the Earth's orbit and the induced changes in insolation are sufficient to iniciate a glaciation.

In this contribution we discuss the simulated changes in storm track activity. The storm tracks are calculated as the 2.5 - 8 day bandpass-filtered variance of the 500 hPa geopotential height of the winter season (DJF). At the glacial inception storm tracks are shifted southward over North America. A decrease occurs over regions with a perennial snow-coverage (esp. north-east Canada), whereas a strong increase is simulated over the Northern Pacific. This strong increase is related to the enhanced temperature gradient, which is caused by the strong cooling of the high northern latitudes. An increase is also simulated for large parts of Europe, especially in the south-east.

The simulated patterns of precipitation change are strongly related to the change in storm track activity. A reduction of precipitation occurs over the high latitudes of

North America. Despite the reduced moisture availability, a long-term accumulation of snow occurs. Due to the reduced temperatures the fraction of precipitation falling as snow is significantly increased in this area. The accumulation starts in regions that are dominated by cold southward winds from the Arctic.