Geophysical Research Abstracts
Vol. 12, EGU2010-2242, 2010
EGU General Assembly 2010

Impact of polar air ejections in the North American area during the Weichselian Late-Glacial

Didier SOTO
University Lyon III, Geography, Lyon, France (didier.soto@gmail.com)

This last winter, the Northern Hemisphere had been struck by very low temperatures, resulting from polar air ejections into North America, Europe and Asia. This global cold situation can be assimilated to a rapid general circulation mode, already known, on a much larger scale, during glacial times, such as the Weichselian Lateglacial (16 900 – 11 700 BP).
To better understand the climatic impact of these polar fluxes, we propose a modelling of continental landscapes in North America, thanks to NOAA-NCDC data compiled in a Geographical Information System. For this purpose, pollens are one of the most interesting indicators because they allow an assessment of the vegetation dynamic and also supply sharp quantitative estimates of the environment.
During the Weichselian Lateglacial, thick ice-sheets were widespread from the Rocky Mountains to the Atlantic and from the Canadian Arctic to the Great Lakes, trapping the Arctic cold air north of the Laurentide ice-sheet. However, its rapid melting created new opportunities for the circulation of polar air mass, particularly between the Rockies and the Laurentide ice field. Because the climatic precession triggered a high thermal deficit in polar latitudes, even if the summer irradiance was reaching its maximum, strong and cold air lenses left the Arctic basin towards the Gulf of Mexico with a meridian component. Along their paths, they generated a severe cold return, as shown by the migration of arcto-alpines species. The unceasing processing of these powerful highs also contributed to a northward deviation of the surrounding airflows from the current Florida to the Great Lakes, favourable to relative warmer and wetter conditions, as revealed by paleoenvironmental data.
It seems now obvious that the recent cold spells in North America highlight a tendency to the establishment of a more rapid atmospheric circulation mode in the northern hemisphere, especially during the winter season.