



More Variable and Stronger Winds during the Last Glacial

Stephan Dietrich (1,2), Martin Werner (2), and Gerrit Lohmann (2)

(1) Federal Institute of Hydrology (BfG), Koblenz, Germany, (2) Alfred Wegener Institute, Helmholtz Center for Polar and Marine Research, Bremerhaven, Germany

Changes of wind systems and thus of atmospheric circulation patterns are an essential feature of fast climate changes that explain hemispheric wide teleconnections. Here, we present the synoptic interpretation of prevailing paleo wind systems for Central Europe during glacial times and compare the results with a proxy record of changes from easterly to westerly wind directions from maar lake sediments (Germany). This record indicates a high amount of east wind and a high variability on a millennial time scale of wind direction changes for the last glacial period. The basic observations, made on the proxy record, are also shown in the 10 m-wind vectors in ECHAM3 and ECHAM4 model experiments under glacial conditions with different prescribed sea surface temperature patterns. However, all glacial experiments show a lower frequency of east wind in comparison to the present-day control runs. But all glacial runs show a high variability of wind direction changes and stronger winds in comparison to the present-day control runs. Furthermore, the analysis of long-persisting east wind conditions (so-called LEWIC events) in the AGCM data shows a stronger seasonality during glacial conditions: all different experiments are characterized by an increase of the relative importance during spring and summer. Synoptic analysis of the air flows with prevailing east wind over Central Europe are given for the spring which is the most important season for dust emission. Under present-day conditions easterly wind directions are mainly forced by a strong high over the Baltic Sea realm. The different glacial experiments show in good agreement a shift from a long-lasting high from the Baltic Sea towards NW, directly above the Scandinavian Ice Sheet, together with the contemporary occurrence of enhanced westerly circulation at the North Atlantic.