Geophysical Research Abstracts
Vol. 21, EGU2019-18815, 2019
EGU General Assembly 2019

The evolution of the Eurasian Ice Sheet on millennial time scales during the Last Glacial Period

Jorge Alvarez-Solas (1,2), Rubén Banderas (1,2), Alexander Robinson (1,2), Marisa Montoya (1,2)

(1) Universidad Complutense de Madrid, Facultad de Ciencias Físicas, Física de la Tierra y Astrofísica, Madrid, Spain, (2) Instituto de Geociencias, Consejo Superior de Investigaciones Cientificas-Universidad Complutense de Madrid, 28040 Madrid, Spain

The last glacial period (LGP; ca.110-10 ka BP) was marked by the existence of abrupt climatic changes on millennial time scales. Ice sheets are thought to play an important role in their occurrence or, at least, to have responded to these climate changes. While a considerable effort has been made to investigate the dynamics and evolution of the Laurentide Ice Sheet (LIS) during this period, the Eurasian Ice Sheet (EIS) has received less attention, particularly from a modeling perspective. Here we focus on the response of the EIS by using a hybrid, three-dimensional, thermomechanical ice-sheet model that includes ice shelves and ice streams. The model is forced offline including the effects of both atmospheric and oceanic variations. Our results show that the EIS responds with enhanced ice discharge in phase with interstadial warming in the North Atlantic when forced with surface ocean temperatures. Conversely, when subsurface ocean temperatures are used, an increase in ice discharge is found both during stadials and at the beginning of the interstadials. Separating the atmospheric and oceanic effects demonstrates the major role of the ocean in controlling the dynamics of the EIS on millennial time scales. While the atmospheric forcing alone is only able to produce modest iceberg discharges, warming of the ocean leads to higher rates of iceberg discharges and major grounding line reorganizations. Our results highlight the need for stronger constraints on the local North Atlantic behavior in order to improve our understanding of the ice sheet's glacial dynamics and its implication in the occurrence of millennial-scale climate variability.