Poster # 103: Evolution of Arctic Oscillation in the Past 21 000 Years: A Modeling Study

Monday, January 13, 2020
04:00 PM - 06:00 PM
Boston Convention and Exhibition Center - Hall B

Arctic oscillation (AO) is one of the most effective modes linked to mid-latitude wintertime weather and climate in the Northern Hemisphere. The long-term variability of AO's mean state and its amplitude in the past 21,000 years, due to lack of observations, still remains unknown. In present work, we investigate the AO's behavior and features in a transient simulation covering the last 21,000 years using NCAR CCSM3, suggesting that: 1) Two AO modes, glacial mode and interglacial mode, can be precisely identified in our preliminary results. The mean state of AO and its interannual amplitude in the glacial mode are distinctly weaker than those in the interglacial mode. 2) AO's interannual amplitude is proportional to AO's mean state of south-to-north pressure gradient throughout the last 22,000 years. 3) The changes of land ice sheets over North America and Scandinavia play a key role in modulating mid-latitude atmospheric circulation and AO's variability through upward propagating Eliassen-Palm fluxes and thermal wind relations. Our results show the wide range of AO's natures on up to orbital timescale, which significantly improve our understanding of AO's evolution since Last Glacial Maximum (LGM), and provide the community a potential modeling sample for reconciling various paleoclimate observations.

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