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Bipolar Synchronicity: Global Atmosphere and Ocean Teleconnections during Dansgaard-Oeschger Oscillations

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Studies using the temporal synchronization of ice cores from Antarctica and Greenland along with coupled climate model simulations of abrupt climate change during the glacial have been used to investigate the interhemispheric climate connection during Dansgaard-Oeschger (D-O) events. It has been proposed that Antarctic climate responds to Northern Hemisphere changes with an oceanic lag of approximately two centuries along with a near instantaneous reorganization of the global atmospheric circulation. In this presentation, results from coupled climate model simulations that accurately simulate the proxy inferred temperature variability from polar ice cores demonstrate a decadal scale synchronization between the poles during D-O transition points. The atmosphere and oceanic teleconnections that are responsible for the discrepancies between this study and previous studies are described. Previously published results that presented a process-based understanding for the bipolar seesaw are further elaborated upon with new modelling studies. In addition to this, we present the dominant atmospheric modes of variability that result in Antarctic temperature heterogeneity. These include the influence of the Southern Annular Mode (SAM) and the Pacific South American (PSA) pattern on Antarctic climate variability and their corresponding teleconnection with decadal El Nino-Southern Oscillation (ENSO) variability and the Atlantic Multidecadal Oscillation (AMO).