



Sea Ice Versus Storms: What Drives Sea Salt Variability in Arctic Ice Cores?

Rachael Rhodes (1), Xin Yang (2), and Eric Wolff (1)

(1) University of Cambridge, Department of Earth Sciences, United Kingdom (rhr34@cam.ac.uk), (2) British Antarctic Survey, Cambridge, United Kingdom

Salty blowing snow lofted from the surface of sea ice may be an important source of sea salt to the polar atmosphere. For paleoclimatologists, this is significant because it provides a mechanism by which sea salt in ice cores could record information about past sea ice extent. However, interpretation remains ambiguous due to the competing influence of changes in sea ice and changes in meteorological conditions that determine aerosol transport and deposition. Here we use a chemical transport model to investigate the relative influence of these two processes at the inter-annual scale on Greenland and other high Arctic ice core sea salt sodium records. For ice cores from the interior of Greenland, our simulations suggest that the sodium budget is dominated by sea salt from the open ocean and that inter-annual variability is primarily driven by meteorological conditions not the strength of aerosol emissions. In contrast, for coastal high Arctic cores, the sea ice surface is the principal source of aerosol, with inter-annual variability strongly linked to changes in aerosol emissions. We suggest that high Arctic ice cores may record decadal to centennial scale sea ice variability over the Holocene.