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A tale of two ice core dust records from the Allan Hills, Antarctica

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Our ability to study past changes in ice sheet extent, surface wind intensity and direction, and large-scale fluctuations in climate is possible through the study of mineral dust preserved in paleoclimate records. In peripheral portions of the East Antarctic Ice Sheet, such as the Allan Hills, dust preserved in the ice core record has provided more regional or nuanced records of Earth's climate, [1, 2] whereas ice core records from the East Antarctic Plateau may represent more hemispheric records of global climate. In this talk, I will highlight records of dust preserved in the Allan Hills ice core record spanning the transition from Marine Isotope Stage (MIS) 6 to 5e (~147 to 120 ka) from core ALHIC1903 and ice ranging in age from 4.053 Ma to 532 ka from core ALHIC1901. In this first case study, we use measurements of dust flux and geochemical and isotopic composition of the ice core dust to demonstrate that the dust composition during the last interglacial warm period (MIS 5e) was sourced from West Antarctica and the Transantarctic Mountains and is consistent with an open Ross Sea and/or a smaller West Antarctic Ice Sheet. In the second case study, we present a record of dust mass concentrations in the oldest ice from Antarctica and highlight the complexity of this record due to the complicated flow history. We find a lack of notable increases in dust mass concentration during glacial periods in ice younger than 800 ka. We attribute this absence of expected glacial peaks to either folding and deformation of the ice or low accumulation and high ablation rates during glacial periods. We then summarize our current progress in reconstructing the ice core dust history through a multi-proxy approach.

[1] Aarons et al. (2019) *Geophysical Research Letters*, 46, 2261–2270.

[2] Carter et al. In review *Science Advances*.