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A North Pacific Paleofire Proxy from the Denali Ice Core

Content

Wildfire is a key component of summer climate in the North Pacific, where fire activity is projected to increase with ongoing summertime warming. Due to decadal-scale climate fluctuations that dominate North Pacific circulation, direct observations of wildfires are insufficient to fully understand the relationship between summer climate and fire. Using the Denali Ice Core, we are developing a proxy record of paleofire in the North Pacific spanning the last ~1500 years. We have integrated a Single Particle Soot Photometer into the Dartmouth ICE Lab melter system and have retrieved high-resolution continuous black carbon concentrations over the full core. We also collected continuous discrete samples for measurement of aromatic acids (e.g. vanillic acid) and sugars (e.g. levoglucosan), which are produced solely from biomass burning. Using these ice core time series alongside instrumental fire records, burn area data, and back-trajectory models, we will be able to test the sensitivity of fire-climate relationships over time and investigate prior periods of warming, such as the Medieval Climate Anomaly (ca. 1000-1300 CE), when regional temperatures were perhaps as warm as the middle 20th century. In this presentation, we will highlight some preliminary results and interpretations from these analyses.

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