Cosmogenic Dating of Moraines to Evaluate Past Behavior of the East Antarctic Ice Sheet

Mathieson, Claire[1], Kaplan, Mike[2], Winckler, Gisela[2], Schaefer, Joerg[2]

[1] Barnard College, New York, NY; [2] Lamont-Doherty Earth Observatory, Palisades, NY

One of the most prominent questions as rising global temperatures become increasingly pressing is how the world's large ice sheets will fare under a warmer climate. Most previous studies concerning the East Antarctic Ice Sheet (EAIS) have been carried out in the relatively accessible Dry Valleys region and have addressed its behavior since the Last Glacial Maximum (LGM). Our study aims to determine when the ice sheet deposited the moraines at the remote Mt. Howe and Mt. Achernar sites in the central Transantarctic Range, data which will tell us about changes in the former height of the ice surface. Lining these dates up with known ^{18}O paleoclimate data can allow pre-LGM behavior of the ice sheet to be evaluated relative to various past climates. To obtain these dates, samples from boulders in the moraines were processed for cosmogenic dating. Cosmic ray spallation causes the isotope ^{3}He to form in surface materials such as the sampled boulders. By isolating the samples' pyroxenes and measuring their concentration of ^{3}He, we will determine how long the boulders were exposed at the surface prior to sampling and thus how long ago the ice sheet deposited each moraine. Preliminary data from measuring ^{10}Be – another cosmogenic nuclide found in quartz-bearing boulders in the same moraines – suggest the majority of the moraines were deposited long before the LGM, which would point to relative stability of the ice sheet, possibly for the past hundred thousand years or more. Analyzing the ^{3}He samples will result in a more comprehensive set of data and allow us to draw more solid and wide-ranging conclusions.