Geophysical Research Abstracts
Vol. 18, EGU2016-661, 2016
EGU General Assembly 2016

Reconstructing temperatures in the Maritime Alps, Italy, since the Last Glacial Maximum using cosmogenic noble gas paleothermometry

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The Gesso Valley, located in the southwestern-most, Maritime portion of the European Alps, contains an exceptionally well-preserved record of glacial advances during the late Pleistocene and Holocene. Detailed geomorphic mapping, geochronology of glacial deposits, and glacier reconstructions indicate that glaciers in this Mediterranean region responded to millennial scale climate variability differently than glaciers in the interior of the European Alps. This suggests that the Mediterranean Sea somehow modulated the climate of this region. However, since glaciers respond to changes in temperature and precipitation, both variables were potentially influenced by proximity to the Sea. To disentangle the competing effects of temperature and precipitation changes on glacier size, we are constraining past temperature variations in the Gesso Valley since the Last Glacial Maximum (LGM) using cosmogenic noble gas paleothermometry. The cosmogenic noble gases 3He and 21Ne experience diffusive loss from common minerals like quartz and feldspars at Earth surface temperatures. Cosmogenic noble gas paleothermometry utilizes this open-system behavior to quantitatively constrain thermal histories of rocks during exposure to cosmic ray particles at the Earth's surface. We will present measurements of cosmogenic 3He in quartz sampled from moraines in the Gesso Valley with LGM, Bühl stadial, and Younger Dryas ages. With these 3He measurements and experimental data quantifying the diffusion kinetics of 3He in quartz, we will provide a preliminary temperature reconstruction for the Gesso Valley since the LGM. Future work on samples from younger moraines in the valley system will be used to fill in details of the more recent temperature history.