Cosmogenic ^{3}He, ^{21}Ne and ^{10}Be production in xenoliths from Mount Hampton, West Antarctica

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Variation in mineral composition plays a significant role in the production rate of cosmogenic noble gases. Here we quantify the relative production rates of ^{3}He and ^{21}Ne in different minerals from lherzolite xenoliths from the peak of Mount Hampton (~3,200m), a Miocene shield volcano in West Antarctica, in order to test prevailing models for chemical control on production. Cosmogenic ^{3}He/^{21}Ne ratios from coexisting olivine, clinopyroxene and orthopyroxene range from 1.7 to 4.5 reflecting the compositional variation. Cosmogenic ^{3}He concentrations in olivine vary from 0.12 to 1.29×10^{9} atoms/g. The mean ^{3}He/^{21}Ne ratio (1.98±0.22) is consistent with the theoretical value and previous determinations.

Combining stable and radioactive cosmogenic nuclides is an established tool for revealing complexities of long-term landscape development. The WAIS is crucial to global sea-level change. We have measured cosmogenic ^{10}Be in Mt. Hampton olivine. ^{10}Be/^{3}He range from 0.012 to 0.018 and are consistent with 1-3 Ma of burial beneath ice. This contradicts the absence of evidence for ice cover. Non-steady state erosion is capable of generating the measured ^{10}Be/^{3}He. We aim to resolve this conundrum with inverse modelling.