Chemical weathering of soils in the King George Island, Antarctica: Evidence from lithium isotopes

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Although extreme environment, such as Artic and Antarctica, has been known for the lack of chemical weathering but severe physical weathering, it is unclear how and to what extent lithium isotope fractionation may occur during chemical weathering. Here, we collected 4 different types bedrocks (i.e., granodiorite, basaltic andesite 1 & 2, tuff, and the Sejong Fm.) and soil samples in the Barton Peninsula, King George Island, West Antarctica. We measured elemental and lithium isotope compositions of samples, and corrected the contribution of the dust input to soils using elemental ratios. The result shows that the dust input contributes max. 40% of total Li in soils. Lithium isotope compositions (δ^7Li) of bedrocks are various, on average, according to rock type, ranging from 0.6‰ in the Sejong Fm. to 11.7‰ in basaltic andesite 2. Likewise, δ^7Li values of soils are also various, ranging from -2.5‰ in the Sejong Fm. to 6.9‰ in granodiorite. The result that soils have lower δ^7Li values compared to the bedrocks indicates that Li isotope fractionation occurs during the soil formation because ^{6}Li is incorporated into secondary minerals.