^{10}Be IN AUSTRALASIAN MICROTEKTITES COMPARED TO TEKTITES: SIZE AND GEOGRAPHIC CONTROLS

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High ^{10}Be contents in tektites reported in the literature [1,2] are evidences of a source material enriched in atmospherically produced ^{10}Be, i.e. a soil or recent sediment. The geographically averaged ^{10}Be concentrations of Australasian tektites, ranging from 69 x10^6 (Indochina) to 136x10^6 atoms/g (Australia) [1], increase with distance from their putative impact location in Indochina. Here, we report ^{10}Be contents in microtektites collected in Antarctica and the South China Sea. Two samples composed of 15-20 microtektites larger than 400 µm were measured at each site. The resulting mass of circa 3 mg for each sample leads to analytical uncertainties of roughly 10x10^6 atoms/g. Regarding the measured ^{10}Be concentration, the difference between the duplicates from Antarctica and the South China sea being 18 and 7 x10^6 atoms/g, respectively. We show that microtektites are ~30x10^6 ^{10}Be atoms/g richer than tektites from the same geographic areas. Antarctic microtektites, with an average ^{10}Be content of 184±8 x10^6 atoms/g after correction for in situ-production, are the richest ^{10}Be content impact melt ever measured. A 0.6 mg Australasian microtektite pool of unknown provenance and diameter range yielded a non significantly different value of 260±60 x10^6 atoms/g [3] . The simpler explanation for such systematic size and geographic trends is that the source depth of the melt within the target surface decreases with ejection velocity, the target being a thin layer of continental soil or sediment covering a ^{10}Be poor bedrock. Indeed, higher initial kinetic energy implies higher launch distances and higher fragmentation of the ejecta. Antarctic microtektite source depth may tentatively be restricted to the first tens of cm. We will discuss alternative models invoking: 1) a thick marine or loessic sediment source; or, 2) a secondary enrichment in the microtektite (either by atmospheric scavenging, volatilization or host contamination). Nevertheless, they seem to fail to reproduce the observed relationships. Considering the first potential alternative explanation, there is no general systematic decrease of ^{10}Be content versus depth along thick sedimentary deposits, making it difficult to generate the observed systematic trends.

References:

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