Seawater and sedimentary $^{10}Be/^{9}Be$: a quantitative proxy for present and past terrigenous flux into the oceans

FRIEDHELM VON BLANCKENBURG[1] AND JULIEN BOUCHEZ[1,2]

[1]GFZ German Research Center for Geosciences, Potsdam, Germany, Earth Surface Geochemistry, (*correspondance: fvb@gfz-potsdam.de)
[2]IPG Paris, Université Paris Diderot, France

Traditionally, the radiogenic isotopes (Sr, Os, Nd, Pb) are measured in sediment as proxies for changes in weathering flux. However, these isotopic ratios are only indirect indicators of flux, and rather provide mostly information on the source and the style of weathering. The $^{7}Li/^{6}Li$ stable isotope ratio is now gaining increasing popularity, but it does not necessarily record flux but tracks instead the ratio of dissolved to solid Li export by rivers. In contrast, we suggested recently that the ratio of the meteoric cosmogenic radionuclide ^{10}Be to the stable isotope ^{9}Be is a quantitative flux proxy of terrigenous input into the oceans [1, 2]. We evaluate this proxy for terrigenous inputs by using published dissolved seawater Be isotope data and a compilation of global river loads. We find that the measured global average oceanic dissolved $^{10}Be/^{9}Be$ ratio of about 0.9×10^{-7} is satisfied by this mass balance if only about 1% of the ^{9}Be mobilised by weathering and erosion is eventually released to the open ocean after escaping the coastal zone. As the seawater $^{10}Be/^{9}Be$ ratio is faithfully recorded in marine chemical precipitates the $^{10}Be/^{9}Be$ ratio extracted from authigenic sediments can now serve to estimate relative changes in terrigenous input into the oceans back through time on a global and on an ocean basin scale. Using such records, we show that the terrigenous flux into the oceans (as seen though the eyes of the $^{10}Be/^{9}Be$ proxy) was remarkably stable in the geologic past.

[1] von Blanckenburg, F. and J. Bouchez, *River fluxes to the sea from the oceans $^{10}Be/^{9}Be$ ratio. Earth and Planetary Science Letters,* 2014. **387**: p. 34-43 [2] von Blanckenburg, F., J. Bouchez, and H. Wittmann, *Earth surface erosion and weathering from the ^{10}Be (meteoric)/^{9}Be ratio. Earth and Planetary Science Letters*, 2012. **351-352**: p. 295-305