Geophysical Research Abstracts
Vol. 15, EGU2013-4316, 2013
EGU General Assembly 2013

Continental scale fluvial sediment recycling as expressed by a constant cosmogenic nuclide ratio in sand supplied from the Nile River over the last 2.5 Ma

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Quartz in the eastern Mediterranean coastal plain is supplied through an extended transport system, which includes the Nile River, east Mediterranean longshore currents, and inland (Aeolian) sand transport. During this long and complex transport system, quartz grains are dosed with cosmogenic nuclides. While the concentrations of 26Al and 10Be, and their ratio, in modern sand deposited along the coast of the eastern Mediterranean reflect the combined effect of sand exposure and burial during transport, the concentrations of these nuclides in ancient buried sand are the result of decay of such an initial dosing. Samples of modern exposed sand (n=3) collected from the coastal plain of Israel yield an average 26Al/10Be ratio of 4.8$\pm$0.2, significantly lower than the expected ratio of 6.8 for exposed quartz grains at the surface. This ratio is equivalent to an apparent burial period of $\sim$600 ka. A ratio of 4.5$\pm$0.3 was measured in a Pleistocene last glacial sand sample. This ratio is similar, within 1σ to the average ratio of the modern sand indicating similar exposure-burial histories during transport in spite of the difference in climatic conditions. The results imply a steady, pre-burial cosmogenic nuclide ratio related to the Nile River's ability, through storage and recycling, to buffer the effects of climatic and tectonic perturbations on cosmogenic nuclide concentrations in the transported quartz. All ancient and buried sand samples (n=9) fall on a decay path which originates from concentrations and ratio of 26Al and 10Be in modern sand suggesting steady pre-burial concentrations of cosmogenic nuclides in quartz sand over the past 2.5 Ma.