Geophysical Research Abstracts
Vol. 15, EGU2013-817, 2013
EGU General Assembly 2013

Can cosmogenic nuclides (^{36}Cl) unravel the timing of dislocation of tsunami blocks on Bonaire (Leeward Antilles)?

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On Bonaire (Leeward Antilles) and rocky coasts worldwide, high-energy wave events (tsunamis, storms) dislocate coarse-clast deposits (Engel and May, 2012). Using these onshore blocks and boulders to derive ages for the most powerful events on millennial scales is still a major challenge. We apply terrestrial cosmogenic nuclides (TCN), in particular ^{36}Cl, in case of the largest blocks in order to directly date the transport event(s), $i.e.$ the inferred tsunami(s). This dating method has hitherto been disregarded in the coastal environment, particularly in the context of block transport. The following characteristics of the blocks are fundamental for the success of the presented dating approach: (1) due to the lithology (aragonite, calcite), concentration measurements of ^{36}Cl are performed; (2) only large and thick boulders and blocks ($>$50 t, $>$2 m thickness) for which tsunami transport was inferred (Engel and May, 2012) were sampled; (3) since the boulders stem from the edge of the coral reef platform, they had been exposed to cosmic radiation prior to the transport event(s) and had already accumulated a certain amount of TCN. To avoid this problem of inheritance, we only sampled the thickest clasts, and those having experienced a 180° overturn during transport; thus, having exposed a "blank" side to cosmic rays only since the event. The complete overturn is attested by the presence of inactive rock pools in upside-down position and bioerosive notches.

Engel, M., and May, S. M.: Bonaire's boulder fields revisited: Evidence for Holocene tsunami impact on the Leeward Antilles, Quat. Sci. Rev., 54, 126–141, 2012.