Long residence time of sediments in small catchments

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Recent work has shown that sediments can reside for as little as a thousand years (Iceland) to as long as several hundreds thousand years (Amazon lowlands) in river basins [1]. This time scale, termed the *sediment residence time*, integrates storage in soils and transport in the river. Such information is important because it can be used as a proxy for the response time of catchment erosion to changes in environmental conditions (tectonic, climatic or anthropic).

Most previous studies have focused on large catchments, where the sediment residence time is controlled by a large number of variables. Here, we investigate erosion processes in two small (< 50km^2) granitic catchments in southeastern Australia (temperate climate) and Puerto Rico (tropical). In both cases, the sediment residence time is controlled by the time required to develop the thick weathering profiles (~ 20m) encountered in these catchments. The uranium-series isotope composition of the river sediments suggests sediment residence times on the order of 100,000 years. This contrasts with the short residence times inferred from studies in Iceland (1,000-6,000 years; [2]). This could suggest that, in the relative absence of tectonic activity and rejuvenation of bedrock outcrops, the development of thick weathering profiles is promoted, resulting in long sediment residence times. A broader consequence of our observations is that catchments in tectonically active regions (e.g. Iceland, Andes) adapt to changes in environmental conditions (or reach equilibrium) faster than those in tectonically quiescent areas.

[1] Dosseto *et al.* (2008) *Earth Planet. Sci. Lett.* **265** (1), 1-17.
[2] Vigier *et al*. (2006) *Earth Planet. Sci. Lett.* **249**, 258-273.

Spatial distribution of isotopic composition of precipitation and brackish water in Greece: Evidence of seawater intrusion

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This study reviews all available stable isotopic data concerning precipitation and brackish (spring and boreholes) water in Greece, from the 60’s until today. The spatial variation of precipitation is investigated in order to provide basic information and identify the locally significant parameters that affect δ^2H distributions. Based on the obtained results, the first maps of the δ^2H composition of water precipitation and brackish (spring and boreholes) water over Greece has been drawn up. The main features of the δ^2H of water precipitation map are the following: (1) a depletion of δ^2H in rainwater precipitating at higher altitudes (altitude effect), (2) a gradual positivisation of δ^2H in relation to the location of the stations relatively to the sea, (3) a large area with relatively depleted values observed in E Greece as a result of lower altitudes and a possible orographic shadow effect (Pindos mountain ridge), (4) the highest δ^2H values in rain water for all Greece are reported in south, showing hot and dry climate and the contribution of vapour derived from the ‘close’ Aegean Sea, (5) particular microclimatic conditions in Attica, normal for areas around large cities. The brackish (spring and boreholes) water map over Greece show a different isotopic composition from precipitation water suggesting an important participation of seawater in several coastal areas across Greece. In fact, according to the variation of Cl^- versus δ^2H and δ^{18}O, all the water samples are on an ideal mixing line between seawater and fresh water. Based on the stable isotope - Cl^- relations, balance equations can be used to determine the marine contribution for these samples. These balances give very similar results and reveal that the sea intrusion in several areas in Greece is very important.