New terrace ages better constrain the uplift history for the Mejillones Peninsula, northern Chile

Ariane Liermann (1), Tibor Dunai (1), Steven Binnie (1), Stefan Heinze (2), Alfred Dewald (2), Pia Victor (3), and Gabriel González (4)

(1) Institut für Geologie und Mineralogie, Universität zu Köln, Köln, Germany, (2) Institut für Kernphysik, Universität zu Köln, Köln, Germany, (3) Deutsches GeoForschungsZentrum GFZ, Potsdam, Germany, (4) Departamento de Ciencias Geológicas, Universidad Católica del Norte, Antofagasta, Chile

The Mejillones Peninsula is a promontory extending spectacularly from the northern Chilean coastline. The peninsula is marked by well preserved marine terraces extending from just above sea-level to greater than 400 m. These staircased planar expressions result from a combination of glacioeustatic sea-level fluctuation and tectonic uplift. It has been shown by several studies that such terraces are formed during interglacial marine high-stands and are preserved because of abandonment in intervening sea-level low-stands. Post Mid Pleistocene transition high-stands (MIS 1 to 19) were within 10 m of the current sea-level (Siddall et al. 2006). We present cosmogenic $^{10}$Be exposure ages from marine pebbles deposited on the surface of the terraces when they were at sea-level in order to constrain the uplift history of the northwestern highland part of the peninsula. Based on the mean age (n=10) of the oldest terrace measured (~140 m) we obtain an average uplift rate of ~0.3 m/ka for the last ~465 ka. This average uplift rate can be subdivided into a recent slower and an older, more rapid rate. The average uplift rate between ~465 and ~280 ka was ~0.6 m/ka, and based on the observed linear increase in age with altitude the uplift was steady throughout this period. However, for the last ~280 ka we calculate a slower uplift rate of ~0.1 m/ka. Tracing the surface expressions of the marine terraces northwards we observe an anomalous increase of >100 m elevation over length-scales of ~2 km. This suggests different amounts of tectonic uplift for adjacent regions within the northern part of the peninsula. From a single terrace surface (288m) in the more elevated region we measured an exposure age of ~405 ka, compatible with the temporal framework of uplift defined by the lower elevation ages. However, the higher altitude of this terrace, in comparison to the adjacent, lower region suggests a more rapid rate of uplift (~0.7 m/ka) and thus differential uplift within the northern part of the peninsula in recent times. The ~0.1 m/ka rate of uplift we measure over the last ~280 ka is similar to other estimates for the regional uplift rate of the north Chilean coastline (~0.2 m/ka). However, the high uplift rates of the northern tip of the Mejillones peninsula, ~0.7 m/ka, significantly exceeds this value.