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

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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 ($\sim$140 m) we obtain an average uplift rate of $\sim$0.3 m/ka for the last $\sim$465 ka. This average uplift rate can be subdivided into a recent slower and an older, more rapid rate. The average uplift rate between $\sim$465 and $\sim$280 ka was $\sim$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 $\sim$280 ka we calculate a slower uplift rate of $\sim$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 $\sim$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 $\sim$405 ka, compatible with the temporal framework of uplift defined by the lower elevation ages. However, the higher altitude of this terrace, in comparison to the adjacent, lower region suggests a more rapid rate of uplift ($\sim$0.7 m/ka) and thus differential uplift within the northern part of the peninsula in recent times. The $\sim$0.1 m/ka rate of uplift we measure over the last $\sim$280 ka is similar to other estimates for the regional uplift rate of the north Chilean coastline ($\sim$0.2 m/ka). However, the high uplift rates of the northern tip of the Mejillones peninsula, $\sim$0.7 m/ka, significantly exceeds this value.

Siddall, M., J. Chappell and E.-K. Potter (2006). Eustatic Sea Level During Past Interglacials. *The climate of past interglacials*. F. Sirocko, M. Claussen, T. Litt and M. F. Scanchez-Goni. Amsterdam, Elsevier. **7:** 75-92.