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Structure and exposure history of a large marine terrace along the Cantabrian shoreline of northern Spain

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Along the Asturian shoreline of northern Spain, marine terraces are present along more than 200 km. These terraces appear mostly on Paleozoic bedrock and reach elevations of 260 m in the east, dropping to 60 m in the west. Digital terrain models from 1:5000 scale elevation data provide the detailed morphology, elevation and extension of the terraces. These analyses are complemented by combining the digital terrain models with detailed geological maps of the Quaternary cover and the Paleozoic bedrock.

In western Asturias, a single terrace extends for more than 100 km along the present coastline. It reaches up to 3 km in width and its altitude decreases westwards from about 100 m to 60 m above sea level. The terrace is bounded by steep near vertical cliffs on the seaward side, and steeper mountain slopes in the inland side. The soil cover is thin and weathering is generally small, with the bedrock not deeper than two meters below the surface. A thin veneer of marine deposits, including marine sands and rounded quartzite pebbles, found in some areas supports the identification of the terrace as marine. Along most of the area, the bedrock consists of steeply dipping Lower Paleozoic clastic sequences with frequent quartzite beds that trend at a high angle to the shoreline. From digital terrain modeling that combines elevation and slope variation the location of the paleo-shoreline angle can be determined., which marks the maximum sea level during formation of the marine abrasion surface. The present elevation of the paleo-shoreline angle reflects differential uplift along the coast. Several meter high, vertical steps, transverse to the terrace and generally coincident with

deeply incised river estuaries are interpreted to correspond to discrete, widely spaced faults that reactivate existing bedrock anisotropy.

Analyses of the 21Ne content in quartz grains from quartzite bedrock and pebble samples are currently underway to date the exposure time of the surface to cosmic rays. Preliminary results indicate 21Ne model ages between 200 and 500 ka for the 100 m elevation terrace, i.e. around the Middle Pleistocene. The roles of erosion or temporary burial are yet to be addressed and may significantly affect these numbers. Four of the samples have also been analyzed for 10Be and 26Al content in an attempt to estimate both exposure age and erosion rate. However, 10Be ages are generally lower than 21Ne ages, indicating a complex exposure history of the terrace.