ICG2022-99, updated on 28 May 2023
https://doi.org/10.5194/icg2022-99
10th International Conference on Geomorphology

Chronology of fossil climbing dunes on the Galician cliff coast (NW Spain) formed during MIS8, MIS6, MIS4 and MIS2 regressive episodes. Past and present of the coastal aeolian record

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The Atlantic coast of Galicia (NW Spain), about 1,700 km long, alternates deep inlets on the mainland (as wide estuaries called rias) with rocky cliffs up to 600 m high (due to neotectonics). Along this irregular coastline, numerous dune deposits (aeolianites) are preserved, which are formed by thin sandy and silty-sandy wedges (<5 m) and a variable extension - not always fully recognisable due to the dense vegetation cover and slope dynamics. These aeolianites are found both in open coastal areas and in the interior of the Galician Rias, reaching heights of up to +45 m above present sea level (and even higher). Grain size, morphological and microscopic analyses (scanning electron microscopy; SEM) have been performed for determining the aeolian origin of sands. Their location on cliff areas, where there are no sand beaches today, suggests that they are ancient climbing dunes deposited during sea level drop events at the end of the Pleistocene. The ages estimated by optically stimulated luminescence (OSL) for these deposits range between 17 ky and 35 ky. Infrared stimulated luminescence (IRSL) was also used for dating four other deposits, providing ages around 66 ky, 128 ky and 131 ky and 166 ky. Additionally, the oldest climbing due to date in the Iberian Peninsula is located in this area, providing an age around 300 ky. All such ages were obtained at the Luminescence Laboratory of the University of Coruña. The formation of such deposits and transport of sand towards the areas now occupied by the present coastline occurred during the isotopic stages MIS2, MIS4, MIS6 and MIS8. During these stages, the sea level dropped between 50 m and 120 m (relative to present sea level), shifting the coastline several kilometres away (>20 km) and exposing a wide strip of the continental shelf covered by sands that would act as a source area. The continuous wind blowing and the wind strength due to the Venturi effect caused by the highest rocky reliefs, favoured the advancing of the climbing dunes to a height of more than 200 m (above sea-level at the time), resulting in the deposits still preserved today. The inland transport of these materials by coastal winds during maximum regressive events was progressively stopped as sea level rose during interglacials (such as the Eemian and Holocene) when sand source areas were flooded. As the sea reaches its maximum transgressive levels, these dunes are severely affected by both alternating wind (blow-out and storm corridors) and then marine erosion (washover fans) that destroys both relict and recent (<10 ky) deposits, contributing to quick erosion process of the sedimentary coastline that is considered a consequence of global warming during the Holocene interglacial.