

COASTAL GEOMORPHOLOGY

Rise of the dunes

Changes in climate and sea level impact the dynamics of wind-driven coastal systems, causing coastal plains to grow, shrink, or otherwise alter their surface morphology. The net effect of these changes is typically only apparent over long timescales (hundreds to thousands of years), which makes it difficult to directly observe large-scale morphological changes that result from changes in climate and relative sea level (RSL). However, the response of past

coastlines to changing conditions can be preserved in aeolian deposits of the sedimentary record.

Fernanda Rodrigues from the University of São Paulo, Brazil and colleagues characterized changes in coastal morphology along the Santa Catarina coastline in Brazil during the late Pleistocene and Holocene. A combination of remote sensing, ground penetrating radar, grain size analysis, and optically stimulated luminescence dating of aeolian

deposits revealed that, since the Last Glacial Maximum ~22,000 years ago (when RSL was about ~125 m lower globally than today) and through the beginning of the Holocene, the study area was largely dominated by sand sheets (relatively flat areas of sand). Then, 5,000–6,000 years ago, a higher RSL (reaching an estimated 2.1 m above current sea level in this region), wetter climate and higher input of sediments from rivers to the coast disrupted the local equilibrium and promoted the development of sand dunes. Dunes continue to be deposited through to present day, following the coastline seaward, but their migration rates have slowed over the past 4,000 years, owing to decreased rainfall and lower fluvial discharge.

Changes to the Earth system during the last 22,000 years have markedly impacted morphology and sand deposition along the coastline in Santa Catarina, and globally. Further understanding both natural and anthropogenic factors that perturb coastline processes, past and present, will help to predict coastal dynamics.

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Credit: Gettyimages/Maiquel Jantsch

ORIGINAL ARTICLES Rodrigues, F. C. G. et al. Deglacial climate and relative sea level changes forced the shift from eolian sandsheets to dune fields in southern Brazilian coast. *Geomorphology* <https://doi.org/10.1016/j.geomorph.2020.107252> (2020)