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## Blowout morphodynamics in southern Portugal

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Blowouts are sandy depressions of different shapes formed by wind-induced erosion of foredunes or dune fields. Their initiation has been linked to air flow acceleration due to the occurrence of irregularities in the topography caused by natural or human causes, or by the lack of vegetation, and they contribute to maintain the available sediment budget in barrier islands migrating inland. In this study, we investigated the morphometric characteristics (area, orientation, and shape/structure) and spatiotemporal evolution of a series of blowouts present in the foredune of a coastal stretch of 1.3 km situated in Ancão Peninsula (South Portugal) that has been retreating for the last 60 years. For that, a set of historical aerial photos, orthophotos, and Google Earth images, covering a 45-year period from 1972 to 2017, was analysed. In addition to the blowout mapping, the dune foot, trampling paths and human occupation (e.g. restaurants, walkways, umbrellas) observable in the previous imagery were mapped in order to find possible causes that could help explaining the observed foredune fragmentation and blowout development. Finally, we characterised the present-day plant species distribution along and across the study area in order to understand the impact of these landforms in the plant community and possible eco-morphological feedbacks. The findings showed that during the analysed period: (1) blowout dimensions ranged from 1.2 m<sup>2</sup> to of 2200 m<sup>2</sup>, with 50 to 80% of the blowouts displaying sizes below 100 m<sup>2</sup>; (2) the orientations of the smallest blowouts (below 100 m<sup>2</sup>) showed high variability (from SSE-NNW to W-E orientations), whereas the bigger ones (above 400 m<sup>2</sup>) were mostly SW-NE oriented, coinciding with the dominant winds in the area; (3) most of the blowouts had mixed shapes and branched structures, likely enhanced by human trampling; (4) the number of blowouts and their morphometric parameters were not clearly related with the shoreline retreat/progradation; and (5) the transition between the blowout lobes and the established foredune suffered a change in the plant community dominated by species such as *Artemisia campestris subsp. maritima*, suggesting a shift to burial tolerant species.

Besides wind conditions and shoreline changes, human pressure seems a very likely trigger of blowout morphology reinforcement and even blowout initiation in the area, although the origin of some of these features seems related also to already-existing irregularities in the topography, suggesting the fragility of this sector and supporting its tendency to migrate inland.