



## Direct and indirect effects of burrowing crab *Chasmagnathus granulatus* activities on erosion of southwest Atlantic *Sarcocornia*-dominated marshes

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**ABSTRACT:** Using field measurements and field experiments, we investigated the effect of a dominant Southwest Atlantic intertidal burrowing crab, *Chasmagnathus granulatus*, on the inland growth of tidal creeks and creek genesis in salt marshes. By burrowing intensively on marsh sediments, this crab changed sediment physical parameters, such as penetrability, water content, and shear strength, which are related to sediment resistance to erosion. There were positive relationships between crab density and activities occurring in the creek heads and creek growth rates. Field experiments show that the presence and activity of *C. granulatus* and the presence of their burrows enhance the growth rates of tidal creeks, promoting marsh erosion. When crabs were present, these creeks grew faster than did creeks in which crabs were excluded. Furthermore, the interaction (disturbance and herbivory) between crabs and the dominant halophyte marsh plant, *Sarcocornia perennis*, generate circular depressions that accumulate standing water (salt pans), which in turn facilitates the creation of new creeks in the marsh surface, which evolve, to a greater extent, into fully functional tidal creeks because of colonization by crabs, which in turn further enhances creek growth rates. These direct and indirect effects of crabs on marsh erosion provide strong evidence of the importance of bioturbation and biological processes to the erosion and geomorphology of marshes.

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