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Warming effects on biogeochemical cycling of algal wrack subsidies in Antarctic shores

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INTRODUCTION

Accumulation of macroalgal stranding, also known as algal wrack, is a common event in the intertidal sedimentary coastal rim worldwide. These external inputs of allochthonous biomass derive from detached primary production of the neighbor marine ecosystems, such as rocky shores. The response of decomposition of sedimentary organic matter to global warming has not been studied in Antarctic shores to date

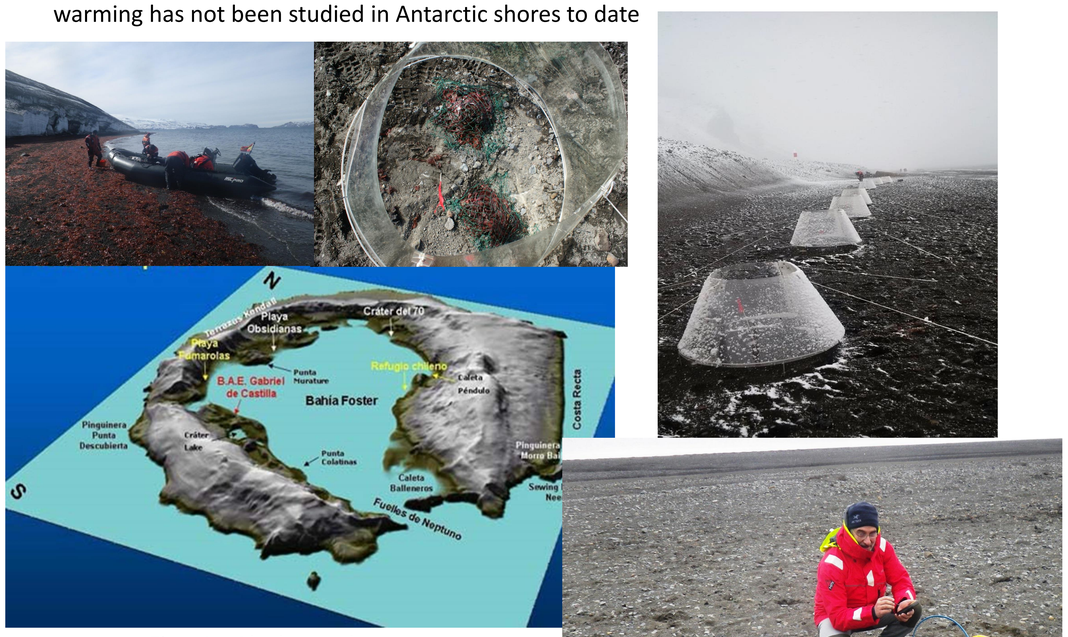


Fig. 1. Algal wrack; open top chamber; Foster Bay, Deception Island.

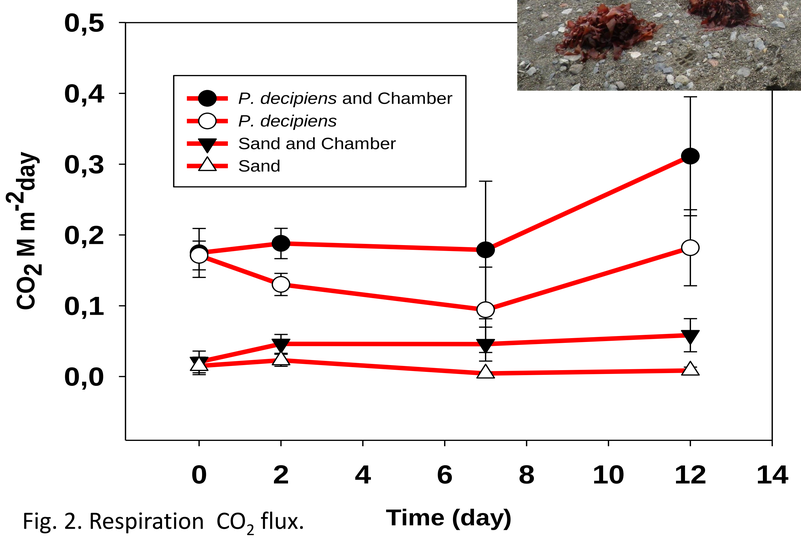


Fig. 2. Respiration CO_2 flux.

MATERIALS AND METHODS

We used passive open top chamber devices (OTCs) to increase ground temperature by green house effect within the range predicted by the IPCC for the Antarctic Peninsula (0.5-1.5 ºC), in the hypotheses that biogeochemical processing of macroalgal wrack deposits would accelerate in response to temperature increase (Fig. 1). The study was conducted in the intertidal sedimentary shores of Foster Bay, South Shetland Archipelago, North of Antarctic Peninsula (Fig. 1). Patches of *Palmaria decipiens* (Reinsch) and bare sand sites, with and without OTC chambers, were sampled at 2, 7 and 12 days.

RESULTS AND DISCUSSION

The results indicate that little warming accelerates decomposition process through traceable decrease in wrack moisture and increases in soil respiration through CO_2 flux, shifting from 0.182 a 0.311 moles m^{-2} day^{-1} (fig. 2.); inorganic nutrients release (Nitrites, Nitrates, Ammonia and Phosphates) (Fig. 3.), microbial pool and beach macrofauna also enhanced in the warmed trials (Fig. 4.). The response of these variables indicated that little increase in temperature affect significantly to the decomposition process of the stranded biomass in the Antarctic environments.

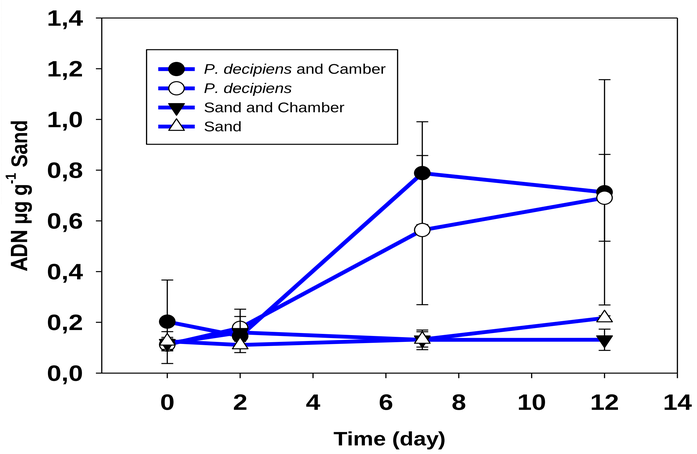
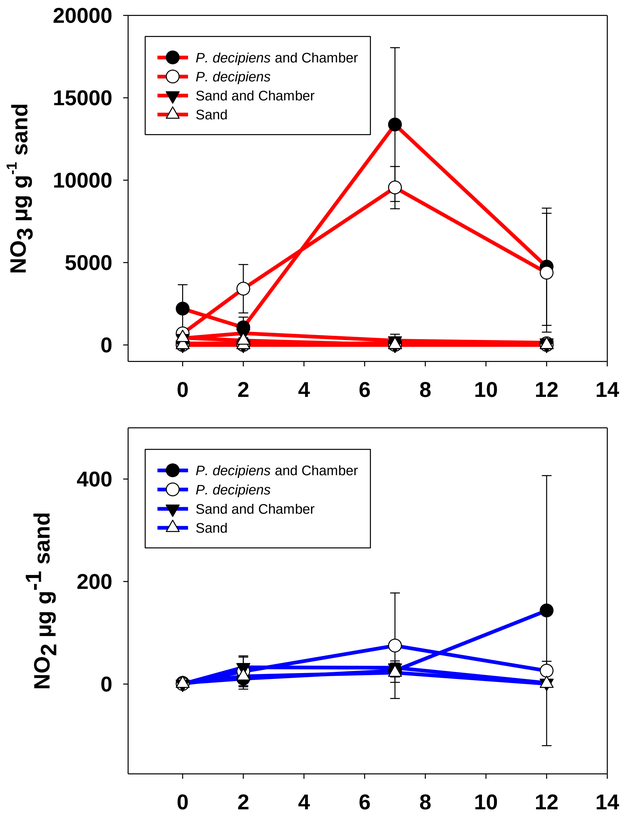


Fig. 4. Sedimentary ADN



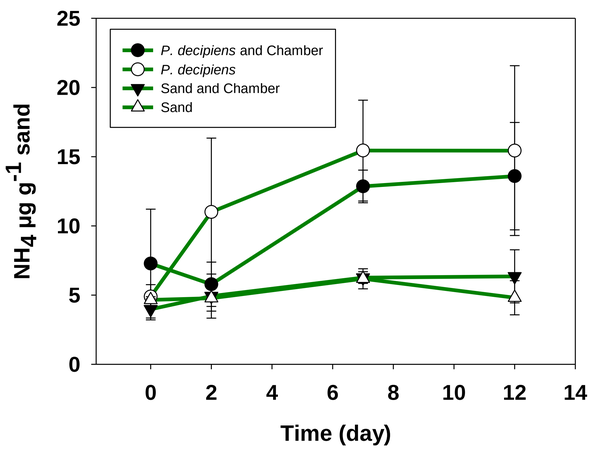


Fig. 3. Inorganic nutrients release.

CONCLUSIONS

This study highlights the important role of free of ice-free Antarctic sedimentary shores in recycling ocean derived organic matter in a changing scenario of global warming that predict significant increases in temperature along the next few decades for the Antarctic Peninsula.

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