

Complex dynamics in seagrass meadows in the Mediterranean Sea in a global warming scenario

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Seagrasses are a key element in the Mediterranean Sea, and the drastic demise of its population in the last decades has worrying implications for marine ecosystems. Temperature anomalies in the coastal water are expected to be intensified in the next years due to the global climate change. Temperature elevation has been observed to strongly affect the ecosystems of seagrass meadows worldwide, decreasing the shoot density, biomass and leaf productivity. This effect will be particularly relevant in the Mediterranean Sea in which endemic seagrasses (mainly *P. oceanica* and *C. nodosa*) and seaweeds (*C. prolifera*) compete. The different response to the thermal stress by the different species will alter the growth dynamics, their spatial distribution and, consequently, the ecosystem functionality.

In this study we present an individual based model able to develop complex spatial patterns from the application of elementary clonal growth rules. We monitor the change in the seagrass demography, the emergence of collective behaviour, and evaluate the resilience of these ecosystems in the Mediterranean, when the growth parameters (i.e. the shoot mortality and branching rates) and the interaction among species are triggered by the raise of the sea water temperature. [1]

[1] E. Llabrés, E. Mayol, N. Marbà and T. Sintes, *A mathematical model for inter-specific seagrass interactions: reproducing field observations for C. nodosa and C. prolifera*, Quantitative Biology, Populations and Evolution. arXiv:2202.03096 (2022).