

**On how tides affect the biological productivity of the Strait of Gibraltar-Alboran sea system: a numerical model study****José C. Sánchez Garrido, C. Naranjo, D. Macías, S. Sammartino, J. García Lafuente***University of Málaga, Spain.***Abstract**

The Mediterranean is an oligotrophic sea that exhibits a decreasing biological productivity pattern from West to East. The Alboran Sea (AS) is its most productive sub-basin as shown by in situ measurements, satellite images, and basin-scale numerical simulations. All these sources reveal a mean state characterized by an incoming jet of Atlantic Water meandering around two mesoscale anticyclonic gyres as it progresses to the Mediterranean. Differently to the gyres, which are largely oligotrophic, the jet and its surroundings are zones of great biological productivity. Given that Atlantic Waters are poor in nutrients such high productivity is explained by an active submesoscale dynamics, with potential to pump nutrients to the photic zone.

The above scenario is based on a hypothetical quasi-steady circulation and does not consider tides, particularly relevant in the Strait of Gibraltar. Tides in the Strait can (1) fertilize the incoming jet through the advection of mixed water from Tangier Basin at the lee side of Camarinal Sill (with origin in an internal hydraulic jump), or facilitate the entrainment of Mediterranean Water by the jet at the narrowest section of the Strait. In addition, (2) tides export nonlinear internal waves and other ageostrophic flows to the AS, giving rise to a more energetic submesoscale circulation. The role that these two processes play on the biological productivity of the AS is investigated with an ecosystemic Nutrient-Phytoplankton-Zooplankton-Detritus (NPZD) model embedded with a submesoscale-resolving tidally-driven circulation model. Results reveal that the join contribution of (1) and (2) increases the biological productivity of the AS in a factor of two.