SST COMO POSIBLE FORZAMIENTO DE LA VARIABILIDAD DE CLOROFILA-A EN EL MAR DE ALBORAN: ¿UNA FUENTE DE PREDICTABILIDAD ESTACIONAL?

POTENTIAL SST DRIVERS FOR CHLOROPHYLL-A VARIABILITY IN THE ALBORAN SEA: A SOURCE FOR SEASONAL PREDICTABILITY?

Jorge López-Parages[1,2], Iñigo Gómara[3,4], Belén Rodríguez-Fonseca[3,4], Jesús García-Lafuente[1,2]

[1] Department of Applied Physics II, Physical Oceanography Group, University of Málaga, Málaga, Spain, parages@uma.es

[2] Instituto Universitario de Biotecnología y Desarrollo Azul (IBYDA), University of Málaga, Málaga, Spain

[3] Departamento de Física de la Tierra y Astrofísica, Universidad Complutense de Madrid, Madrid, Spain

[4] Instituto de Geociencias (IGEO), Madrid, Spain

SUMMARY

This study investigates the link between climate modes of the sea surface temperature (SST) and the surface chlorophyll-a (Chl-a) concentration in spring along the northern flank of the Alboran Sea. To this aim, surface satellite-derived products of SST and Chl-a, together with atmospheric satellite variables, are used. Our results indicate that both the tropical North Atlantic and ENSO affect the distribution of Chl-a through the alteration of the usual upwelling taking place in northern Alboran in spring. Furthermore, the related SST signals might be used as predictors of this Chl-a response. In particular, during the El Niño/La Niña years, the Chl-a signal can be robustly predicted with 4 months in advance. On the other hand, the tropical North Atlantic SSTs allow to significantly predict, up to 7 months in advance, the Chl-a concentration in spring offshore. The results presented here could contribute to develop a future seasonal forecasting tool of upwelling variability and living marine resources in northern Alboran.

This study investigates the link between large-scale variability modes of the sea surface temperature (SST) and the surface chlorophyll-a (Chl-a) concentration in spring along the northern flank of the Alboran Sea. To this aim, surface satellite-derived products of SST and Chl-a, together with atmospheric satellite variables, are used. Our results indicate that both the tropical North Atlantic and El Niño Southern Oscillation (ENSO) could trigger the development of anomalous distribution patterns of Chl-a in spring in northern Alboran. This anomalous feature of Chl-a is, in turn, associated with the alteration of the usual upwelling taking place in northern Alboran at that time of the year. The skill of the related SST signals, over the tropical North Atlantic and the tropical Pacific, as predictors of the aforementioned Chl-a response in Alboran, has also been assessed through a statistical prediction model with leave-one-out cross-validation. Our results confirm the predictive skill of ENSO to realistically estimate the coastal Chl-a concentration in spring in northern Alboran. In particular, during the El Niño/La Niña years, this Chl-a response can be robustly predicted with 4 months in advance. On the other hand, the tropical North Atlantic SSTs allow to significantly predict, up to 7 months in advance, the Chl-a concentration in spring offshore, in particular by the north of the Western and the Eastern Alboran gyres. The results presented here could contribute to develop a future seasonal forecasting tool of upwelling variability and living marine resources in northern Alboran.

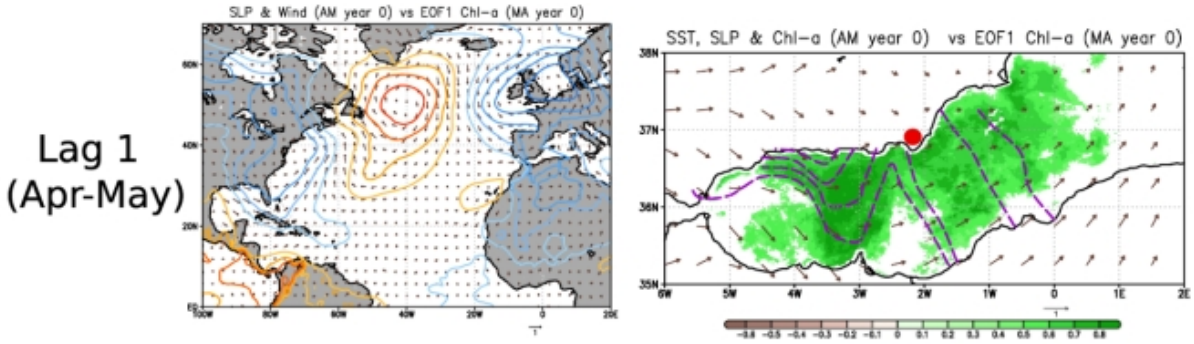

Figure 1 – From right to left: 1) leading EOF mode of Chl-a in spring in the Alboran Sea (shaded) and related SST (contours) and surface winds (vectors), 2) SLP (contours) and surface wind (vectors) in the North Atlantic related to the Chl-a in Alboran.

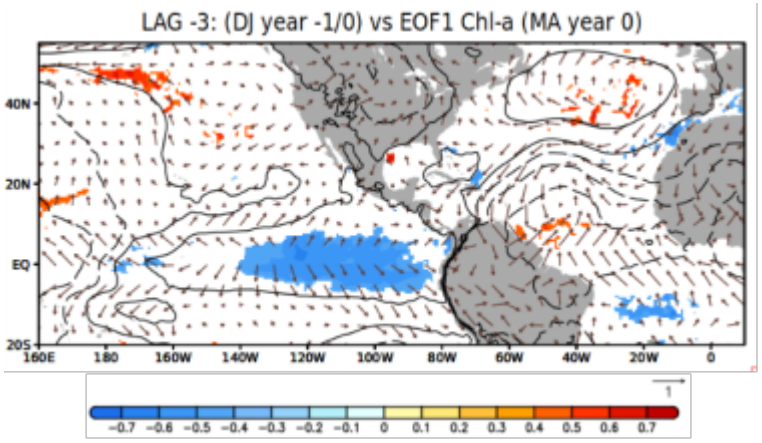

Figure 2 – SST (shaded), SLP (contours) and surface wind (vectors) signals in December-January (lag -3) linked to the leading Chl-a mode in Alboran in spring (Figure 1).