Aurelia spp. Ecology in the Mediterranean Sea

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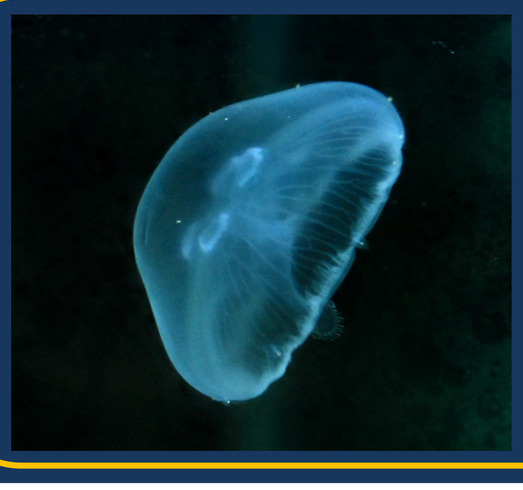

Aurelia spp. are cosmopolitan scyphozoan species and probably the most studied jellyfish in the world. They inhabit nearshore waters, especially closed basins, such as coastal embayments, fjords and estuaries, occupying a great variety of habitats worldwide. Recent studies have addressed the biogeography of the genus *Aurelia* and reported that it constitutes a species-complex embracing numerous locally adapted species.
The Mediterranean Sea is a hotspot of biodiversity threatened by climate change, which is expected to have a significant influence on the biodiversity and biogeography of marine populations. Here we compiled a comprehensive data set on *Aurelia* spp. occurrence in the Mediterranean Sea and assess the thermal niche in Mediterranean locations.

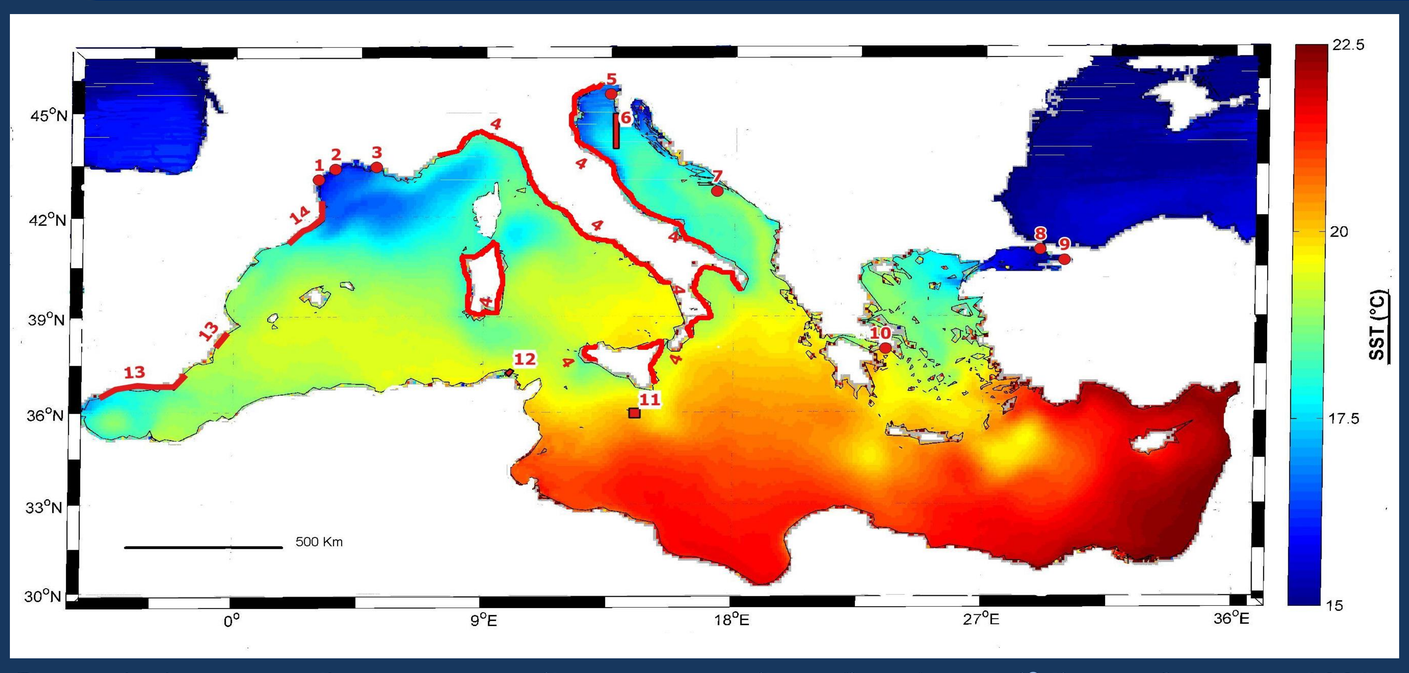

Figure 1: Data contribution on *Aurelia* occurrence (in red) and SST (°C) map from Jan 2003 – Dec 2014 from MODIS Aqua 9km Resolution.

Aurelia spp. biogeography is restricted to temperate areas of the Mediterranean (i.e. the Western basin of the Mediterranean) (Fig. 1). When temperature data were avalailable and *Aurelia* sp. occurrence records abundant enough, thermal niche preferences were determined (Fig. 2).

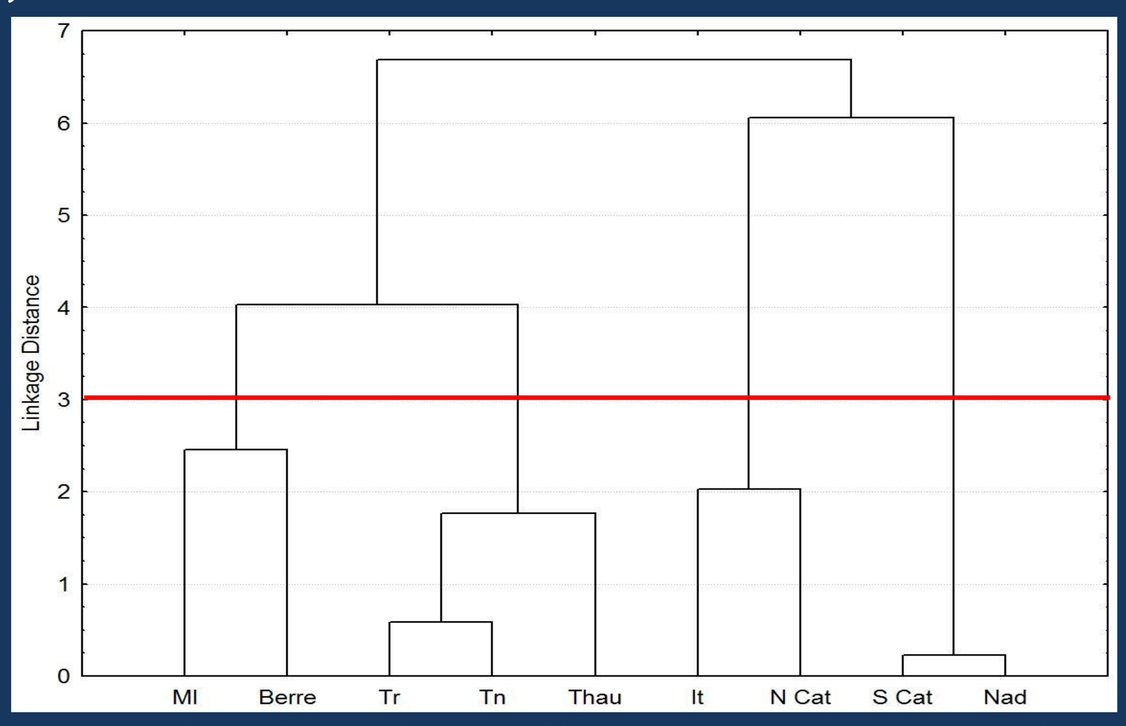

Figure 3: Thermal niche preference for the different groups. G1: Berre Lagoon (Berre) and South Adriatic, Lake Mljet (Ml); G2: Turkey (Tr), Tunisia (Tn) and Thau; G3: western Italy (Sardinia, Sicilia, Thyrrenian Sea), North Catalan Sea (N Cat); G4: South Catalan Sea (S Cat) and North Adriatic Sea (Nad).

Clustering after a principal component analysis (ACP) indicates that *Aurelia* spp. populations in the Western Basin present 4 distinct thermal niches (Fig. 2 & 3). Those results might be explained by different genetic populations or by phenotypic plasticity.

Perspectives

While global warming has been claimed as one of the most important triggers for jellyfish outbreaks, the projected temperature increase of the Mediterranean Sea warns on the shrinking of favorable environmental conditions for the species (i.e. G1) with the concomitant risk of its potential decline and perhaps extinction in the Mediterranean Sea (Fig. 4).

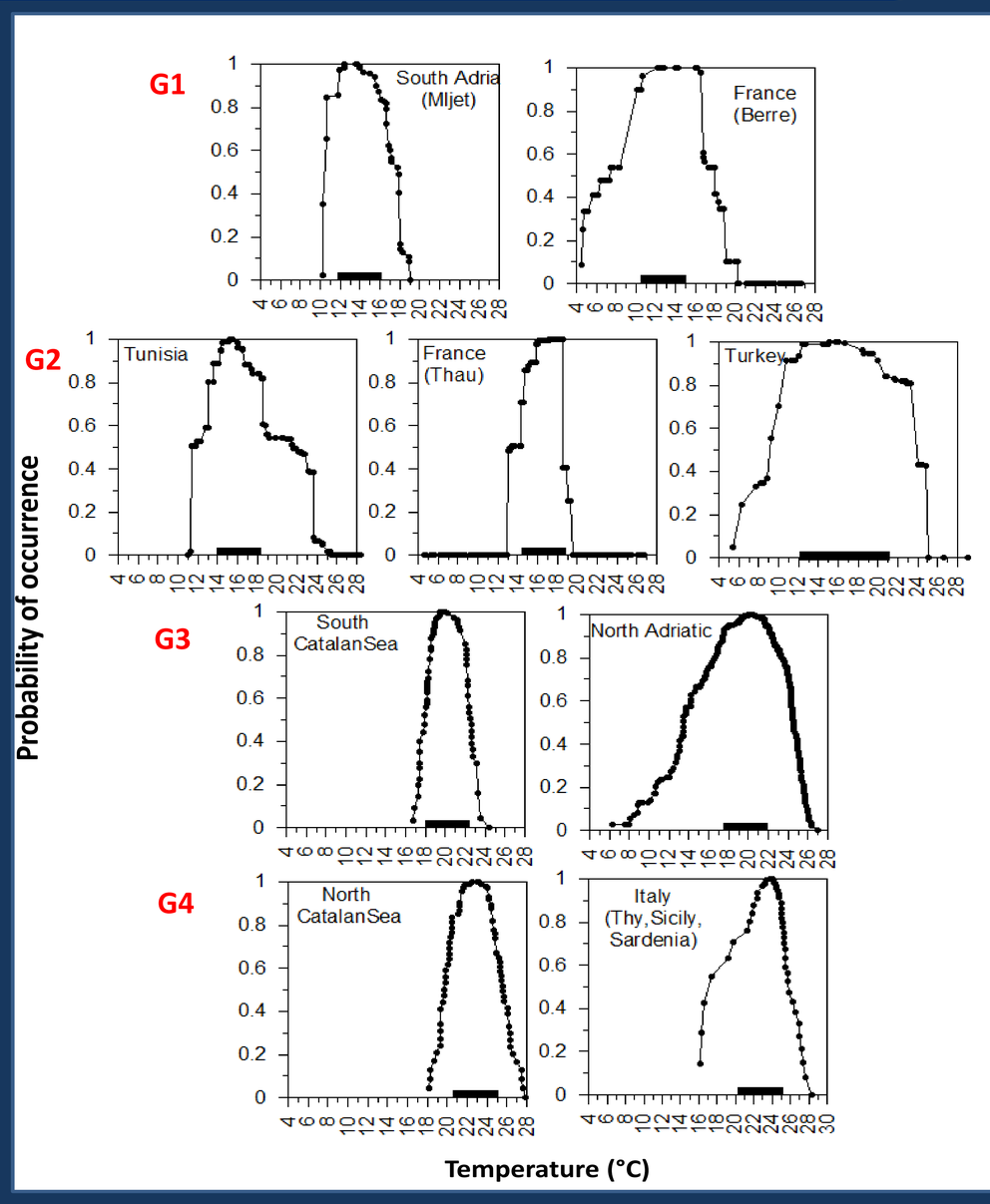

Figure 2: Thermal niche preference for the different groups. G1: preferred isotherme 14°C; G2: 16.5°C; G3: 19°C; G4: 23°C.

Our results highlight that for G1, the bulk of the population (90%) shows a temperature window from 10 to 20°C and that organisms are not encountered at temperature >20°C while for G2, G3 and G4, records of *Aurelia* are made for higher temperatures such as 26, 28 or 30 °C.

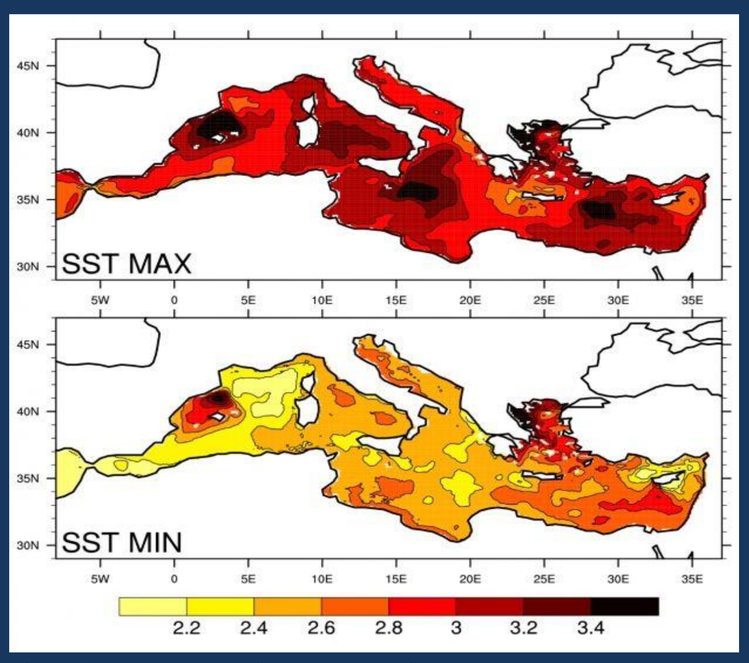

Figure 4: Composite of sea surface temperature anomalies maxima (*top*) and minima (*bottom*) for the 2070–2099 period (vs. 1961–1990). The largest (maxima) or smaller (minima) anomaly out of the 6 scenario simulations is represented at each *grid point*. Units are in °C. © Climate Dynamics