

FOUR YEARS OF TROPICAL SIGNALS MONITORING IN THE MARINE PROTECTED AREA OF NEW TABARCA (SW MEDITERRANEAN)

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Abstract

The Marine Protected Area (MPA) of Tabarca is being monitored from 2011 to assess the tropicalization effects, into the ‘Tropical Signals’ Program of The Mediterranean Science Commission (CIESM). The main objective of this monitoring is to provide new insights in the diversity and dynamics of Mediterranean species and exotic ones in the framework of global change.

Keywords: Alien species, South-Western Mediterranean, Mortality, Global change

Introduction

The enclosed Mediterranean Sea is a miniature ocean, where the effects of the global warming are more evident than in other more open oceans [1]. Several studies have confirmed a rapid warming of the surface sea water temperature that has suffered an increase of 1.15°C on summer average temperatures in the last three decades [2]. The rise in sea water temperature is favoring the bioinvasions from the Red Sea by thermophilic, mostly tropical, species. [3], and few species coming from the tropical parts of Atlantic sea. Simultaneously, an increase in the numbers of native warm-water “vagrants” that are also extending their range into the northern Mediterranean, has been also detected [3]. The warming of Mediterranean Sea has also been linked to mass mortality outbreaks in coastal ecosystems. The most large episodes were recorded in 1999 and 2003, affecting more than 30 invertebrate benthic species over hundreds kilometers in the NW Mediterranean coast [4, 5]. Heat stress not also affects invertebrates species, but it could be also related to the endemic seagrass *Posidonia oceanica* flowering that is considered a rare event [6].

Material and methods

Since 2012 we have carried out the monitoring of Tropical Signals Program in the Marine Protected Area of Tabarca, where sea water temperature has been registered at 5, 10, 25 and 40 meters depth by HOBO dataloggers. Each summer, 3 different sites were monitored in order to assess the “sentinel species”, which are indicators of climate change.

Results and discussion

Previously to begin with the Tropical Signals monitoring a bleaching event related to the increase of sea water temperature that affected to the coral *Oculina patagonica* was observed in the Marine Protected Area of Tabarca in 2011 [7]. In the summer 2015 the largest mortality event recorded in the MPA was observed. During this event gorgonians, sponges and scleractinian corals showed tissue necrosis and more than 40% of the endemic coral *Cladocora caespitosa* population was affected. Together with mortality events, *Posidonia oceanica* flowering has been also observed in 2012, 2014 and 2015 in meadows between 3 and 10 meters depth, which could be indicating that exists a positive relationship between the prevalence and intensity of flowering of *P. oceanica* meadows and the increase of sea water temperature. Among the thermophilic species that could be extending their distribution range, we have observed an increase of *Percnon gibbesi*, firstly observed in the Tabarca harbour breakwater and nowadays also found in natural rocky habitats along the island. As the same form the coral *O. patagonica* has also increased its distribution in the MPA. Also, *Caulerpa cylindracea* has spread over maerl beds, between 30 and 33m deep.

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