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From ‘catching the algae’ to the role of zooplankton in biogeochemical cycles

## *Oithona similis* likes it cool: evidence from two long-term time series

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We compare the long-term and seasonal patterns of abundance and phenology of the cyclopoid copepod *Oithona similis* at the L4 site (1988–2013) in the North Atlantic and at the LTER-MC site (1984–2013) in the Mediterranean Sea to investigate whether high temperature limits the occurrence of this species with latitudinal cline. The two sites are well suited to testing this hypothesis as they are characterized by similar chlorophyll *a* concentration (Chl *a*) but different temperature [sea surface temperature (SST)]. The abundance of *O. similis* at L4 was ~10 times higher than at LTER-MC. Moreover, this species had several peaks of abundance during the year at L4 but a single peak in spring at LTER-MC. The main mode of temporal variability in abundance was seasonal at both sites. The abundance of *O. similis* was negatively correlated with SST only at LTER-MC, whereas it was positively correlated with Chl *a* at both sites. *Oithona similis* had a temperature optimum between 15 and 20°C reaching maximum abundance at ~16.5°C at LTER-MC, but showed no Chl *a* optimum at either site. We conclude that the abundance of *O. similis* increases with prey availability up to 16.5°C and that temperature >20°C represents the main limiting factor for population persistence.

KEYWORDS: time series; copepod; *Oithona similis*; temperature; Atlantic; Mediterranean

### INTRODUCTION

The small cyclopoid copepod *Oithona similis* is considered one of the most abundant and ubiquitous metazoan species in the marine environment with a distribution ranging from coastal to oceanic regions and from tropical to temperate and polar waters (Paffenhöfer, 1993;

McKinnon and Klumpp, 1998). Despite its reported widespread occurrence, published literature suggests that *O. similis* thrives in boreo-arctic localities (Nielsen and Sabatini, 1996; Gislason and Astthorsson, 2004; Castellani *et al.*, 2007; Blachowiak-Samolyk *et al.*, 2008) whereas