

Climate change from another perspective: effects of temperature fluctuations on population dynamics and species interactions

Vafeiadou Anna-Maria^{1,2}, Chariton Chintiroglou² and Tom Moens¹

¹ Ghent University, Marine Biology Section, Krijgslaan 281/S8, 9000 Ghent, Belgium
E-mail: AnnaMaria.Vafeiadou@Ugent.be

² Aristotle University of Thessaloniki, Biology Department, 54124 Thessaloniki, Greece

Although the rise of temperature is one of the main consequences of global climate change, organisms may develop plasticity towards thermal stress. However, extreme temperature maxima and the increased frequency and different amplitude of fluctuations, which occur worldwide the last decades, can eventually alter population dynamics. While the effects of average temperature increase on population dynamics and species interactions have been widely studied, the effects of changed-amplitude fluctuations of temperature have not been much investigated. The present study focuses on the effects of diurnal temperature fluctuations on the fitness of free-living marine nematodes, which due to their high abundance and short life span are an excellent model group for testing such stress conditions. We examine whether daily temperature fluctuations affect a) fitness and population dynamics and b) interspecific interactions of two congeneric species: *Diplolaimelloides meyli* and *D. oschei*, which co-occur in nature. Microcosm experiments were performed using mono-species and two-species combinations incubated under constant and daily fluctuating temperature. Results showed effects of temperature regime on the fitness for the monospecific populations, with higher numbers of adults and shorter minimum development time under fluctuating temperature compared to the stable temperature control. Furthermore, interspecific competition negatively affected the involved species' fitness under both stable and fluctuating temperature conditions, an effect which was more pronounced under fluctuating temperature. The strength of the interaction's effect on species fitness is though dependent on thermal regimes. We conclude that changes in daily temperature fluctuations may be very important determinants of the effects of temperature change on species interactions.

Keywords: plasticity; extreme events; resilience; population fitness; competition