



Biological invasions in the Mediterranean correlated with Pleistocene glacial–interglacial cycles

Konstantina Agiadi (1), Angela Girone (2), Efterpi Koskeridou (1), Pierre Moissette (1), Jean-Jacques Cornée (3), and Frédéric Quillévéré (4)

(1) National and Kapodistrian University of Athens, Geology and Geoenvironment, Historical Geology and Paleontology, Athens, Greece (kagiadi@geol.uoa.gr), (2) Facoltà di Scienze, Dipartimento di Geologia e Geofisica, Università degli studi di Bari, Bari, Italy (angela.girone@uniba.it), (3) Géosciences Montpellier, Université de Montpellier, Université des Antilles, CNRS, Pointe à Pitre, Guadeloupe, FWI, France (Jean-Jacques.Cornee@gm.univ-montp2.fr), (4) Univ. Lyon, Université Claude Bernard Lyon 1, ENS de Lyon, CNRS, UMR 5276 LGL-TPE, F-69622 Villeurbanne, France (Frederic.Quillevere@univ-lyon1.fr)

Marine bioinvasions are documented here using the paleontological record of fish. Focusing on the Pleistocene, we investigate the effect of extreme climate changes on the fish fauna of the eastern Mediterranean shelf, by identifying the fish otoliths in the Gelasian–Ionian hemipelagic sediments cropping out in the northeastern coast of Rhodes (Greece). Reviewing the Mediterranean marine fish fauna from the Tortonian until today, we hypothesize on the conditions that drove marine fish distribution range shifts during the Pleistocene, taking into consideration local paleogeography and taphonomic factors affecting the fossil record. In particular, we used the identified otolith assemblages to estimate the paleodepth of these deposits, based on the modern bathymetric distribution of the species and the occurrence of otoliths in surficial sediments of the Mediterranean. Notably, the study area was characterized by high bathymetric gradients and rapid bathymetric changes during the middle-late Pleistocene, as suggested by previous sedimentologic studies. The climatic deterioration from the Pliocene to the Pleistocene resulted in the gradual stepwise replacement of the tropical–subtropical fauna persisting since the Miocene with a subtropical–temperate fauna in the Pleistocene. Here, we comment on the progress of this phenomenon that yielded the modern marine fish fauna of the Mediterranean. This subtropical–temperate middle–late Pleistocene fauna with small contribution of tropical species was punctuated by periodic invasions of cold-water fish from the North Atlantic. These episodic invasions of cold-water North Atlantic mesopelagic species are correlated with the glacials during marine isotope stages 50, 44, 36, 20, and 18. However, the warm-water species recovered after the respective deglaciations during the studied interval. This suggests that the eastern Mediterranean acted as a refuge area for cosmopolitan tropical–subtropical species until the Late Pleistocene.