

Tectonic and climatic controls on coastal sedimentation: The Late Pliocene–Middle Pleistocene of northeastern Rhodes, Greece

Jean-Jacques Cornée^{a,*}, Pierre Moissette^a, Sébastien Joannin^a, Jean-Pierre Suc^a,
Frédéric Quillévéré^a, Wout Krijgsman^b, Frits Hilgen^c, Efterpi Koskeridou^d,
Philippe Münch^e, Christophe Lécuyer^a, Paula Desvignes^a

^a UMR CNRS 5125 Paléoenvironnements and Paléobiosphère, Université Claude Bernard Lyon I,
27 Bd du 11 Novembre 1918, 69622 Villeurbanne Cedex, France

^b Paleomagnetic Laboratory 'Fort Hoofddijk' Faculty of Earth Sciences, Utrecht University Budapestlaan 17, 3584 CD Utrecht, The Netherlands

^c Institute for Earth Sciences, Budapestlaan 4, POB 80021, 3584 TA Utrecht, The Netherlands

^d Department of Historical Geology–Paleontology, University of Athens, Panepistimiopolis, Zografou, 15784 Athens, Greece

^e FRE 2761 Géologie des Systèmes Carbonatés, Université de Provence, case 67, 3 place Victor Hugo, 13331 Marseille Cedex 3, France

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Abstract

The Late Pliocene to Middle Pleistocene coastal sediments of northeastern Rhodes (Greece) were deposited in an active tectonic setting. They provide an excellent opportunity to investigate the relative roles played by climate and tectonics in sedimentary processes. The tectono-sedimentary organization of these deposits is revised in the light of an integrated study combining data from field investigations, sedimentology, bio- and magnetostratigraphy, radiometric dating, palaeoecology, and palynology.

Three lithostratigraphic units are recognised: the Rhodes Formation, the newly defined Ladiko–Tsampika Formation, and the Lindos Acropolis Formation. A major erosional surface separates the Rhodes Formation from the Ladiko–Tsampika Formation, which was deposited in deep and narrow palaeovalleys. The Rhodes Formation (Late Pliocene to 1.4–1.3 Ma) comprises three Members: the Kritika, the Lindos Bay clay and the Cape Arkhangelos calcarenite. The shallow-water clastic sediments of the Ladiko–Tsampika Formation (1.3 to 0.3 Ma) are subdivided into two Members: the Ladiko (mostly sandy) and the Tsampika (predominantly clayey). The Lindos Acropolis Formation is Late Pleistocene in age.

Two major transgression–regression cycles occurred prior to the Lindos Acropolis cycle. The deposition of the first cycle (Rhodes Formation) is tectonically controlled, with very high rates of vertical movements (2.6–5.2 mm/year). The second cycle (Ladiko–Tsampika Formation) records sea-level changes controlled by slow vertical motions (around 0.16 mm/year) and glacio-eustatic events with 40-kyr and 100-kyr periods. Finally, the tectonic and sedimentary evolution of Rhodes is integrated into the geodynamic context of the eastern Aegean fore-arc.

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* Corresponding author.

E-mail addresses: Jean-Jacques.Cornee@univ-lyon1.fr (J.-J. Cornée), pierre.moissette@univ-lyon1.fr (P. Moissette), sebastien.joannin@univ-lyon1.fr (S. Joannin), jean-pierre.suc@univ-lyon1.fr (J.-P. Suc), frederic.quillevere@univ-lyon1.fr (F. Quillévéré), krijgsma@geo.uu.nl (W. Krijgsman), fhilgen@geo.uu.nl (F. Hilgen), ekosker@GEOL.UOA.GR (E. Koskeridou), philippe.munch@up.univ-mrs.fr (P. Münch), christophe.lecuyer@univ-lyon1.fr (C. Lécuyer), paula.desvignes@univ-lyon1.fr (P. Desvignes).