



HAL
open science

Geodynamic evolution of the western Mediterranean during the Late Cenozoic: a new reconstruction using GPlates

Adrien Romagny, Laurent Jolivet, Rémi Leprêtre, Dominique Frizon de Lamotte, Romain Augier, Eloïse Bessièrè, Gianluca Frasca

► To cite this version:

Adrien Romagny, Laurent Jolivet, Rémi Leprêtre, Dominique Frizon de Lamotte, Romain Augier, et al.. Geodynamic evolution of the western Mediterranean during the Late Cenozoic: a new reconstruction using GPlates. 20th EGU General Assembly, Apr 2018, Vienne, Austria. pp.4408. hal-03552840

HAL Id: hal-03552840

<https://hal.science/hal-03552840>

Submitted on 2 Feb 2022

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution 4.0 International License



Geodynamic evolution of the western Mediterranean during the Late Cenozoic: a new reconstruction using GPlates

Adrien Romagny (1), Laurent Jolivet (2), Rémi Leprêtre (3), Dominique Frizon de Lamotte (3), Romain Augier (1), Eloïse Bessi re (1), and Gianluca Frasca (4)

(1) ISTO/OSUC, UMR 7327, Facult  des Sciences, Universit  d'Orl ans, Orl ans, France, (2) ISTEP, UMR 7193, Sorbonne Universit , Paris, France, (3) GEC, Universit  de Cergy-Pontoise, Neuville-sur-Oise, France, (4) CRPG/CNRS, UMR 7358, Vand uvre les Nancy, France

The Late Eocene-Early Oligocene is a key-period for the geodynamic evolution of the Western Mediterranean. Due to complex lithosphere/asthenosphere interactions (slab roll-back, slab-tear, slab break-off, asthenosphere upwelling, etc.), deformations in this area became more driven by forces related to slab dynamics than by Africa/Eurasia convergence. This led to a widespread extensional regime that affected the upper plates of the different subduction systems and dismantled the mountain chains formed previously (Paleocene-Eocene times). Numerous and very different models have been proposed in an attempt to explain the geodynamic evolution of this area. However, crucial questions are still debated. Among these questions, the reasons of the drastic change of tectonic regime observed everywhere at Eocene-Oligocene transition remain unexplained. How did the initiation of slab retreat and the inception of back-arc rifting induce these changes in the Alps, the Pyrenees and everywhere? Another unsolved question is the complex interactions between shortening and back-arc extension in the Alboran Domain and the timing of the emplacement of the Ronda-Beni Bousera peridotite massifs in this context. In order to answer these questions a prerequisite is to dispose of a precise kinematic framework that is the goal of this study, combining kinematic, structural, metamorphic, paleomagnetic, magmatic and geophysical data. We performed kinematic reconstructions using GPlates, following the principle of non-rigid domains to avoid problems due to rough approximations linked to rigid blocks. Paleomagnetic data and amounts of shortening/extension from balanced cross-sections constituted the main constraints used for the calculation of motions of more than 650 polylines. These reconstructions were processed backward, from the Present to the Eocene-Oligocene boundary, in order to be as free as possible from any pre-existing model. Based on these detailed reconstructions we discuss a geodynamic model and propose answers to some pending questions.