American Geophysical Union, Fall Meeting 2014, San Francisco, Calif., 15-19 december, abstract #T53A-4665

Crustal Structure and Miocene Geodynamic Evolution of the Easternmost Algerian Back-Arc Basin and Continental Margin (western Mediterranean Sea) from Wide-Angle and Multichannel Seismics

Meeting 2014 Fall Meeting

Section Tectonophysics

Session Constructing Crust from the Backarc to the Forearc in the Izu-Bonin-Mariana (IBM) and Other Arc Systems III Posters

Identifier T53A-4665

Authors
Bouyahiaoui, B*, CRAAG, Algiers, Algeria, UMPC, UNSA, CNRS, IRD, Géoazur,, Valbonne, France
Sage, F, UMPC, UNSA, CNRS, IRD, Géoazur,, Valbonne, France
Abtout, A, CRAAG, Algiers, Algeria
Klingelhoefer, F, IFREMER, Plouzané, France
Yelles-Chaouche, A, CRAAG, Algiers, Algeria
Schenini, L, UMPC, UNSA, CNRS, IRD, Géoazur,, Valbonne, France
Philippe, S, IFREMER, Plouzané, France
Marok, A, university Abou bekr Belkaid, Tlemcen, Algeria
Deverchere, J, UBO University, Brest, France
Arab, M, Sonatrach Divsion Exploration, Boumerdes, Algeria
Galve, A, UMPC, UNSA, CNRS, IRD, Géoazur,, Valbonne, France
Collot, J Y, UMPC, UNSA, CNRS, IRD, Géoazur,, Valbonne, France

Index Terms
Magma genesis and partial melting [1037]
Subduction zone processes [8170]
Tectonics and landscape evolution [8175]
Tectonics and magmatism [8178]

We use new wide-angle seismic and multichannel seismic reflection data (SPIRAL cruise, 2009) and additional geophysical data to study the crustal structure of the eastern Algerian back-arc basin that was born during the Miocene Tethys subduction rollback, before the collision of the European forearc (Kabylian blocks) with the northern African continent ~16-18 Ma ago. In the deep basin, the P-wave velocity model images a thin, 5.5-km-thick oceanic crust with velocity ranging between 4.8 km/s and 7.1 km/s. It is composed of two layers, with a velocity-gradient higher in the upper layer than in the lower one. S-wave modeling indicates a Poisson ratio of 0.28 in the lower crust, supporting a dominant gabbroic composition. Below the continental edge, we define two segments: (1) West of 7°45'E, a typical continental crust with P-wave velocities between 5.2 km/s and 7.0 km/s depicts a gradual seaward thinning of ~15 km over an ~35-km distance characterizing a stretched margin resulting from back-arc extension; (2) East of 7°45'E, the continental crust is a few kilometers thinner, arguing for a variable crustal thickness along the forearc before collision. Based on the deep basin crustal structure and magnetic anomalies, we propose that the eastern Algerian basin opened during the southeastward migration of the European forearc along a NW-SE elongated spreading center that ran perpendicular to the subduction trend, which is an unusual configuration for back-arc opening. Such an atypical geometry of the accretion and the oceanic crustal structure may result from a slab tear at depth related to diverging directions of the subduction rollback (and hence the forearc blocks) during back-arc opening: eastward for the Corsica–Sardinia block, and southward for the Kabylian blocks. The variable thickness of the continental crust along the margin may result from the crustal stretching along the forearc that accommodated the opening of the oceanic domain north of it.
Cite as: Author(s) (2014), Title, Abstract T53A-4665 presented at 2014 Fall Meeting, AGU, San Francisco, Calif., 15-19 Dec.