Analogue modelling of strike-slip fault – thrusts and strike-slip fault – volcano interactions: application to the Alboran domain (ALBANEO project)

Fabien Caroir*[1], Pauline Souloumiac†‡[2], Nadaya Cubas§[3], Anvar Farkhutdinov[4], Bertrand Maillot[5], Léa Vidil[6], and Elia D'acremont[1]

[1]ISTeP-CY – Sorbonne Universite, Centre National de la Recherche Scientifique, Institut National des Sciences de l'Univers – France

[2]ISTeP-CY – CY Cergy Paris Université, Sorbonne Universités, UPMC, CNRS, Institut National des Sciences de l'Univers – France

[3]ISTeP-CY – Sorbonne Universités, UPMC, CNRS, Institut National des Sciences de l'Univers – France

[4]ISTeP-CY – CY Cergy Paris Université, Sorbonne Universités, UPMC, CNRS, Institut National des Sciences de l'Univers – France

[5]ISTeP-CY – CY Cergy Paris Université, Sorbonne Universités, UPMC, CNRS, Institut National des Sciences de l'Univers – France

[6]ISTeP-CY – Sorbonne Universités, UPMC, CNRS, Institut National des Sciences de l'Univers – France

Résumé

During the Oligocene and Miocene, the Alboran domain underwent the Tethyan subduction followed by westward slab retreat that lead to backarc extension. Since the Tortonian, the Africa-Eurasia convergence, striking N135∘E, formed folds and thrusts that are currently observed along the Alboran Island and high offshore reliefs. This convergence phase caused indentation of a African crustal block within the Alboran Sea, bounded by two strike-slip fault systems: the Yusuf and the Al Idrissi fault systems. This dominantly left lateral system shows significant variations in orientation from north to south and intersects the Small Al Idrissi Volcano. The initiation of the Al Idrissi fault system is estimated to have occurred between 1.1 and 1.8 Ma, with total displacement of approximately 3 km, inferred from offsets in the volcanic basement. North of this volcanic edifice, the deformation is distributed along several fault segments whose activity is inferred to have migrated from east to west. South of the volcano, the deformation is localized along a single segment, the Bokkoya Fault.

In this study, we aim to investigate the interactions between the compressive structures and the left-lateral strike-slip Al Idrissi fault system using analogue modelling. Two successive phases of deformation are considered: an initial oblique convergence followed by a left-lateral strike-slip phase. In a second model, we examine how the presence of a volcano influences the distribution of deformation prior to the initiation of the strike-slip faulting.

The results reveal significant control by both thrust faults and the volcanic edifice on the

*Auteur correspondant: caroir.fabien05@gmail.com

†Intervenant

‡Auteur correspondant: pauline.souloumiac@cyu.fr

§Auteur correspondant: nadaya.cubas@sorbonne-universite.fr

strike-slip fault segmentation, deformation distribution and segments orientation. Our results also suggests the possibility of more recent volcanic activity than expected, potentially due to reactivation of a magmatic chamber. These results will be integrated into seismic and tsunamigenic hazard models for the Alboran domain to improve future risk assessments.

Mots-Clés: Tectonics, Analogue Modelling, Strike, slip fault, Alboran domain, Interactions