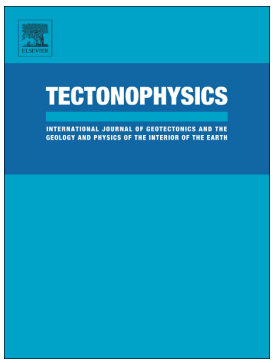

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Structural analysis and Miocene-to-Present tectonic evolution of a lithospheric-scale, transcurrent lineament: The Sciacca Fault (Sicilian Channel, Central Mediterranean Sea)

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ABSTRACT

Seismo-stratigraphic and structural analysis of a large number of multichannel seismic reflection profiles acquired in the northern part of the Sicilian Channel allowed a 3-D reconstruction of a regional NS-trending transfer zone which displays a transcurrent tectonic regime, and that is of broad relevance for its seismotectonic and geodynamic implications. It is constituted of two major transcurrent faults delimiting a 30-km-wide, mostly undeformed basin. The western fault (Capo Granitola) does not show clear evidence of present-day tectonic activity, and towards the south it is connected with the volcanic area of the Graham Bank. The eastern fault (Sciacca) is structurally more complex, showing active deformation at the sea-floor, particularly evident along the Nerita Bank. The Sciacca Fault is constituted of a master and splay faults compatible with a right-lateral kinematics. Sciacca Fault is superimposed on an inherited weakness zone (a Mesozoic carbonate ramp), which borders to the east a 2.5-km-thick Plio-Quaternary basin, and that was reactivated during the Pliocene.

A set of scaled claybox analogue models was carried out in order to better understand the tectonic processes that led to the structural setting displayed by seismic data. Tectonic structures and uplift/subsidence patterns generated by the models are compatible with the 3-D model obtained from seismic reflection profiles. The best fit between the tectonic setting deriving from the interpretation of seismic profiles and the analogue models was obtained considering a right-lateral movement for the Sciacca Fault. Nevertheless, the stress field in the study area derived from GPS measurements does not support the present-day modelled right-lateral kinematics along the Sciacca Fault. Moreover, seismic events along this fault show focal mechanisms with a left-lateral component.