Geophysical Research Abstracts
Vol. 12, EGU2010-15469, 2010
EGU General Assembly 2010

Salt tectonics and crustal tectonics along the Eastern Sardinian margin, Western Tyrrhenian : New insights from the « METYSS » cruise (June 2009)

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The « METYSS » cruise was carried out in June 2009 onboard the R/V « Téthys II » along the eastern Sardinian and south-eastern Corsican margins, western Tyrrhenian Sea, in order to better constrain the potential links between deformation related to either crustal tectonics or salt tectonics and sediment accumulation, especially during the Messinian and Plio-Quaternary times. We acquired 15 high-resolution seismic reflection profiles (about 1200 km in cumulative length) along the south-eastern Corsican margin, immediately north of the Bonifacio Strait and along the upper and middle parts of the eastern Sardinian margin, from the continental slope to the Cornaglia Terrace. The Tyrrhenian Sea is considered as a Neogene back-arc basin that opened during continental rifting and oceanic spreading related to the eastward migration of the Apennine subduction system from Tortonian to Pliocene times (Jolivet et al., 2006). Rifting of the Tyrrhenian Sea started first along the Eastern Sardinian margin during the Tortonian-Messinian times and therefore the series of that age should be considered as syn-rift sediments (Sartori et al., 2004). The « METYSS » seismic profiles clearly illustrate that this part of the Tyrrhenian was highly segmented during the rifting stage by N-S trending normal faults delineating ridges (e.g., Baronie Ridge) and basins (e.g., Sardinian Basin and Cornaglia Terrace), as previously described for example by Thommeret (1999) and Sartori et al. (2004). The Messinian sedimentary units and especially the « Upper Unit » (UU, Lofi et al., this congress, corresponding to the « Upper Evaporites » in the previous literature) are, without any doubt, of syn-rift age, as they display a fan-shaped stratal geometry. The Mobile Unit (MU, Lofi et al., this congress), i.e. the Messinian halite, is clearly imaged in the study area and its spatial repartition can be outlined. The highly-variable thickness of the confined salt basins could be due to the initial basin geometry (i.e. before the Messinian salinity Crisis) or to the syn-rift character of the deposition. Southeastward of the study area, in the vicinity of the Cornaglia Seamount, salt tectonics appears surprisingly vigorous. More surprisingly, several normal faults seem to have remained active in recent times, if not even at present time. Fault slip has been recorded by bathymetric scarps and associated footwall debris flows interfingered within the Plio-Quaternary sequence, even though the eastern Sardinian margin is usually considered to be passive now. Moreover, some amount of tectonic inversion is visible on some normal faults that show contractional or transpressional components of late slip. In addition, this “post-rift” deformation can be illustrated within the Plio-Quaternary sequence by a regional unconformity. Consequently, numerous mass-transport deposits and channel-levees systems observed in the Plio-Quaternary cover could be partly controlled by tectonic activity. These very preliminary results require further investigations in order to better decipher the role of crustal tectonics and salt tectonics, salt-related structures being very efficient markers to discriminate between the respective contribution of gravity-driven, salt tectonics and deep-seated, crustal tectonics (Gaullier et al., 2010). Finally, we aim to precisely determine the relative vertical movements (tilting, subsidence, magmatism...) and geodynamical history of the different segments of the area since 6 Ma.

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