

**THE SARDINIA CHANNEL (CENTRAL MEDITERRANEAN):
A STRUCTURAL ANALYSIS OF A SUBMARINE OROGENIC CHAIN(****)**

ABSTRACT

The interpretation of multi- and single-channel seismic reflection profiles together with petrographic and stratigraphic analysis of samples, dredged during several oceanographic cruises, allowed to reconstruct the structural framework of the marine area which connects the southern part of the Tyrrhenian Sea with the Sicily Channel and the Algerian-Balearic basin.

A 350 km wide submarine orogenic chain, involving several tectonic/stratigraphic units of the European and African plates, extends from Sardinia to the foreland of the Pelagian Sea and connects the African and Sicilian segments of the Maghrebian mountain range (Fig. 1).

Tectonically this chain can be considered as an accretionary wedge composed (from top to bottom) of continental crystalline nappes and Meso-Cenozoic basin to platform carbonate thrust-sheets of the southern Tethyan margin (Fig. 2). These units were mainly emplaced with E-SE direction in Latest Oligocene to Pliocene times in connection with the northeastward underplating of the African continental lithosphere. Generally the chain is topped by a wide spread irregular surface modelled by subaerial erosional processes and it is unconformably overlain locally by pre-Messinian and Messinian acoustic facies and thin Plio-Quaternary sedimentary sequence which, sometimes, are involved in the compressional deformations. The magnitude of shortening across the orogenic wedge is difficult to calculate, but it seems to exceed several hundred kilometers inasmuch as the shortening in a portion of the Maghrebian domain is about 150 km.

During its growing and also later on, the chain was widely disrupted by both extensional and strike-slip tec-

tonics which contributed to modify and rotate the original NE-SW structural trends. At present it is separated, eastward, from the Plio-Pleistocene S-verging Gela Nappe by a N-S trending zone along which a complex trascurrent displacement occurs.

The main regional tectonic features are two low-angle SE-verging overthrusts, labelled respectively Drepano Thrust Front (DTF) and Sardinia Thrust front (STF). The Burdigalian-Langhian DTF represents the overthrust of the internal crystalline and sedimentary nappes over the carbonate and clastic foredeep sequence of the African margin. The probably Early Miocene STF is the shallowest expression of a NW-dipping crustal ramp which marks the tectonic contact between the Kabylo-Calabrian units and the superimposed Sardinian units. The thrust imbrication of this sector was interpreted as the result of a large-scale intracontinental collision which led to the development of a wide crustal shear zone and was accompanied by a low-grade metamorphic re-equilibration in the Kabylo-Calabrian Hercynian assemblages.

This process was driven by the Latest Oligocene-Early Burdigalian drifting and counterclockwise rotation of the Corsica-Sardinia microplate which involved ensialic subduction of the African lithosphere. After this main contractional event tensional and strike-slip tectonics developed in the region during the Neogene evolution of the Tyrrhenian basin; this gave rise somewhere to a strong down-faulting of the substrate and to a tensional reactivation of the low-angle overthrusts. Coeval thrusting and folding occurred within and in front of the Maghrebian domain. Since Late Pliocene the whole area was involved in compressional and transpressional stresses which produced basin inversion and small-scale thrust faults.

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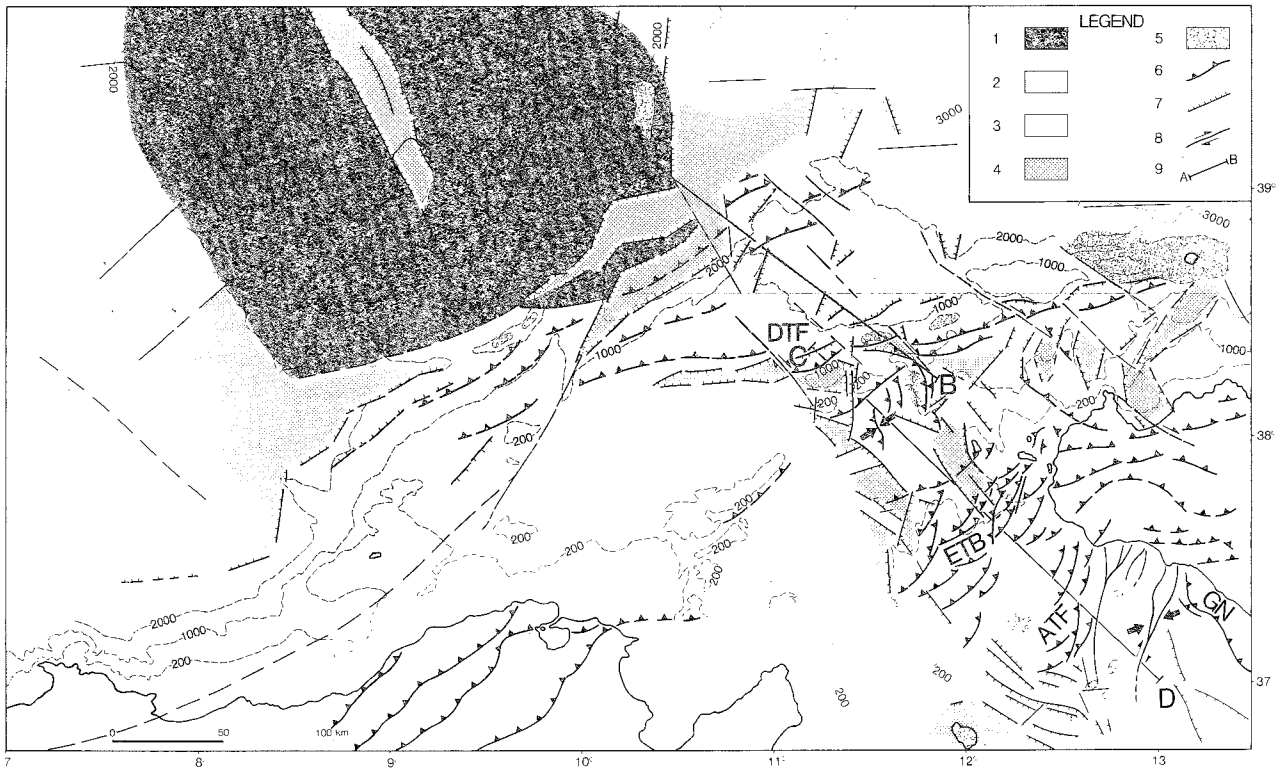


Fig. 1 - Tectono- and structural map of Sardinia Channel. 1) Sardinian domain; 2) Kabylo-Calabrian domain; 3) Maghrebian domain; 4) extensional basins; 5) volcanic bodies; 6) thrust and reverse faults; 8) strike-slip faults; 9) traces of the cross-sections in Fig. 2. STF: Sardinia thrust front; DTF: Drepano thrust front; ETB: Egadi thrust belt; ATF: Adventure thrust front; GN: Gela nappe.

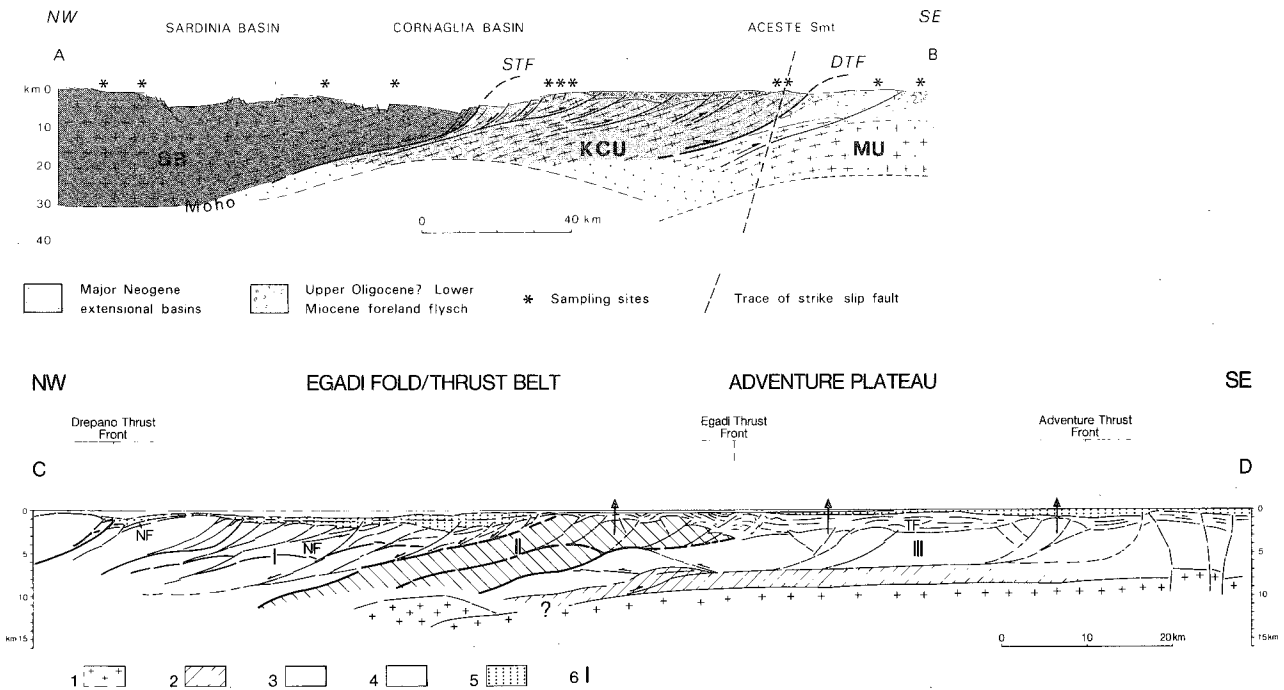


Fig. 2 - Geological cross-sections across the Sardinia Channel orogenic wedge: from Sardinia to Adventure Plateau. AB section (after Compagnoni et al., 1989). SB: Sardinian basement; KCU: Kabylo-Calabrian units; MU: Maghrebian units. CD section. 1) African basement; 2) Triassic shales; 3) Kabylo-Calabrian units; 4) Lower Miocene clastic wedge of foreland basins; 5) Messinian-Quaternary deposits of both extensional and piggy-back basins; 6) tectono-stratigraphic subdivision of the Maghrebian domain. FN: Numidian flysch; TF: Terravecchia Formation.