

Plio-Quaternary Southern Sardinia Campidano Graben, Italy

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Data here reported are summarised from a recent paper by the same authors (Casula *et al.*, 2001); they represent the main result of a long established collaboration (1996-2000) between researchers from the Earth Science Dept. of Cagliari University, Italy (A. Cherchi & M. Murru), the Institut Français du Pétrol and the Beicip Franlab, Rueil-Malmaison, France (L. Montadert) and Progemisa S.p.A., Cagliari, Italy (G. Casula & E. Sarria); Progemisa S.p.A. sponsored most of the field-work and seismic studies.

The Plio-Quaternary Campidano Graben extends overland for about 100 km and about 30 km wide, probably related to the formation of the Tyrrhenian Basin, displays more than 600 m of syntectonic deposits (Fig. 1). It is restricted to the southern branch of the Oligo-Miocene Sardinian rift, showing a NNW-SSE orientation ("Campidano trend").

THE SEDIMENTARY RECORD FROM PLIOCENE TIME TO PRESENT

The geometric relationship with the Messinian substratum reveals that the Lower Pliocene transgression was preceded by an shortening phase of Late Miocene age (Cherchi & Tremolières, 1984).

In the northern Campidano the base of the Lower Pliocene is characterized by the presence of *Globorotalia margaritae*. While significant Pliocene transgression occurred in the southern Campidano (Murru, 1983). For this reason, the Messinian erosional surface is often mistaken for the base of the Middle Pliocene Samassi Formation (Pecorini & Pomesano Cherchi, 1969). The Samassi Formation consists of a marly-silty continental complex with occasional sand and pebble beds within layers of clay. About 600 m of these fluvio-deltaic continental sediments were deposited in the Campidano Graben subsiding during the Middle Pliocene-Pleistocene interval (i.e. 2 My, according to the radiometric age of the basalt covers at the top of the Samassi Formation (Beccaluva *et al.*, 1977). As suggested by the thickness of the alluvial deposits, sedimentation continued until the Quaternary, but the principal infilling phase occurred during the Middle-Upper Pliocene. Subsidence still continues in the marine segments of the Graben (Gulfs of Cagliari and Oristano).

Above these lay important thick Pleistocene alluvial and marshy deposits, followed by Flandrian-Versilian marine and lagoon deposits (S. Gilla Cagliari). Tyrrhenian deposits are limited inland principally along coastal areas.

A late alkaline volcanic event (Assorgia *et al.*, 1976; Bigazzi *et al.*, 1978) began in the Messinian 5.2-5 My, developed mainly during the Pliocene and continued until the Quaternary (0.14 My). In Sardinia important volcanic massifs are morphologically evident; broad highlands ("Giare") are localized at various heights due to relief inversion and neotectonics.

The few Plio-Quaternary extensional faults are clearly inherited and reactivated from previous stages of deformation. Up to the present, mostly vertical movements along these structures have controlled the differentiation of subsident areas and deposition. The peak of subsidence is marked by the syntectonic Samassi Formation.

The maximum thickness of the Plio-Quaternary deposits (500-600 m) occurs both in the southern and in the northern parts of the Campidano. These subsiding area are related to the reactivation of two



Fig. 1 - Structural sketch map.

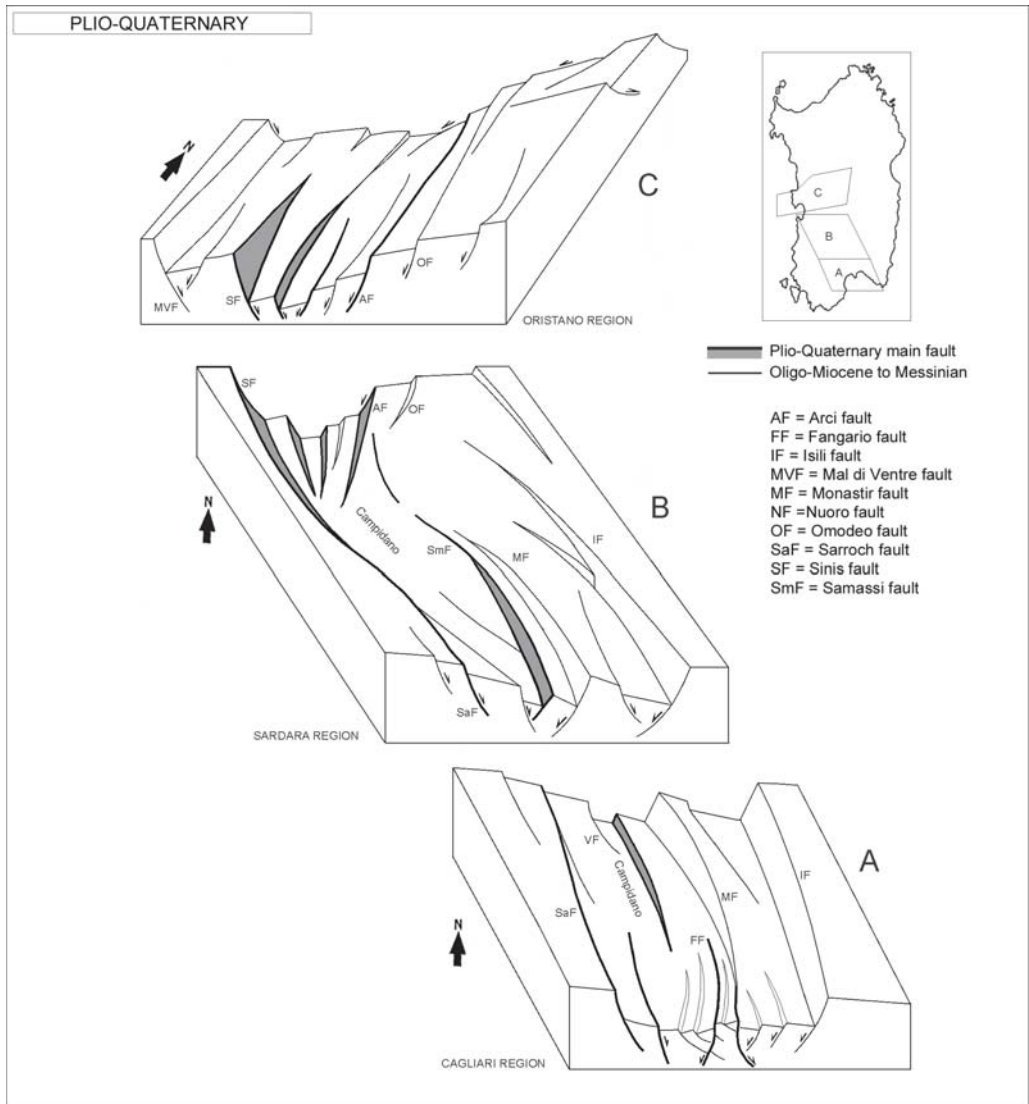


Fig. 2 - Schematic block diagram of the Plio-Quaternary structure in the Campidano area.

Oligo-Miocene fault sets (Fig. 2): the NNW-SSE east-dipping longitudinal faults linked in an 'en echelon' pattern (Sinis, Villacidro and Sarroch faults) affecting the whole Graben, from Oristano to Cagliari; and the N-S and NNW-SSE west-dipping antithetic faults, in the central and eastern areas (Samassi, Fangario faults).

These faults can have significant throws, but less than those of the Oligo-Miocene. Locally they are associated with deep-rombic-shaped troughs. In the southern Campidano, a narrow 40 Km long Plio-Quaternary depocenter is identified; it is filled with some 500 m of Plio-Quaternary sediments (Fig. 1). In the northern Campidano, another Plio-Quaternary depocenter is about 500-600 thick.

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