

The Villasalto overthrust

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This important tectonic structure, previously known as “Villasalto fault” (Teichmüller, 1931; Calvino, 1962), has more recently been interpreted as an overthrust surface of regional importance, produced during the compressive movements of Hercynian orogeny (Carmignani & Pertusati, 1977; Carmignani *et al.*, 1978). In addition, recent structural studies (Carmignani *et al.*, 1992) have demonstrated this structure to be the most important tectonic feature of the main (D1) Hercynian deformation phase in SE Sardinia. As a matter of fact, the overthrust surface outcrops along a line striking W-E and almost 38 km long, from the western border of the Miocenic rift (“Fossa sarda” *Auct.*) south to San Basilio, to the Tyrrhenian coast close to Capo S. Lorenzo.

Along this surface the Sarrabus Tectonic Unit (or Genn’Argiolas Unit) overthrusts, through its lower part represented by the Arenarie di San Vito (Middle Cambrian - Lower Ordovician; Barca *et al.*, 1981, 1988), on the Gerrei Tectonic Unit, and, in particular, on its shaly and carbonatic formations from Silurian to earliest Carboniferous in age (Barca *et al.*, 2000; Corradini *et al.*, 2002). Along this tectonic boundary, a foliated cataclasites belt, up to 200-300 m thick and made up mainly of Silurian carbonaceous shale fragments, developed. In the cataclastic belt big boulders are even incorporated, sometimes enormous in size, derived from the surrounding formations (e.g. Santa Barbara Porphiroids, Arenarie di San Vito thrust of M. Atzeri, Villasalto; Fig. 1).

The analysis of the kinematic indicators along the overthrust surface indicates a translation towards West of the Sarrabus Unit; this evidence witnesses, during the first Hercynian tectonic phase, an independent evolution from the lower tectonic units (Gerrei Unit, Meana Sardo Unit, etc.). The latter units show a tectonic shift towards SSW (Carmignani *et al.*, 1992).

The Villasalto overthrust is locally crossed by both normal and transcurrent faults indicating a re-activation of the movements during post-collisional extensional Hercynian tectonics, and probably also during the “Alpine” movements.

The Hercynian overthrust is very well-exposed close to the Villasalto village; here, from south to north, are visible the “Arenarie di San Vito” (Middle Cambrian-Lower Ordovician), representing part of the base of the Sarrabus Unit, tectonically overlaying the Devonian-Tournaisian metalimestones (“Calcarei di Villasalto” or “Calcarei a Clymenie” *Auct.*) and Culm type deposits of the upper part of the Gerrei Unit. The overthrust surface is verging nearly towards south, but in places it may be verticalized or reversed because of late tectonic movements. It is marked by a cataclastic belt about 100 m thick, which, being this more erodible, produced a morphological saddle interposed between the reliefs formed by *Arenarie di San Vito* to south, and the Devonian-Tournaisian carbonatic edge to north.

South to the Villasalto overthrust, the typical lithologies of Ordovician and Silurian - Devonian complexes of the Gerrei Unit crop out only where some tectonic windows develop, because of local erosion of the overthrust “Arenarie di San Vito” of the Sarrabus Unit, in connection with axial culmination of the overthrust.

The area of the lower Flumendosa valley, north to Villasalto, structurally corresponds to the “Flumendosa Antiform”, an antiform of Late Hercynian origin; in the inner part (nucleus) of this antiformal stark several tectonic units crop out, up to the deepest ones, of the Southeastern Sardinia (i.e. Castello di Medusa Unit).

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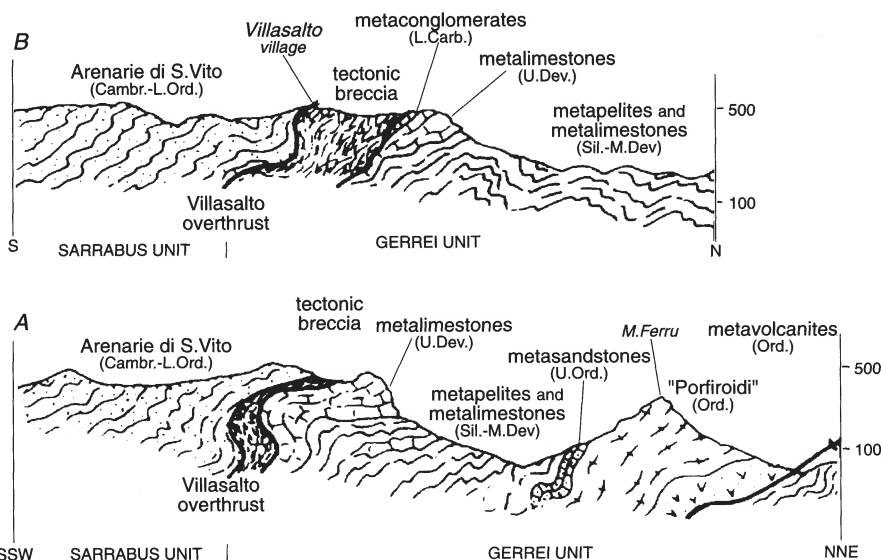
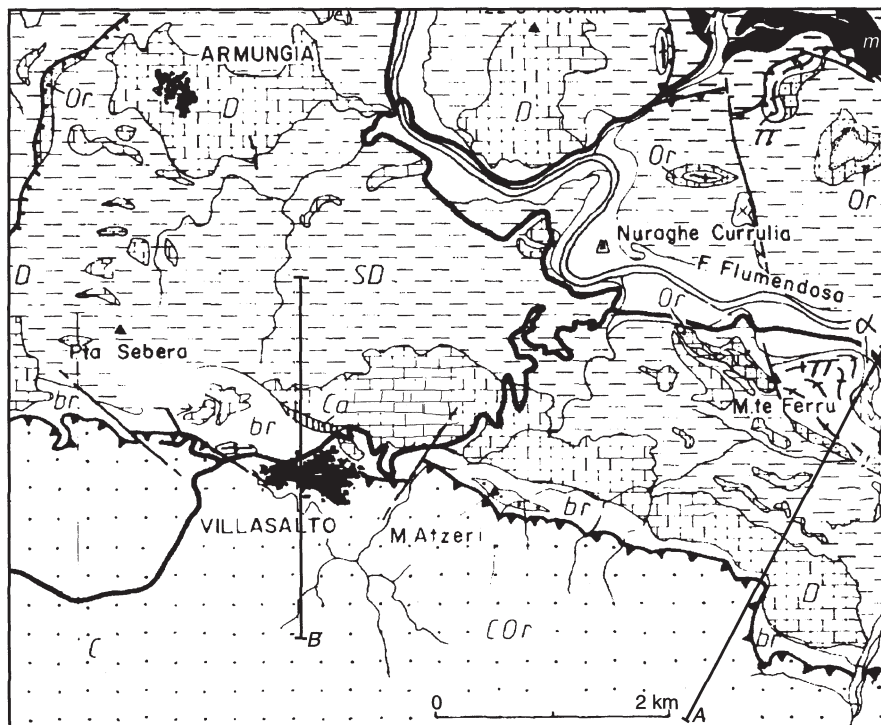


Fig. 1 – Schematic geological map and cross-sections of the Villasalto area (after Barca *et al.*, 1986, mod.). Eo: Eocene deposits.

Sarrabus Unit. Cor: "Arenarie di San Vito" (Cambr. – L. Ord.); br: Polygenic tectonic breccias, mainly constituted by Silurian black shales.

Gerrei Unit. Ca: Metaconglomerates (L. Carb.); D: Metalimestones (M. Dev. - L. Carb.); SD: Marly slates with intercalation of metalimestones (L. - M. Dev.), Graptolitic carbonaceous shales with dark metalimestones and black quartzites intercalated (Sil.); Or.: Metalimestones with brachiopods, bryozoans, etc., metarkoses and metasandstones (U. Ord.); ð: Metarhyolites with augen texture ("Porfiroidi" Auct.) (Ord.); â: Metamorphic products of reworked volcanites and intermediate to acid volcanites (Ord.).

Castello Medusa Unit. m: Marbles and calc-schists (?Sil.-?Dev.); ds: Phyllites and metasandstones (?U. Ord. - ?Dev.).

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