

# STRATIGRAPHY OF THE PLIO-PLEISTOCENE SANT'ARCANGELO BASIN, BASILICATA, ITALY

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The Sant'Arcangelo basin (see location in Fig. 1) is the most recent onshore sedimentary basin of the southern Apennines. It has been interpreted as a piggy-back basin (Casero *et al.*, 1988), because of its position relative to the frontal thrust sheets of the Apenninic chain. The Plio-Pleistocene sedimentary fill is composed of up to 3,000 meters thick siliciclastic deposits ranging from massive conglomerates to mudstones. Pieri *et al.* (1994) recognized four sedimentary cycles, ranging in age from Late Pliocene to Middle Pleistocene. Extensive field work carried out in the last two years in the north of the basin makes it possible to propose a new stratigraphic scheme, based on detailed field observations and on more than 7,000 meters of bed-to-bed measured sections. Five allogroups, i.e. unconformity-bounded units, have been recognized in the Sant'Arcangelo basin (Fig 1), ranging in age from Late Pliocene to Middle Pleistocene.

From base to top, these include:

1) *Catarozzo Allogroup* (Upper Pliocene). This allogroup is completely exposed near the west border of the basin (Fig 1). It unconformably overlies over the Gorgoglione Flysch (Miocene), and it is internally composed of marine (C1) and lagoonal (C2) sub-units bounded by a sharp contact. The C1 sub-unit corresponds to a flood-dominated fan-delta marine system (cf. Mutti *et al.*, 1996) up to 500 meters thick. It is composed of a basal matrix-supported conglomeratic unit changing into coarse-grained shallow-marine deposits. These deposits are followed by a thick succession of prodelta mudstones, ending with shelfal sandstone lobes (cf. Mutti *et al.*, 1996). The C2 sub-unit is mainly fine grained, with a total thickness up to 150 m. It is interpreted as deposited in a flood-dominated fan-delta marine restricted system.

The Catarozzo Allogroup is partially equivalent to the Caliendo Cycle of Vezzani (1966) with the difference that, in this work, the upper conglomeratic unit of this cycle has been segregated and assigned to the Aliano Allogroup. This is because these conglomerates (up to 600 meters in thick) overlie through an angular unconformity the C2 sub-unit. In the Armento area, these continental deposits occur in angular unconformity directly over the Gorgoglione Flysch.

2) *Aliano Allogroup* (Upper Pliocene-Lower Pleistocene). These deposits include an up to 1,400 meters thick succession ranging from poorly-organized alluvial conglomerates in the west to massive marine mudstones in the east. Two distinctive sub-units have been recognized, bounded by a regional unconformity, which shows an abrupt passage from marine (A1) to lacustrine (A2) conditions (Fig 1).

The A1 sub-unit comprises a flood-dominated fan-delta marine system (cf. Mutti *et al.*, 1996). Proximal deposits outcrop near the Agri river, between the Armento and Cerrito streams. They are composed of cyclically stacked red conglomerates and

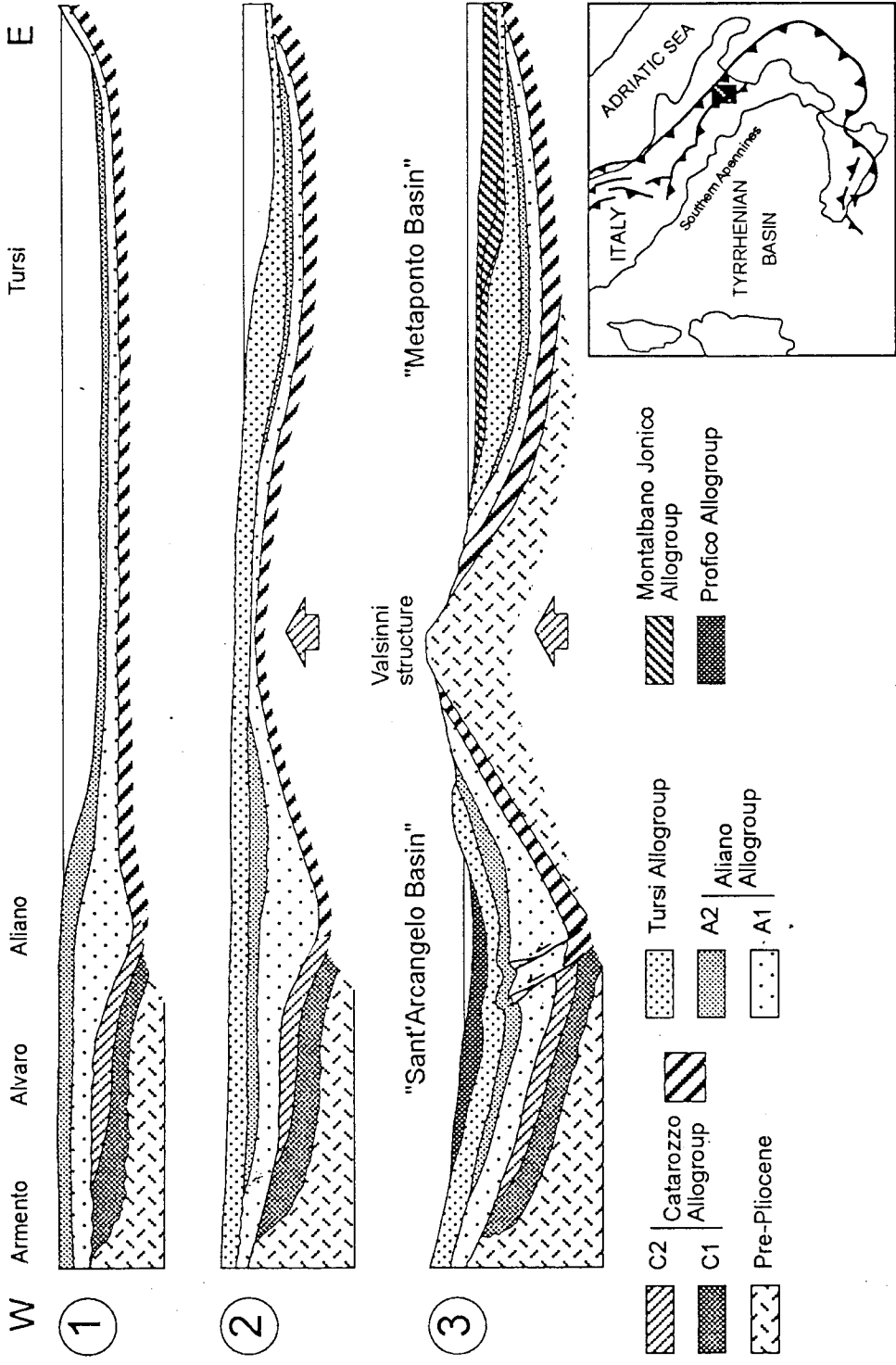


Fig. 1 - Conceptual basin evolution of the Sant'Arcangelo basin. Horizontal length 46 km. (1) Late Pliocene-Early Pleistocene. (2) Early Pleistocene. (3) Early-Middle Pleistocene.

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siltstones, the last with pedogenic evidence. In the Alvaro stream area, these deposits show the transition from continental to marine conditions, and they are composed of residual conglomeratic facies with marine fossil remnants, coarse- to fine-grained sandstones with hummocky cross-stratification and mudstones. The main depositional area of this sub-unit is recorded in the Aliano zone, and consists of flood-dominated shelfal sandstone lobes and mudstones. Shelfal sandstone lobes are composed of amalgamated fine-grained sandstone bodies showing hummocky cross-stratification. In more distal regions, the A1 sub-unit is represented by prodelta mudstones. The A2 sub-unit corresponds to a flood-dominated fan-delta lacustrine system up to 300 meters thick. Facies and sediment distributions are essentially similar to those of the previous sub-unit with the difference that flood-dominated shelfal sandstone lobes are poorly developed, and these deposits lack marine fossils.

Stratigraphic evidence indicates that the deposits assigned to this allogroup may have been misinterpreted in previous works (Caldara *et al.*, 1988; Pieri *et al.*, 1994) because (1) in proximal areas (e.g. Cerrito stream) the conglomeratic deposits were included in the Caliandro Cycle, (2) in the Alvaro stream area, coeval deposits were assigned to the Agri Cycle, and (3) in the Aliano area these deposits were interpreted as belonging to the Sauro Cycle.

3) *Tursi Allogroup* (Early-Middle Pleistocene). This allogroup reaches a thickness of 500 meters, and represents the sedimentary expression of an important paleogeographic change in the Sant'Arcangelo basin (Fig 1). The basal deposits of the Tursi Allogroup are developed over a deep-scoured surface, putting into contact fine-grained delta front and prodelta lacustrine deposits of the Aliano Allogroup (A2) with proximal poorly-organized conglomerates. Flood-dominated shelfal sandstone lobes are well developed in the Tursi area, and are composed of m-thick amalgamated sheet sandstone bodies with hummocky cross-stratification and marine fossils.

The stratigraphy of these deposits have been diversely interpreted in previous literature, because (1) in the Armento stream area they were assigned to the Agri Cycle, (2) in the Sauro river area they were included in the Sauro Cycle, (3) in the Alianello area they were interpreted as part of the San Lorenzo Cycle.

4) *Profico and Montalbano Jonico Allogroups* (Middle Pleistocene). The deposition of these allogroups (partially time equivalent) has been controlled by the uplift of the Valsinni structure, which divides an early broader Sant'Arcangelo basin into two sub-basins, the present "Sant'Arcangelo" and "Metaponto" basins (Fig.1). The Profico Allogroup consists of up to 300 m thick of lacustrine strata overlying in angular unconformity the Tursi Allogroup in the "Sant'Arcangelo basin". These deposits are partially equivalent to the San Lorenzo Cycle of Pieri *et al.* (1994). The Montalbano Jonico Allogroup is made up of up to 300 m of fine-grained marine strata unconformably overlying the Tursi Allogroup in the "Metaponto basin". The basal levels include a conglomerate with angular clasts derived from the pre-Pliocene (flysch blocks and carbonates). Vertically, this allogroup evolves in shelfal sandstone lobes and prodelta mudstones, indicating the deactivation of the system.

## CONCLUSIONS

(1) Detailed correlations support the syntectonic deposition of the Aliano Allogroup. A local differential subsidence appears as the main responsible mechanism in controlling the geometry of this allogroup.

(2) Facies, inferred depositional processes and geometry of conglomeratic and sandstone bodies indicate that catastrophic flooding is the main depositional mechanism in controlling the fill of the Sant'Arcangelo basin.

(3) Stratigraphic and sedimentologic evidence strongly supports the hypothesis of a common early origin for the "Sant'Arcangelo" and "Metaponto" basins. As shown in Fig.1, the Valsinni structure seems to have been activated in early-middle Pleistocene times, thus dividing the Sant'Arcangelo basin in two sub-basins.

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