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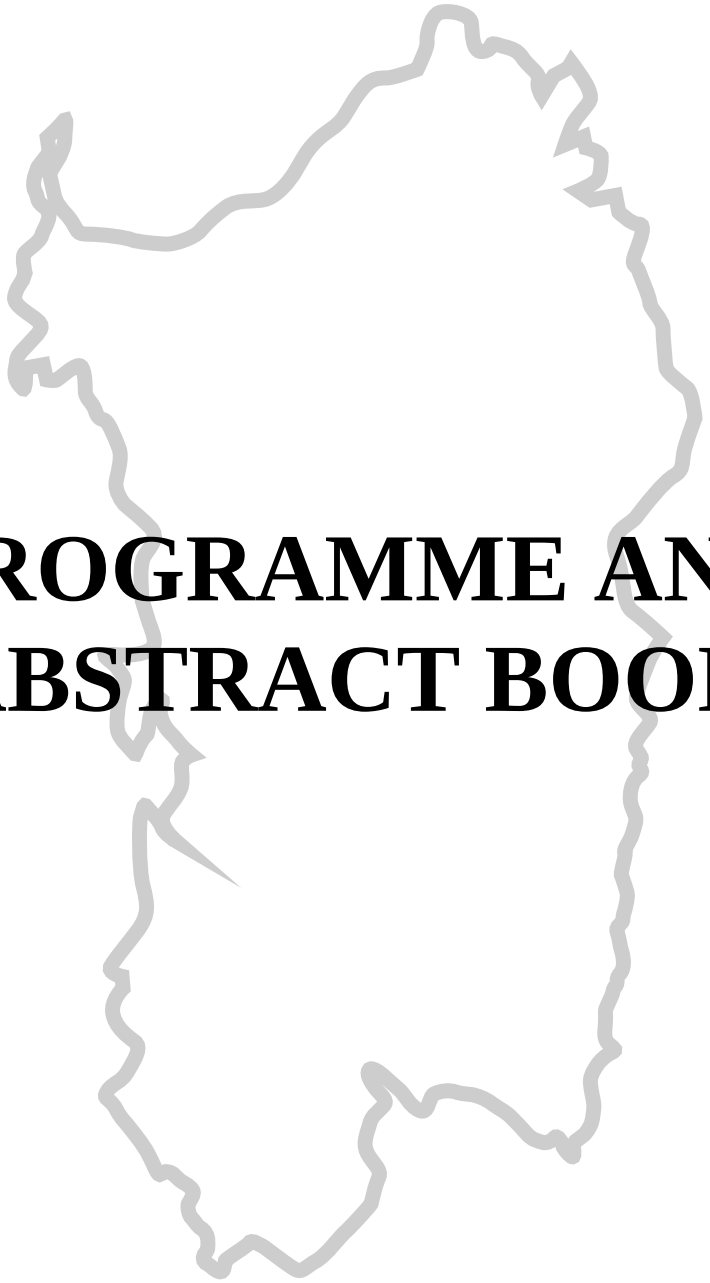

PROGRAMME AND ABSTRACT BOOK

THE PLIOCENE-PLEISTOCENE TRANSITION IN SOUTHERN PIEDMONT: NEW DATA FROM THE ALESSANDRIA BASIN

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The Plio-Pleistocene Villafranchian succession in the type section of the central Piedmont is divided in two main complexes, separated by a regional unconformity (i.e. Carraro et al., 1996; Vigna et al. 2010). The age of this discontinuity is still debated as well as the filling succession of the upper complex, tentatively ascribed to the Calabrian for the lack of precise chronological constrains. In the whole North-western Italy few data are available for the Pliocene-Pleistocene transition because of the erosional unconformity, associated to a variably lasting time-hiatus, and for the presence of coarse continental sediments, which are normally poor in palaeontological remnants, both above and below the unconformity.

The Alessandria Basin presently represents an isolated sedimentary basin, located in south-eastern Piedmont; during the Pliocene it was connected to the Villafranchian type area, when the marine-transitional succession of the "Asti sands" *Auct.* and the "Ferrere sands" *Auct.* of the Villafranchian lower complex were widespread. In the Alessandria Basin the upper portion of the Villafranchian continental succession shows a continuity likely covering most of the hiatus related to the unconformity in the other sectors. For this reason, in the present study our investigation focused on expanded continental successions at the southern border of the basin, well exposed in gravel pits.

The integration of field data, consisting of geological mapping and stratigraphic analysis, coupled with preliminary palaeomagnetic, palaeobotanical (plant and pollen biostratigraphy) and fresh-water molluscs assemblage analyses allowed us to recognize several sedimentary units, bounded by erosional surfaces, locally showing smooth angular unconformities.

The studied succession forms a gently NNE-dipping monocline. It consists of Piacenzian tide-dominated delta plain sediments ("Ferrere sands" *Auct.*) followed by fluvial deposits, that were up to now undated, and are here referred to as the "Maranzana Formation" (MRZ). Ferrere sand and MRZ are both unconformably followed by terraced fluvial deposits, tentatively ascribed to the Middle Pleistocene from considerations on soil development.

We focused on the MRZ continental deposits, represented by 3 vertically stacked unconformity-bounded stratigraphic units (namely MRZ1, 2, 3), showing sharp facies association changes in terms of fluvial style. At the local scale MRZ 1 and 2 strata dips 3-5° Northward, whereas MRZ 3 strata are sub-horizontal, like those related to the river terraces.

The lowermost unit (MRZ1), 8-10 m thick, unconformably rests through an irregular surface (S1) onto heavily weathered clays and sands, that form the upper part of the Piacenzian tide-dominated delta plain sediments of the "Ferrere sands". MRZ1 consists of cross bedded sands and gravelly sands, that made small to medium scale bars, and clayey silts forming small to large scale lenticular bodies, inferred as abandoned channel fills. Facies association of MRZ 1 suggests a deposition in a (sandy-gravelly) braided fluvial system, whose pebble composition indicates a source area from the alpine metamorphic basement and a possible reworking from the Oligocene successions of the Tertiary Piedmont Basin.

A sharp and abrupt increase in grain-size and in the scale of sedimentary structures is recorded by the basal surface (S2) of MRZ2. This unit forms a 12-15 m thick gravelly body, split into two minor sub-units (MRZ2a and MRZ2b), by an erosional surface (S2'). MRZ2a (8-10m thick) is made up of planar-cross bedded, coarse to very coarse clast-supported gravels and sandy gravels that constitute large scale longitudinal-bars. Up to 10 meters wide and 2 m thick subordinated lenticular bodies, made up of thin laminated clays, silts and sands, are also present; these are interpreted as abandoned channel fills. A remarkable feature is the occurrence of mud-clasts, represented by: **i)** abundant dm-sized rounded clay chips, randomly dispersed in the gravels and **ii)** up to 3-m sized angular mud-blocks, fallen from the river bank in a deep channel. These features indicate the transition to a higher energy fluvial system (if

compared to MRZ1) and the past occurrence in the MRZ2a fluvial system of deeply incised pools (at least 6-m deep). This interpretation is supported by the occurrence of large scale dunes at the top of the channel fill sequence. MRZ2a deposits are referable to a low-medium sinuosity fluvial system, that is here interpreted as a wandering system (sensu Miall, 1996). MRZ2b (4-5-m thick) is made up of planar to cross bedded coarse clast-supported gravels and matrix supported gravelly sands, mainly deposited as longitudinal bars. This unit marks the recurrence of a braided fluvial system, but characterized by an higher energy than MRZ 1. The pebble composition of MRZ2 shows a transition to a more extended catchment, including large portions of the Ligurian Alps.

An erosional unconformity (S3) cuts the uppermost portion of MRZ2 unit and marks the base of MRZ3. This surface corresponds to a subtle angular unconformity, clearly indicating its tectonic nature. MRZ3 is introduced by a slightly cemented, cross bedded, gravel, in which, cm-dm sized rounded red-clay pedorelicts, are randomly dispersed. They suggest a relatively prolonged phase of subaerial exposure. MRZ3 shows a thickness increase from 0 to 8m toward the north. It consists of planar cross bedded sands and gravelly sands forming large scale (7-m thick and up to 80-m wide) bars, interpreted as point-bars, and laminated clays and sands (7-m thick and up to 60-m wide) ascribed to abandoned channel fills. Massive to ripple-cross laminated sands are also present and interpreted as crevasse splay deposits. MRZ3 facies association records the sharp transition to a meandering river system, and marks the broadening of fluvial depositional areas. This is also recorded by the increase of variability in pebble composition, suggesting a widening of the river catchment.

The channel-fill deposits, along the whole section, are particularly rich in molluscs, that appear to be dominated by *Unio* sp. and Planorbidae (such as *Planorbarius* or *Gyraulus*).

Preliminary magnetostratigraphic data on fine-grained channel-fill deposits of MRZ3 show, at the bottom reverse polarity and, after a short transitional period, normal polarity to the top. Palaeomagnetic analysis on the fine-grained lenses of MRZ2 yielded normal polarity.

Preliminary pollen data from one sample taken from fine-grained deposits of unit MRZ2a indicate a cool temperate type of vegetation, rich in conifer taxa such as *Pinus, Picea, Tsuga*, and *Cedrus*; the relative abundance of *Abies* and *Sciadopitys* points to a humid climate.

Plant macrofossils from MRZ2 and MRZ3 confirm the climatic indications of pollen assemblages and provide accurate taxonomic information on several woody and herbaceous plants which allow to formulate an hypothesis on the biochronologic assignment. The features of the cool temperate plant assemblage do not agree with the warmer ones of the Lower Complex of the Villafranchian type-succession. The occurrence in MRZ2 of *Bohemeria lithuanica* and *Scirpus isolepioides*, which are common in Piacenzian assemblages, is particularly interesting because up-to-date they were not reported in the Pleistocene.

The multidisciplinary approach restricted the possible age interval of the succession to two hypotheses:

1) the upper portion of the succession can be ascribed to the Reunion normal polarity (lower part of the Matuyama epoch); in this case the unconformity at the bottom of MRZ3 is referable to the early Gelasian and could be correlated to the intra-Gelasian unconformity (*sensu* Vigna et al., 2010), while the lower sub-units MRZ1-2 are referred to the late Piacenzian.

2) the whole succession can be referred to the Gelasian, with fine-grained sedimentation occurring mostly on normal sub-chrons of Olduvai and Reunion, while the main unconformities at the bottom of MRZ1 and MRZ3 were shaped in the early Gelasian.

References

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