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A Global Synthesis with implications
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Quaternary coastal morphology and sea level changes

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Eustatic and tectonic control on fan development along the Tyrrhenian coast of Calabria (Southern Italy)

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Abstract

The study area represents a portion of the onshore belt located on the eastern margin of the Tyrrhenian extensional basin (Coastal Range). This sector of Calabria consists of a thrust-pile (*Calabrian Arc Auct.*), including both metamorphic and non-metamorphic rocks. In particular, the metamorphites constitute the basement for a sin-rift sequence of post-orogenic Late Miocene sedimentary rocks (Amantea Basin, in Patacca et al., 1990) and, in turn, overlain by Quaternary deposits (Sorriso-Valvo and Sylvester, 1993; Robustelli et al., 2002). Structural analysis evidences three sets of major fault systems; They affect a monocline consisting of a complex folded morphostructure.

The oldest structures collected, are represented by two generations of folds, with axes oriented roughly NNW-SSE and NE-SW. The NNW-SSE axial trend, characterize the southern sector. The NNW-SSE trending faults are dip-slip and oblique extensional faults as suggested by superimposition of the striations. The relative chronology suggests that the youngest kinematics is represented by right-lateral normal faults.

The NE-trending faults are oblique normal and dip-slip faults; the latter is compatible with the kinematics of the right-lateral NNW trend. Geomorphological analysis allow two generations of alluvial-fans to be distinguished; furthermore valley-side perched alluvial terraces occur in the lower reaches of the valley descending from tha Coastal Range. The two generation of alluvial fan are telescopically arranged, and the apexes of the piedmont fans (1st generation) are entrenched with respect of perched terraces. The fans at issue derived from steep catchments developed as consequent and/or subsequent river valleys debouching from the mountain front.

The piedmont zone comprises the 1st generation of alluvial-fans . bordered to the west by a nearly N-S striking scarp commonly reaching up to 80m height to the South. The present-day coastal plain comprises the 2nd generation of alluvial-fans which lie upon and interfinger with Late Pleistocene coastal and eolian deposits, the latter sail the foot-zone scarp of piedmont fans. A tephra layer has been recognized within eolian deposits.

The Quaternary alluvium is characterized by a variety of coarse-grained facies coming to be regarded as alluvial-fan facies. In particular detailed facies analysis revealed the presence of 4 facies associations, which are described on the basis of clast-size, bedding, sedimentary structures and shape of the units.

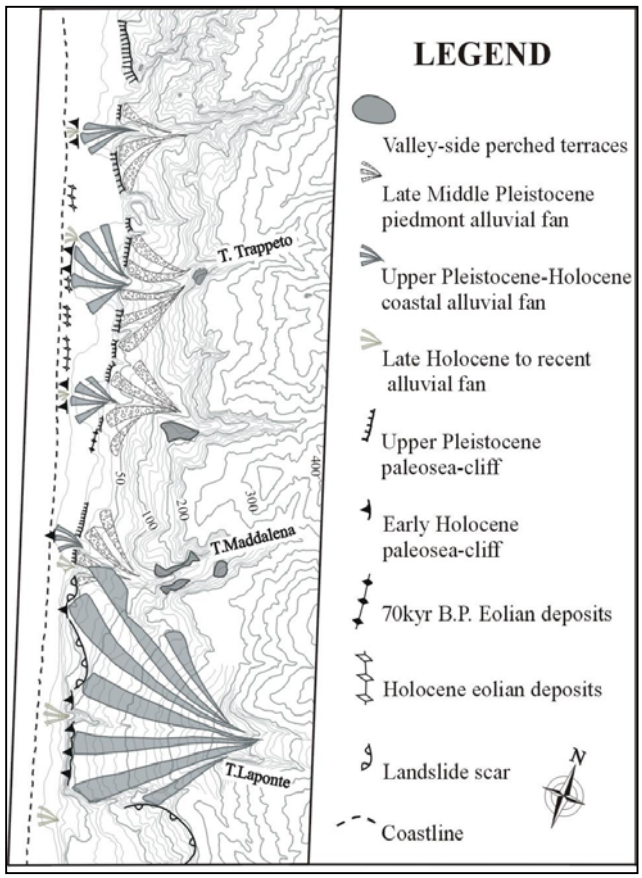

Figure 1. Geomorphological sketch map of the study area.

Facies association A is restricted to the South of the study area; the few and scattered road-cut sections and observations of the cliffs from a distance indicates that this facies association consists of vertically alternating debris flow and, subordinately, debris avalanche deposits.

Facies association B characterized the central sector of the study area.. The most common facies is the massive, poorly sorted, clast-supported sheet conglomerates (Debris-flow facies). Subordinate facies are represented by inversely graded conglomerates (clast-rich debris flow facie) and clast-supported, lenticular units of granule-pebble grade produced by fine-fraction winnowing on the debris-flow are uncommon.

Facies association C is constitutes the bulk of northward piedmont fans. It consists of alternating debris flow and sheetflood facies.

Facies association D is restricted to the northward coastal fans and consists of dedris flow deposit usually capped by conglomerates produced by fine-fraction winnowing on the debris-flow. Sheetflood facies are uncommon. This facies association, though analogous to facies association C, is characterized by a slight decrease of clast-size. On the basis of gathered data a Late Pleistocene-Holocene evolution has been proposed; in particular relations between tectonic, eustatic and geomorphic factors have been identified.

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