

Ophiolitic sequences from the central sector of the Catena Costiera (Calabria): stratigraphy, petrology and structural analyses

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Mesozoic ophiolites crop out in the Catena Costiera (Northern Calabrian Arc). The Northern Calabrian Arc is characterized by the superposition of three structural elements (OGNIBEN, 1973): the uppermost Hercynian continental section intruded by late-Variscan granitoids (Calabrian Nappe), the intermediate ophiolitic Nappe and the lowermost Mesozoic passive margin carbonate sequences (Apenninic Units).

The studied area is located in the central Catena Costiera (fig. 1) where the ophiolitic sequences are characterized by both aphyric and porphyritic metabasalts with a T-MORB affinity (LIBERI *et alii*, 2006). They represent the basement of a pelitic-arenaceous metasedimentary sequence, previously interpreted as a pre-Mesozoic continental basement (Bagni Unit of AMODIO MORELLI *et alii*, 1976). In the metasedimentary cover, a remarkable increase in the carbonatic supply is noticed moving from south to north of the study area. According to this evidence two stratigraphic sequences have been defined for the southernmost Cozzo Cervello area and the northernmost San Martino di Finita area.

The Cozzo Cervello area ophiolitic sequence is characterized by: metabasites, thin levels of volcanoclastic metasediments, rare metacarbonates, metapelites and metarenites.

The San Martino di Finita area ophiolitic sequence is instead characterized by: metabasites, volcanoclastic metasediments and calcschists.

The studied rocks underwent a polyphase deformation history and the meso- and microstructural analyses allowed distinguishing three main (D1-D3) deformation phases:

- D1, this phase is characterized by a S1 foliation locally developed and preserved as microlithons inside the S2 main foliation;
- D2, a N-S trending isoclinal folding event (F2; fig. 2 a,b) is responsible for the formation of the S2 foliation (fig. 2 d), that represent the main surface recognizable in the field;
- D3, this phase is characterized by asymmetric folds (F3) developed at different scales and showing a WNW-ESE trending axes. An incipient foliation (S3) is locally developed in the phyllosilicate-rich levels (fig. 2 c,d).

The petrographic analysis allows to define the mineralogical assemblage of the different lithotypes and to determine the relationships between deformation and blastesis.

The metabasites are characterized by the mineralogical assemblage: Epidote + Na-amphibole + Lawsonite + Phengite + Chlorite + Albite ± Calcite ± Quartz + Magnetite. Metapelites and metarenites are characterized by: Epidote + Phengite + Stilpnomelane + Na-Amphibole + Pumpellyite + Chlorite + Albite + Quartz + Magnetite. The calcschist are constituted by: Calcite + Phengite + Chlorite + Albite + Quartz + Magnetite.

The described mineralogical assemblages suggest that the studied rocks underwent P-T conditions typical of the blueschist facies as suggested by the blastesis of Na-amphiboles, lawsonite, stilpnomelane and phengite along the S2 foliation. The blastesis of white mica can be observed along the S3 foliation also. The following metamorphic retrogression developed within the prehnite-pumpellyite facies and is characterized by a static recrystallization.

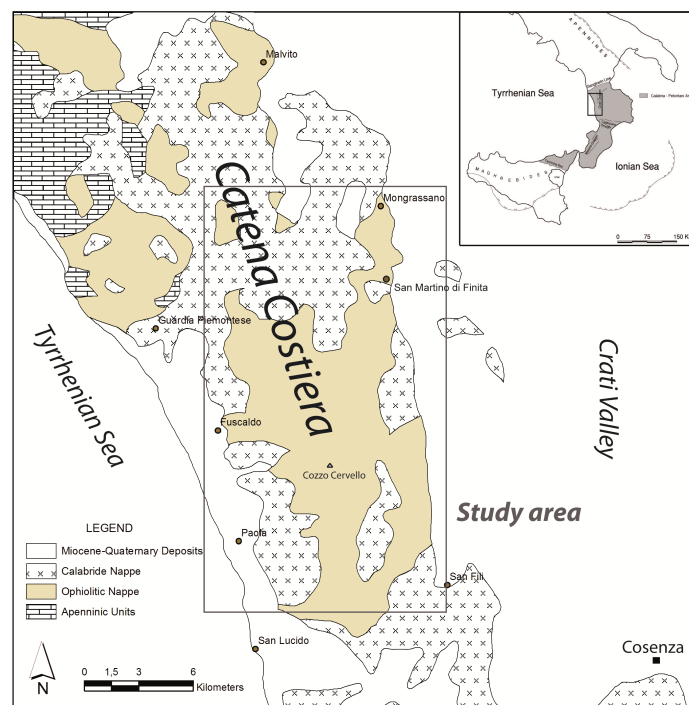


Fig. 1 – Tectonic sketch map of central sector of the Catena Costiera, after LIBERI *et alii* (2006).

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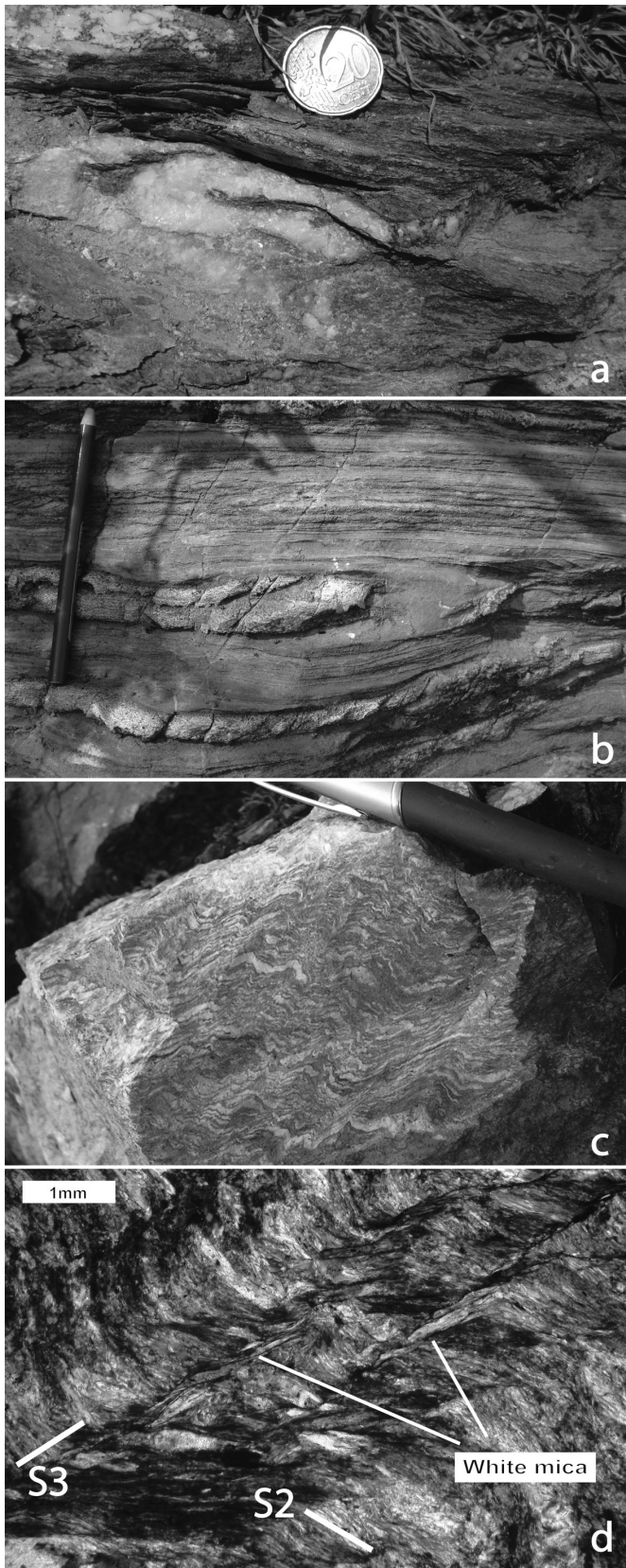


Fig. 2 – a) isoclinal folds (F2) in the metapelites of Cozzo Cervello area; b) isoclinal folds (F2) in the calcschists of San Martino di Finita area; c) crenulation F3 in the metabasites; d) microscopic view of the main foliation S2 deformed by the later D3 phase in the metapelites. The white line indicates white mica flakes along S3.

The field study and the tectonometamorphic evolution reconstructed for the ophiolitic sequences cropping out in the central sector of the Catena Costiera of Calabria show that a subduction and exhumation history inside an accretionary wedge can be proposed. In particular, the characterization and the definition of the complex relationships existing within the ophiolitic metasedimentary cover allow us to propose:

1. the source area was composite, with both carbonatic and siliciclastic contributions;
2. the presence of terrigenous deposit, even in the lowermost part of the sedimentary sequence, seem to indicate that this part of oceanic crust was located close to the continental margin;
3. the San Martino di Finita type sedimentary cover can be correlated with that of the Malvito ophiolitic unit (sensu AMODIO MORELLI *et alii*, 1976), cropping out in the northernmost sector of the Catena Costiera;
4. the subdivision between the Bagni and Gimigliano-Monte Reventino Units, as proposed by DIETRICH & SCANDONE (1972) and AMODIO MORELLI *et alii* (1976) for the study area, is not supported by the data collected in this work.

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