Intrabasinal Oligocene-Lower Miocene ophiolitic Turbidites in the Val Marecchia Nappe (Northern Apennines; Italy)

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In the North-Apenninic Sub-ligurian Val Marecchia Nappe, some peculiar microbreccias occur in the lowermost part of the Lower Miocene Argille Varicolori Formation.

The rock is a disorganized breccia, made up of subrounded to highly angular monolithic dark-to-light ultramafic clasts, cemented by light-grey, fine-grained carbonate matrix.

Microscopic study points out that the rocks show randomly oriented fabric, serpentinite (more than 95%), diabase, chert and limestone clasts. Cathodoluminescent analysis reveals that serpentinite fragments are frequently grouped as derived from a single clast, and show very common crackle and rarer jigsaw textures. The serpentinite clasts display hourglass and bastite and, most recurrent, mesh textures. Olivine and pyroxene are preserved as relicts. The matrix is generated by comminution and/or alteration of serpentinized peridotite clasts, later obliterated by calcite replacing.

Similar structural-petrographic features are known in rocks drilled in the Atlantic Ocean (Vema fracture zone; Iberia Abyssal Plain), and this allows to consider for the microbreccias an intrabasinal origin. The microbreccias deposited close to transform faults, that uplifted the magmatic substratum, feeding with clasts a pelagic succession. A similar origin can be proposed for the coarse magmatic and sedimentary breccias and olistoliths characterizing also the Cretaceous-Oligocene rocks of the Val Marecchia Nappe.

This interpretation is in agreement with the ophiolitic detritism of the North-Apenninic oceanic belts, related to the occurrence of transform faults and peridotite diapyrs. Considering the intrabasinal origin and the early Miocene age of the studied rocks, also the Sub-ligurian Domain has to be interpreted as an oceanic domain, which must be located in a branch of the Central Tethys, deformed since the early Miocene, instead of on the thinned continental crust of the westernmost Adria margin.