

Sedimentological and petrographic evolution of the Oligo-Miocene succession in the Carrosio and Arquata Scrivia area (eastern Tertiary Piedmont Basin, NW Italy)

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The Tertiary Piedmont Basin of NE Italy is an episutural basin which lies at the junction between the Alpine and Apennine chains. Its late Eocene to Pliocene sedimentary fill is thus important because it may provide a record of a source to sink system modulated by tectonics. This study focuses on sedimentology and petrography of the sedimentary succession cropping out in the Arquata Scrivia-Carrosio area, a key sector separating the Alto Monferrato area to the west from the Borbera-Curone sub-basin to the east.

The lithostratigraphic succession indicates initial establishment of a conglomeratic fan-delta (Conglomerati di Savignone and Molare Fms., Rupelian), which is drowned and overlapped by slope hemipelagic marlstone and channelized turbidites (Gremiasco Fm., Chattian). These are followed up section by a suite of confined turbidites, mass transport deposits, and channelized turbidites (Castagnola and Costa Montada Fms., Aquitanian-Early Burdigalian pro-parte), which record a further deepening culminating in the establishment of a basin plain environment (Costa Areaa Fm., Early Burdigalian-Langhian). Lastly, from the late Langhian onward, tectonic uplift resulted in a regional unconformity capped by shelfal marly deposits with storm layers and hyperpycnites (Marne di Cessole Fm., Langhian).

Quantitative petrographic analysis of the above succession allowed us to recognise 11 petrofacies, which were compared and contrasted in a stratigraphic perspective. In agreement with previous studies, we identified lithic fragments from the Voltri Group, the Sestri-Voltaggio Zone, the Ligurian Apennine Units and the Mortara Volcanic complex, which can be therefore regarded as the main sediment sources. Results show that quartz and feldspars fractions increase up-section, whereas that of lithics decreases. In the lithic fraction, a decrease in the content of metamorphic lithics is observed in favour of volcanic and sedimentary lithotypes.

The increase in quartz and feldspars content requires further investigation to be linked to candidate source terrains (Dora Maira? Cristallino di Valosio?). On the other hand, the increase of the volcanic fraction is partly coeval to the Mortara Volcanic complex (Upper Oligocene-Lower Miocene), now buried about 50 km to the north of the study area, and may thus correlate to an acme of volcanic activity and/or dismantling of its products. Lastly, the increase of the carbonate fraction can be interpreted to reflect the establishment of carbonate platforms of similar age documented at outcrop both to the N and S of the study area (P. da Cantoni Fm. of the Basso Monferrato and Visone Fm. of the Alto Monferrato, respectively) and in the subsurface (Quargnento High) to the N.