



Deep water depositional elements of the Tyrrhenian Sea

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The present-day morphosedimentary features and the character and distribution of depositional systems within the Tyrrhenian Sea reflect the recent geological evolution of the area consisting of distinct, eastward migrating episodes of extensional tectonics and backarc basin opening. Numerous intraslope basins, bounded seaward by fault blocks, are located along the rifted Latium-Campanian, Calabrian, Sicilian and Sardinian margins that surround the two abyssal plains of Vavilov and Marsili, where extension has progressed up to back-arc basin formation. Due to the variability in age and style of the tectonics that have shaped the different margins and to the present-day geodynamic setting of the adjacent emerged areas, contrasting sedimentary processes are active and responsible for the distinct depositional settings of the intraslope basins.

A striking difference emerges between the depositional architecture of the Sardinian passive margin and that of the Cefalu and Gioia Basins located along the Sicilian active margin. While both margins have slopes with numerous canyons, they show a markedly different setting of deposition at the base-of-slope. The Sardinian intraslope basins (Olbia, Baronie, Ogliastro and Ichnusa-Sarrabus) are in fact characterized by the development of small fans with circular or elongated planform and dimensions up to 15 km developed at the mouth of the main canyons. In the Cefalu and in the Gioia basins, on the contrary, canyons pass downslope to leveed channels that at the base-of-slope build a prograding wedge of channel-levee deposits forming a constructional depositional apron elongated along the basin margin. Different sedimentary processes are also responsible for the destructional slope sectors that characterise both the Sardinian and the Sicilian margin. In the Gioia basin, in fact, a 20 km wide slope sector is affected by seafloor instability that results in the Villafranca mass-wasting complex, straddling the whole margin. In the Sardinian margin, on the contrary, slope destruction occurs through erosion focused along canyon systems that in the case of the Orosei-Gonone system affect a 20 km wide slope sector.

Some of the intraslope basins such as the Cefalu and the Olbia basins are completely confined by their seaward bounding structures and represent therefore isolated depositional systems. Other intraslope basins, on the contrary, develop submarine drainage networks resulting in sea valleys that cross the whole margin and are throughgoing sedimentary fairways connecting the coastal areas to the ultimate base level for the sedimentary processes active in the Tyrrhenian region, the deep abyssal plains of the Vavilov and Marsili basins that represent. The obstacle effect of tectonic and volcanic features control the general course of the sea valleys. This is particularly evident in the Latium-Campanian margin where, due to the recent age of the tectonics that has shaped the margin, the Ischia-Magnaghi and the Dhorn Valleys are characterized by sharp bends between fault-parallel and –crosscutting segments. The control of volcanic features is displayed by the Stromboli valley that in the Gioia basin runs toward the NE parallel to the Aeolian arc and then turns to an E-W direction in correspondence of a breach in the Aeolian arc between the Stromboli and the Lametini volcanic edifices. Tectonic features also promote changes in the sedimentary dynamics within the sea valleys. The Ischia-Magnaghi and Dhorn valleys, that have a depositional character in the Ventotene and Capri basins, become highly erosive in the crossing of the Sirene and the Sartori lineaments. Also the distal portion of the Sardinia valley undergoes a change from depositional to erosional character in the crossing of the Selli line.

In the Calabrian margin and in the Gioia Basin slope deposits have almost completely mantled the basement highs and as a consequence the Gioia-Mesima and the Angitola slope channels follow a more direct downslope route. However, the downslope evolution of the Angitola and the Mesima-Gioia slope channels, from meandering segments running through a wider depositional channel belt to linear mainly erosional segments, likely reflect changes in slope gradients in turn controlled by basement structures.

The different characteristics of the margins are also basically the major control of the depositional processes in the deep Vavilov and Marsili Basins. The Marsili basin, surrounded by the active Sicilian and Calabrian margin and by the Aeolian volcanic arc, receives a large sedimentary input mainly through the Stromboli valley. As a consequence it displays a deep-sea fan that occupies the eastern side of the basin with a length of 40 km and a width of 20 km. On the contrary, the Vavilov basin, due to the distance from the Sardinian margin and the underfilled nature of the Latium-Campanian margin that stores much of the supplied sediments, is mainly filled by distal sheet turbidites.