A NEW BATHYMORPHOLOGICAL MAP FOR STROMBOLI VOLCANO

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Abstract
The Island of Stromboli is the emergent summit (about 12 km^2) of a large and steep-sided edifice, rising over 3000 m above the surrounding seafloor, comparable in size to the Etna volcano. In recent years, new surveys have been carried out in the area, and the acquisition of multibeam swath bathymetry have greatly enlarged the knowledge of the morphology of the submerged portions of Stromboli down to its base. A new bathymorphologic map of Stromboli and surrounding seafloor is presented, where the main volcanic and erosional-depositional features are mapped, enhancing the role of mass wasting and dismantling processes in the evolution of the volcanic edifice.
Keywords : Aeolian Arc, Tyrrhenian Sea, Bathymetry.

Stromboli, together with Panarea and minor islets, represents the emerged portion of a 45 km-long volcanic belt of the eastern Aeolian Archipelago, lying on thin continental crust on the Southern Tyrrhenian margin. Although most (95%) of the areal extent of the Stromboli volcano lies underwater, the knowledge on its evolution is mainly based on studies on the very tip of the cone. Recent surveys, carried out in 2002-2006 aboard the oceanographic Italian ships *Urania*, *Universitatis* and *Thetis* and positioned with GPS and differential GPS, allowed to obtain a complete high-resolution multibeam bathymetric coverage of the submerged flanks of Stromboli and surrounding areas. Multibeam Seabat models 8160, 8101, 8111 and 8125 have been used. Data processing was performed with nonconventional procedures, to recover the maximum possible precision and resolution. Bathymetric data were integrated with the acquisition of high-resolution seismic and side scan sonar data; surficial sea-bottom sampling was also performed through grab and dredge operations.

The Stromboli composite volcano is broadly symmetrical about a NE-SW trending axis, along which the major vents and eruptive fissures are located, likely controlled by regional tectonic stresses. This is still more evident in the submerged setting of the volcanic edifice; inparticular, the early development of Stromboli along a NE-SW alignment is witnessed by the shallow-water NE and SW portions of the volcanic edifice, showing well-developed abrasion platforms, likely related to Late-Quaternary sea-level fluctuations and covered by reworked terraced volcaniclastic sequences. The new bathymetric data set depicts the Stromboli submerged flanks from the coast down to the base of the volcanic edifice; the Stromboli Canyon surrounds it to the East and to the North. This is a huge erosional feature originating from the northern Sicilian margin and collecting sediments from the Calabrian slope and the central-eastern Aeolian Islands down to the bathyal plain (Marsili Basin), to over 3000 m of depth. To the Southwest, a saddle (with a minimum depth of 1275 m) connects Stromboli with the nearby Panarea volcano. Northeast of Stromboli, about one nautical mile from the island, the sea-stack of Strombolicchio is the remnant of an earlier volcanic center, whose conical summit has been dismantled and deeply abraded down to 100-180 m, leaving a wide subcircular abrasion platform.
Mass wasting and dismantling processes are widely diffused at all possible scales along Stromboli submarine slopes, indicating that flank instability is a very common process on island volcanoes.
One of the most relevant new results, apart from the general improvement in the definition of main volcanic, erosional and depositional features, is in fact the discovering of several megablocks at the foot of the eastern submerged Stromboli flank. They are present below 1000 m of depth and are mostly concentrated around 1550-1750 m, being likely the result of one or more large-scale debris avalanche events occurred on the eastern side of island. This evidence enlarges the knowledge on the volcanological and structural evolution of Stromboli, where a sequence of lateral volcano-tectonic collapses is known to have affected mainly the western side of the island, the relevant features being recognized on land [1] and in the offshore [2]. The recurrence of large-scale destructive events along both the western and eastern flanks of the edifice suggests that structurally-controlled instability occurs at both sides of the main NE-SW oriented axis of intrusion, likely due to a combination of slope unbuttressing and oversteepening and to magmatic dilation effects.

References
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