Marine geological researches on the Messina Strait area

by

R. SELLI, P. COLANTONI, A. FABBRI, S. ROSSI, A.M. BORSETTI & P. GALLIGNANI
Laboratorio per la Geologia Marina del CNR, Bologna (Italy)

Many data on geology of the Strait and adjacent areas were collected during a cruise carried out by the L.G.M. The examined area lies between 15°15' E and 16°15' E and between 38°40' N and 37°30' N. On the basis of high and low frequency echo-sounding profiles, samples and photographs, four groups of seafloor types were recognized. They are :

a. ***irregular sea-floors without sub-bottom reflections.*** Their nature is rocky : sandstones, paraconglomerates and biogenous concretions. They occupy almost completely the Messina sill, i.e. the shallow (less than 100 m) strip affected by small depressions and reliefs between Punta Pezzo and Ganzirri. These seafloors are subjected to erosion by the strong currents of the Strait;

b. ***seafloors with or without sub-bottom reflections and many crossing diffractions (hyperbolae).*** They are covered by different types of sediments : 1. clays and fine sands found in the southern part of the Strait and in the Northern Ionian Sea and 2. medium and coarse sands in large and small waves widely distributed in the Strait and in its northern approach. These are seafloors with moving sediments whose dynamics are controlled by the currents. Somewhere on the echo-sounding profiles a sub-bottom reflection also appears that must represent the substratum upon which the sands move;

c. ***smooth seafloors with or without some sub-bottom reflections.*** Also these seafloors are subjected to strong environmental dynamics causing erosion. They are rocky or with gravels and coarse sands and occur on the both N and S sides of the sill. Erosional phenomena are often clearly shown in places where sub-bottom reflections appear obliquely cut by the seafloor surface. We think that large erosional processes and removals of finer materials from the gravelly deposits took place in the past, when sea level was lower than today and the currents were much stronger, as suggested also by bimodal sediments which show the influence of distinct activities in the sedimentation processes;

d. ***seafloors with a large number of sub-bottom reflections.*** They are characterized by an active sedimentation and extend with great continuity into the Southern Tyrrhenian Sea and into the Northern Ionian Sea. Here, muds are deposited both by normal and turbiditic sedimentation in absence of strong bottom currents.

Therefore in the Strait the seafloor nature varies gradually and symmetrically with respect to the sill both north- and southward. That is, on the sill and on its immediate sides there are rocks, then gravels, coarse sands, medium and fine sands and finally muds. This distribution is closely tied to the velocity of both old and recent currents. As demonstrated by direct measurements and calculations from the granulometric data, they reach their maximum speed (4.8-5.3 knots) on the sill and then rapidly decrease.

From the sill descend two valleys : the Scilla Valley northward and the Messina Valley southward. The latter, between Messina and Reggio Calabria, evolves in the big Messina canyon that with a sigmoidal course goes to the ionian bathyal plain joining a great number of minor canyons from the sicilian and calabrian slopes. The northern part of the Ionian Sea, deeply dissected by these numerous canyons, is thus characterized by an active mainly turbiditic sedimentation. The studied cores show that generally the turbidites are only few centimeters thick. Their calculated frequency is one event per century, when based on sedimentological consideration, or one every 60 years according to paleontologic study. Also the earthquakes as generators of turbidity currents seem to have in the area a return period of 100-150 years.

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