Recent sedimentation in the Tyrrhenian Sea

by

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This contribution reports some of the sedimentological findings of three cruises conducted by the University of Southampton aimed at collecting evidence of the movement of sediment onto and across the Tyrrhenian Bathyal Plain (Figure 1). Four submarine valleys off the Italian west coast were surveyed and a total of 94 sediment samples were collected at 69 sites, ranging from the Bathyal Plain to the coastline.

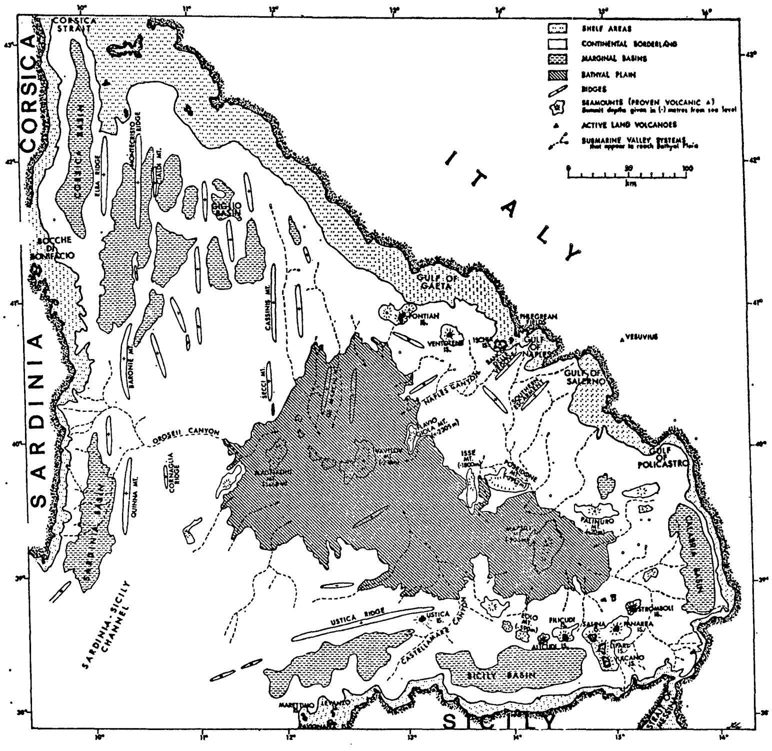

FIG. 1. — Morphologic sketch of the Tyrrhenian basin.

The bathyal plain gravity and free-fall cores have silts to silty clays interspersed with beds and laminae of sandy silt to silty sand. Continental borderland cores, excepting those in the valley axes, rarely show bedding, rather sand is dispersed throughout the silts or is concentrated in burrows.

Almost all of the coarse intercalations in the bathyal plain cores are resedimented ashes. They are current laminated and contain varying percentages of non-volcanic sedimentary components derived from shallower environments. The most common structural bed types found are: 1. a non-graded current

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laminated form with transitional upper and lower contacts, and 2. a normally graded, current laminated form with a sharp base and transitional top. The finer-grained lithologies are a mixture of nannofossil ooze, detrital silt and clay, shell debris and volcanic glass shards. They also are considered resedimented on the basis of 1. their fine lamination on X-radiographs; 2. their reworked nannofossils (most are Pre-Pleistocene in age); and 3. their associated fresh volcanic glass shards and altered volcanogenic sediment. Authochthonous pelagic sediment appears infrequently and then only in short intervals.

Micropaleontological analyses show that all of the sediments are post-glacial. Tentative carbon 14 and fission track dates suggest high sedimentation rates on the Bathyal Plain margins. Minimum rates of 50 to 60 cm/10^3 years concur with 60 to 80 cm/10^3 year rates calculated from magnetic secular variation by Blow & Hamilton [1974].

Dominantly grey/green colours in the bathyal plain sediments attest to the retention of organic matter by generally high sedimentation rates. However, sharp down-core changes from these reducing colours into oxidizing yellows and browns occur frequently. Burrows, channels and/or winnowed shell accumulations occur at the contacts. They are interpreted as former surfaces of slow or non-deposition, sometimes of erosion.

Ryan *et al.* [1965] suggested that sand layers could be traced over the whole Bathyal Plain, based on a study of geophysical profiles and four piston cores. More closely spaced piston coring and detailed profiling by Kermabon *et al.* [1969] did not support this contention. Beds in the Southampton bathyal plain cores are laterally discontinuous and confirm the latter view. No correlation is evident even between the closest spaced cores.

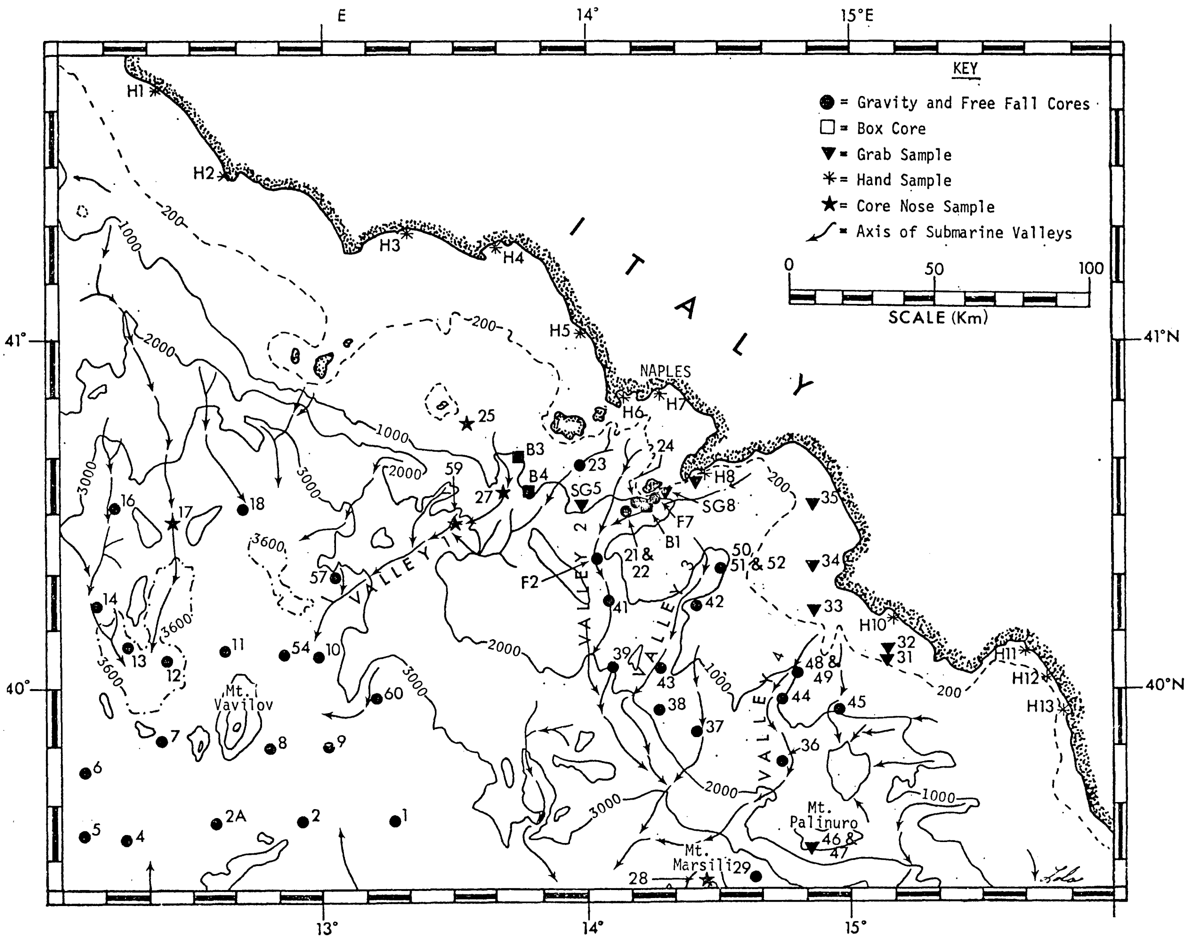

Fig. 2. — Tyrrhenian Sea Sampling Sites.

Analyses of the basin-wide distribution of ash types and of other coarse sediment components show that the submarine valleys are the major contributors of sediment to the Bathyal Plain as do magnetic fabric measurements [Frederick, 1972] and geophysical profiling [Charnock, Rees & Hamilton, 1972]. Furthermore the distributions suggest that most of the material in the Bathyal Plain beds was transported there through the Naples and Castellamare Submarine Valley systems. Other submarine valleys entering the Bathyal Plain had only a localized effect on Holocene sedimentation. Gravels and bedrock samples recovered from the valley axes and large scale cross bedding, detected by our profiling and by sonograph studies [Belderson *et al.*, 1972] attest to the activity of strong currents within them.

By invoking distal turbidity current deposition from low-density channelised flows one might explain many of the features of the marginal bathyal plain cores. However, the presence of better sorted non-graded and reversely graded beds and the dominance of the former in the plain's central parts suggests that either there is subsequent transport of turbidity-current deposited materials or that a bottom-current regime related to the submarine valleys is the dominant depositional mechanism.

Current transport of ashes is obvious here. Due to their ease of transport by sea floor processes, the practice of attempting long range correlation of ashes with specific volcanic eruptions should be avoided in such basins.

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