

GRAIN SIZE ANALYSIS OF THE SEDIMENTS OF THE SOUTHERN OKINAWA TROUGH

MIN-PEN CHEN and CHENG-LONG KUO

*Institute of Oceanography
National Taiwan University*

ABSTRACT

Eighteen piston cores were collected in the southern Okinawa Trough for the sedimentation study. The grain size analysis shows that the source of the sediment at the west side of Kuroshio current is mainly from Taiwan Island. Coarse materials from Taiwan may be transported to about 70 km far from the north-eastern coast of the island. In southern Okinawa, the Kuroshio current is the major mechanism to keep the finer particles in suspension, so that the sediment beneath the current contains a moderately well sorted and coarsely skewed silt. The loop currents at the east side of Kuroshio current may set up the slumping debris flow, turbidites and contourites from the north slope. The thin-bedded contourites in which the silt and fine sand are carried by the loop currents, are more common than the turbidites intercalations in southern Okinawa Trough.

INTRODUCTION

The turbidite sand layers which filled in the Okinawa Trough exceeding 1,200 m have been recognized from the seismographic study (Wageman *et al.*, 1970). The investigations of the sediments in the Okinawa Trough have been carried out by the Japanese Geological Survey in several research cruises (1976). But all focused attention on the northern Okinawa Trough, and the results were very scratchy. The southern Okinawa Trough is bounded by the Taiwan Island to the west and the Asiatic continental margin beneath the East China Sea to the north (Fig. 1). Structurally, it may extend into Ilan Plain in the northeastern part of Taiwan. The warm and rapid flow of Kuroshio Current turns northwest to Japan after passing through the southern Okinawa Trough. Because of its high speed, this current should affect the sedimentation in the trough. Chen (1979) divided the southern Okinawa Trough into three sedimentary regions according to the sedimentation rate. In this paper, an attempt was made to use the grain size distribution to observe the effect of Kuroshio Current on the sedimentation and sedimentary features, because grain-size is the most important property affecting transportability of sediment. Both vertical and horizontal grain size distributions analyzed from the piston cores will be available for interpreting the depositional environment. Statistical parameters calculated from the grain-size distribution data will give a comprehensive description of the deposit.

The Kuroshio Current flows northwestward through the southern Okinawa Trough to Japan and the adjacent area with a speed of 2 to 3½ knots in the central flux. The surface water temperature is relatively uniformly distributed from 23°C to 24°C in winter and from 27°C to 28°C in summer. The salinity contours protrude toward northwest at the Kuroshio Current passage with salinity ranging from 34.0‰ to 34.5‰ (Lien and Chen, 1977).

METHOD OF STUDY

Eighteen piston cores (Fig. 1, Table 1) were collected during three cruises in 1978 by the R/V Chiu Lien. These core sites were situated almost along the axis of the southern Okinawa Trough and not beyond 125°E. In general, the sampling interval was in 20 cm apart, but