

I-3. 3.5 kHz ECHO SOUNDER PROFILING SURVEY

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Introduction

A subbottom profiling survey for investigating the structure of surficial sediments was carried out, using the equipment of the Raytheon 3.5 kHz subbottom profiling system. This system is composed of nine transducers at 3.5 kHz (type TR75A) installed within the sonar dome beneath the bow bottom, a transceiver (Model PTR105A), a correlation echo sounder processor (CESP-II), a precision depth digitizer (Model PDP 200A) and a universal graphic recorder (UGR196B). The reflective signal was processed by the CESP II for high resolution near subbottom profiling, 20 dB processing gain and noise immunity and water reverberation immunity. They were recorded on the recorder at a 2-sec or 4-sec range. The profiles were obtained for 5,000 nautical miles of track during the cruise.

Preliminary results

(1) Kagoshima Bay

A small basin exists in the northern part of Kagoshima Bay, which is filled with well stratified layers. The northern slope of the basin has small ridges which may be the result of igneous activity. The southern slope of the basin, which is covered by thin younger sediments, has no such ridge. The basin is separated from the outer area by an uplifted ridge which trends from the southern part of Osumi Peninsula to Satsuma Peninsula.

(2) Northern part of the Okinawa Trough

On the profile of the cross section, approximately in an EW direction off Osumi Peninsula, there are two troughs which are separated by a ridge. The surface of the eastern trough and the ridge is composed of an opaque layer, where the western trough is filled with well stratified layers. The steep western slope of the ridge seems to have been formed by a fault.

Thick, well-stratified layers, which are frequently folded and cut by active faults, and intruded by the acoustic basements, are generally present in the NW part of the Okinawa Trough (Fig. I-3-1).

(3) Southern part of the Okinawa Trough

Thick opaque layers with an overlying thin transparent layer partly cover the southern part of the Okinawa Trough. A small depression filled with thin transparent layers is elongated in a NE-SW direction in the central part of the trough. Several volcanic ridges which have irregular surfaces are distributed in the western part of the trough.

(4) Ryukyu Ridge

The Ryukyu Ridge is composed of several small ridges covered by an opaque layer. Generally, the southern part of the ridge has a somewhat irregular surface and the central part of the ridge has a relatively smooth surface. The western slope of the ridge is fairly steep, while the upper part of the eastern slope of the ridge is relatively gentle.

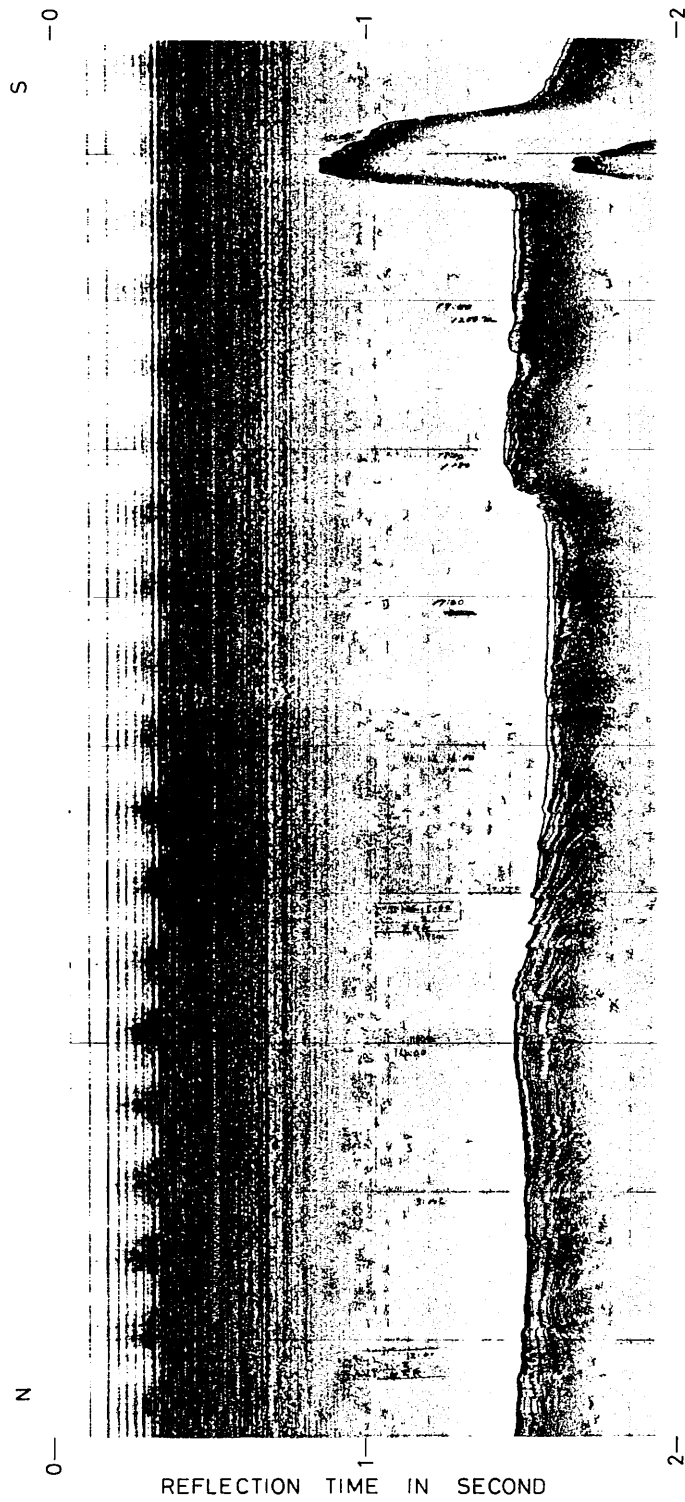


Fig. I-3-1 A profile by 3.5 kHz echo sounder in the northern Okinawa Trough (northern part of Line I).

(5) Outer slope of the Ryukyu Ridge

The outer slope of the Ryukyu Ridge is characterized by benches. Typical benches are generally developed at the depth of between 2,000–2,600 meters. Sometimes the bench is covered with well-stratified layers which are dammed up by the outer ridges. In general, the lower slope steepens towards the Ryukyu Trench and has several small benches.

(6) Ryukyu Trench

The bottom of the Ryukyu Trench usually has a flat surface and is filled with weakly-stratified layers. In some places, however, it is intruded by the acoustic basement or has an irregular surface where the surface is covered by opaque layers.