Session 1. Summary

RICHARD N. UCHIDA and SIGEITI HAYASI

Two papers were presented during the session. The first by Roden dealt primarily with the effects that seamounts have on the ocean's thermohaline structure and generated an active exchange of opinions during the discussion. The behavior of this structure and the circulation depend on several factors including speed and sheer of the oncoming flow, shape and orientation of the seamount, vertical stratification, and rotation of the earth. When conditions are favorable, stationary water masses called Taylor columns may form near seamount peaks, whereas under other conditions eddies may be shed from the seamount. Not all Taylor columns reach the sea surface. Those that do are more easily observed in winter by their low temperatures; in summer, the temperature contrast is minimal at the sea surface because the Taylor column may not extend above the mixed layer. The duration and frequency with which Taylor columns form have not been researched.

Yamanaka presented the second paper which reviewed results of investigations into the association of fish schools with oceanographic conditions in the vicinity of seamounts and other undersea features. He cited studies which showed that size and shape of seamounts, depth of the summit, bottom topography, water quality, and current strength all contribute to the formation of eddies and upwelling which aggregate fish. In these eddies, water color and transparency change and productivity is high near the summit. Many phenomena in the vicinity of seamounts need to be clarified. For example, one study showed that tuna usually aggregated upstream of seamount eddies whereas prey were found downstream. Unique bottom conditions around Crozet and Kerguelen Islands have been reported to be responsible for accumulating Antarctic krill and whales. Undersea ridges, which alter surface circulation, have influenced the transport and dispersion of fish eggs and larvae.

Yamanaka reported that even artificial reefs, although small compared with seamounts, also influence currents, to some extent, and may serve as models in the study of circulation over and around seamounts.

In the discussion that followed, Roden emphasized that to properly investigate the influence of seamounts on the oceanic environment, three-dimensional sampling would be required. Sampling stations should be spaced not more than 20 km apart for large seamounts and 5 km apart for small ones. Combination of ship, satellite, and satellite-tracked drifter measurements should produce results superior to single measurements. Accurate navigation and precision depth recording are also essential, and hydrographic stations should be conducted to depths of 3,000 m and preferably to the bottom.

Discussion also brought out that the height of the Taylor column is associated with the strength of the vertical stratification, that is, the stronger the stratification, the shorter the column. Furthermore, whether a Taylor column can be detected on the sea surface depends on weather conditions. Differences in water color and transparency can be seen over, and adjacent to, seamounts to some extent. On cyclonic and anticyclonic eddies in the vicinity of seamounts, the discussion centered on Yamato Bank located at the division of two current systems. Observations at this bank showed current speed in the southern part of the bank was twice as fast as that in the northern sector.

On a question of whether information on topography and other parameters could be used to develop models for other seamounts, Roden replied that a generalized model will be quite difficult to construct, explaining that some models will provide answers some of the time, but no generalized model is possible for all seamounts.

Another point brought up was the depth profile of chlorophyll *a* in the vicinity of seamounts. Yamanaka responded that because his presentation was an overview of other investigations, he was not able to describe its depth distribution. The question of why aggregations of small fish appear on the downstream side and large fish such as tunas occur on the upstream side was brought up but remained unanswered for lack of research information.