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AS THE KUROSHIO TURNS: (I) CHARACTERISTICS OF THE CURRENT[1]

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ABSTRACT

During the Kuroshio cruise of July 26-29, 1983, CTD was used for the first time in this Institute of Oceanography for studying the characteristics of Kuroshio current. Our findings suggest that (1) the salinity distribution of Kuroshio well resembles itself of 1965-66, (2) the total volume transport of Kuroshio is about $44.2\times10^6\,m^3/s$ (Sv) crossing 24°N latitude as compared to the July average of 42.3 Sv (Nitani, 1972, Table 8), (3) the uplift of isotherms at the NNE of Taiwan, discussed earlier by Yin (1973) and Fan (1980), seems to be a common event from Spring to Fall, (4) the Kuroshio water spreads into East China Sea when the former impinges on the continental shelf and turns northeastward, (5) long term monitoring work, including deploying deep sea current meter moorings, is required to determine Kuroshio's absolute velocity and the fluctuation of it.

INTRODUCTION

The Kuroshio current originates in the Luzon Strait, flows by Taiwan, Ryukyu, and Japan, and then slows down as a drift current of the North Pacific ocean, after months of meandering at the southeast of Japan. While flowing by Taiwan, Kuroshio reaches its maximal surface velocity and total volume transport (Nitani, 1972, Fig. 3 & 28). In the area northeast of Taiwan, the Kuroshio current was intensively surveyed ten to twenty years ago, as part of the international program-Cooperative Study of the Kuroshio (CKS). Most of the earlier cruises aimed at studying the general characteristics of the Kuroshio (Chu, 1976 & 1974) Here, we shall look closely in the region where Kuroshio turns away from Taiwan island. Chao and McCreary (1982) suggested that the bimodal behavier of Kuroshio is the result of its deceleration and acceleration. Taiwan Island is best located for monitoring the upstream changes of Kuroshio, and studying the Kuroshio near Taiwan Island is an indispensable work for understanding the hydrodynamics of Kuroshio current.

Several local phenomena worth mentioning. First, the uplift of isotherms in the northeast of Taiwan was observed and explained as the result of eddy formation, topographic effect, geostrophic effect and the convergence of water masses (Yin, 1973 and Fan, 1980). Second, during winter monsoon, the northeasterly wind pushes surface water against the northern shore of Taiwan (Chern, 1982). This will conceivably excert extra bending force on the turning of Kuroshio, and make it more vulnerable to cross-current instability. As the first part of a series of report on the characteristics of Kuroshio as it turns, we shall make a baseline comparison with earlier works, and delineate the oceanic phenomena that we shall concentrate our efforts on.

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