

STUDY OF THE KUROSHIO CURRENT BETWEEN TAIWAN AND ISHIGAKIJIMA¹

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ABSTRACT

The purpose of the present study is twofold: 1. To study the fluctuations of the Kuroshio Current especially the transport of the current in the sea east of Taiwan. 2. The relation between the geostrophic transport of the current and the difference of mean sea level between Ishigakijima and the coast of Taiwan to assess the general utility of tide gauge data for monitoring the Kuroshio transport.

Six cruises were carried out during the year 1974 and 1975 by the *R/V CHIU LIEN* for hydrographic measurements and geostrophic transport of the Kuroshio has been calculated. The results show that the total transport varies from cruise to cruise. It was increasing from $18.69 \times 10^6 \text{ M}^3/\text{sec}$ in July, 1974 to $42.12 \times 10^6 \text{ M}^3/\text{sec}$ in September, 1975. The yearly variation is quite large while the seasonal variation is not clear.

Tidal gauge data of Keelung and Ishigakijima of the year 1974 and 1975 have been processed with the low pass filter CL 121 and their difference are used for comparison with geostrophic transport between Ishigakijima and the coast of Taiwan. The results show that the mean sea levels of Ishigakijima are all higher than that of Keelung. This is quite in accordance with the theory that geostrophic currents are flowing to the right hand side of the slope of sea surface in the northern hemisphere.

The average transport of the six cruises is $29.3 \times 10^6 \text{ M}^3/\text{sec}$ and the difference of mean sea levels of the two places is 93.8 cm. The mean total difference of dynamic height between the two end stations A and O of six cruises is 61.4 cm (dynamic). If we consider this value as the actual rise in cm of the mean sea level at Ishigakijima due to the total transport of Kuroshio we can subtract this value from the difference of mean sea level and the balance 32.4 cm may be considered as the difference of datum plane of tide gauge at the two places. This value may also include some meteorological effects upon sea level not eliminated in average.

Since the difference of datum plane must be a constant and if we assume that the meteorological effects not eliminated in average are also constants, then we can subtract this value from the actual measurements of difference of mean sea level of the two places and calculate the total transport of the Kuroshio between Ishigakijima and the coast of Taiwan.

On the other hand, we have found that the ratios of geostrophic transport to the difference of dynamic height between the two end stations A and O of six cruises are very close. If we consider the mean ratio of the six cruises $0.47 \times 10^6 \text{ M}^3/\text{sec}/\text{cm}$ as a reasonable value, we need only to carry out hydrographic measurements at stations A and O at the same time and calculate the total transport from the hydrographic data.

INTRODUCTION

As the Kuroshio is a warm current in the Pacific Ocean, the northward transport of heat by the current and its variation have a great influence upon the heat exchange between the sea and the atmosphere. The general circulation of atmosphere and the climate in that region will also be affected.

The study of Kuroshio Current east of Taiwan is carried out in cooperation with Dr.

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