

OBSERVATION OF ABYSSAL FLOWS IN THE NORTHERN SOUTH CHINA SEA¹

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ABSTRACT

The characteristics of the abyssal waters in the Northern South China Sea (NSCS) are surveyed based on hydrographic observations. The route for the inflow of the Pacific Deep and Bottom Waters (PD) to the NSCS can be traced from the distribution of abyssal isotherms and the T-S relation. The PD waters creep over sills at the inlet of the Bashi Channel, enter the Luzon Trough, and, finally, turn to the Manila Trench and the South China Sea Abyssal Plain. These results agree with the past speculation that the origin of the abyssal waters at the South China Sea is from the Pacific. In addition, a cold-core, cyclonic circulation at the NSCS is observed from the present data. The existences of both the inflow and the cold-core cyclonic flow pattern, which is possibly a branch of the major abyssal circulation of the South China Sea, can be inferred from a conceptual model.

INTRODUCTION

The South China Sea (SCS) is a semi-enclosed oceanic basin. If one looks at the 200 meters isobath, the SCS is really a mediterranean. The abyssal waters at the SCS can be refreshed from the Pacific Ocean via the Bashi Channel. In his pioneering studies, Chu (1972) has mentioned that the abyssal waters in the SCS are too cold to originate from Taiwan Strait, or any other straits (or passages) along the Luzon island arc, other than the Bashi Channel. Few articles have discussed this topic since then. Because the SCS is the biggest marginal sea at the Western North Pacific Ocean, the exchange of waters with the Pacific is important to the climate variations in the Far East and the Southeastern Asia. Synoptic and dynamical studies within the SCS will be beneficial to the surrounding countries. This context describes recent observations on the inflow of deep waters from the Pacific Ocean to the NSCS. The route and circulation patterns, as well as the dynamics of abyssal flows at the SCS, will be discussed within the following sections.

DESCRIPTION OF DATA

From January to August, 1985, six cruises were made in the SCS area with a Neil-Brown Instrument System (NBIS) Mark III CTD system on board the R/V Ocean Researcher I. The locations of hydrographic stations are shown in Fig. 1. Due to the tight schedule of the research vessel, the survey was broken into several phases. Some cruises (Cruises 1, 3, 6, see Table 1) are assigned to get an overall feature of the hydrographic field, while the others (Cruises 4, 5, Table 1) are attempted to trace the abyssal waters along their possible route in the Bashi Channel and other entrance. Since the climate of the SCS is

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