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APPARENT OXYGEN UTILIZATION IN THE WESTERN PHILIPPINE SEA AND SHELF WATERS NEAR TAIWAN

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ABSTRACT

Linear temperature-AOU relationships were observed in the top 1000 m in the western Philippine Sea. The relationship showed a two-segment structure corresponding to two layers which were divided by the isotherm of 14~14.5°C. Vertical mixing appeared to be dominating the AOU distribution over other processes. The $\Delta NO_3^-/\Delta AOU$ and $\Delta PO_4/\Delta AOU$ ratios in the western Philippine Sea were 0.15 and 0.010, respectively. These ratios, which are higher than the Redfield ratios, resulted from the increase of preformed nutrients with depth. Preformed nutrients increased linearly with decreasing salinity maximum and minimum in the water column. This is consistent with the notion that the salinity minimum and maximum originated, respectively, from the subarctic and the tropical Pacific. Anomalous AOU-phosphate relationship, which was observed in destratified shelf water north of Taiwan, needs further investigation.

INTRODUCTION

The concept of apparent oxygen utilization (AOU) was first introduced by Redfield (1942). It is now defined as,

$$AOU=[O_2]^*-[O_2]$$

where $[O_2]$ is the observed oxygen concentration and $[O_2]^*$ is the solubility of oxygen at the potential temperature and salinity. By this model, Redfield assumed that the apparent utilization or production of oxygen should be related to the nutrient changes which accompany these processes. This concept has been used to study the mixing of water masses in many regions throughout the world (Kester, 1975).

Pytkowicz (1971) has pointed out that the apparent oxygen utilization in a mixture of two different water masses is related in a simple linear fashion to the proportion of each mass in the mixture. Thus, AOU can be considered as a characteristic property of water masses which gives us a means to study mixing processes in the ocean.

Several surveys on nutrients and dissolved oxygen have been made in the past in the coastal region and the Kuoshio near Taiwan (Hung *et al.*, 1975; 1979a, b). Howevre the distribution of AOU and its relationships with other parameters in deeper waters around Taiwan have yet to be systematically studied.

In order to understand the correlations between temperature, nutrients, and AOU in the surface and intermediate waters in the off-shore region of Taiwan, and to exploit the use cf AOU as a tracer for the frontal system at the Kuroshio

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