

MEAN ANNUAL VARIATIONS OF THE
THERMAL STRUCTURE
IN THE SOUTH CHINA SEA

A THESIS SUBMITTED TO THE GRADUATE DIVISION OF
THE UNIVERSITY OF HAWAII IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE

IN OCEANOGRAPHY

May, 1990

By

Dongchull Jeon

Thesis Committee:

Klaus Wyrтки, Chairman

Eric Firing

Peter Muller

Abstract

The upper layer of the sea is greatly influenced by the monsoons in the South China Sea. 10 years' XBT data and long-term monthly mean wind data were used to see the annual variations of the thermal structure along the line between Singapore and Taiwan. Dynamic heights were calculated by using mean annual T-S data and monthly mean sea surface salinity data. A horizontal reference level was chosen at 400 meters due to the limit of XBT's.

Based on the monthly averages of temperature within the study areas along the line between Singapore and Taiwan, vertical sections of the thermal structure show downward tilting of the isotherms toward the Sunda Shelf during the northeast monsoon and no overall slope within the thermocline during the southwest monsoon. A strong thermal front, with a horizontal gradient of 3°C to 5°C / 200 km, exists at the Kuroshio edge near the Bashi Channel during the whole year. Annual cycles of sea level differences between Singapore and Kaohsiung, Taiwan, and of the averaged surface wind stresses along the line show a high correlation. Time-series of dynamic topography shows the annual variations of the frontal structure in the Bashi Channel and of the slope along the monsoon axis. The annual variations of the thermal structure in the upper layer of the South China Sea can be explained by a vertical circulation which is balanced by kinetic energy due to the surface wind stresses and potential energy corresponding to the change of the density structure.