

Variability of pigment biomass and mesoscale thermal features along First Oyashio Intrusion as determined from satellite and ship data

Kedarnath Mahapatra and Yoshihiro Okada

Center for Advanced Technology

Institute of Ocean Research and Development

Tokai University, 3-20-1 Orido, Shimizu, Shizuoka, 424-8610 Japan

e-mail: kedar@scc.u-tokai.ac.jp

Abstracts

A series of satellite data from the Sea-viewing Wide Field-of-view Sensor (SeaWiFS) and Advanced High Resolution Radiometer (AVHRR) over one year period, were examined to determine the relationship between the phytoplankton pigment distribution and sea surface temperature along the First Oyashio Intrusion. The structure of the temperature fronts and their role in phytoplankton pigment distribution was studied. The SST data showed generation of a thermal eddy during late fall, south east of Hokkaido and persisted for six months before coalescence. The eddy had very little impact on the phytoplankton pigment distribution during the winter due to deep mixing. Stratification of water column during spring induced a phytoplankton bloom, which consequently led to formation of a phytoplankton eddy. Four sets of hydrographic data obtained from ship observations along two meridional transects were assessed to explore causal parameters for the spatio-temporal variability of phytoplankton distribution as delineated from the satellite images. Significant correlation was marked between SST and phytoplankton pigment concentration during the fall and spring, however, nitrogen strongly related to pigment concentration during the winter and the summer. The relevance of such relationship was explored on the basis of the results from earlier investigations in the study area. Potential of complementary analysis of ocean color and thermal images in understanding meso-scale biological oceanographic phenomena was demonstrated in this study.