INVESTIGATION OF BLACK SEA COASTAL CURRENT CIRCULATION BY REMOTE SENSING AND OCEANOGRAPHIC DATA

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Abstract

Increasing resolution of satellite data and recent coastal oceanographic researches has contributed significances to our present information of the Black Sea coastal current circulation. Coastal eddies observed in the Black Sea are normally elongated, anticyclonic gyres jammed between the cyclonic Rim Current over the coast and the shelfbreak. In this study, near-shore current system of the Turkish Black Sea coasts is investigated in the light of the data collected in six main cruises handled between the years 2003 and 2005 and the satellite images of the region.

Keywords : Black Sea, Remote Sensing, Surface Waters.

Introduction

The Black Sea is a nearly enclosed basin connected to the Marmara Sea and the Azov Sea by the narrow Turkish Strait system (Bosporus, Marmara Sea and Dardanelles) and Kerch Straits, respectively. Its catchment area covers large parts of Europe and Asia, providing a total freshwater supply of 3 x 102 km^3 per year. However evaporation exceeds precipitation, the freshwater flux remains large in comparison to basin volume (approximately 5.4 x 105 km^3), making the Black Sea having brackish water. Because of the large freshwater flux and the narrow opening in the strait of Bosporus, the exchange between the Black and Marmara Sea is asymmetric: the volume of water transported by the out flowing surface current is two times larger than the inflowing deep counter-current, thus the Black Sea's surface salinity is about half that of the Mediterranean's salinity. Unlike other large estuarine basins (e.g., the Baltic Sea), the Black Sea is a deep basin (maximum depth of 2200m) with a large shelf. A distinct vertical ayering is created between the surface waters in the upper 100 m and the deep waters, limiting the vertical exchange and creating a unique chemical and biological environment.

The Black Sea circulation involves a complex, eddy dominated system with different types of structural organization in which eddies and gyres of the interior cyclonic cell interact continuously among themselves and with meanders and filaments of Rim current system [1].

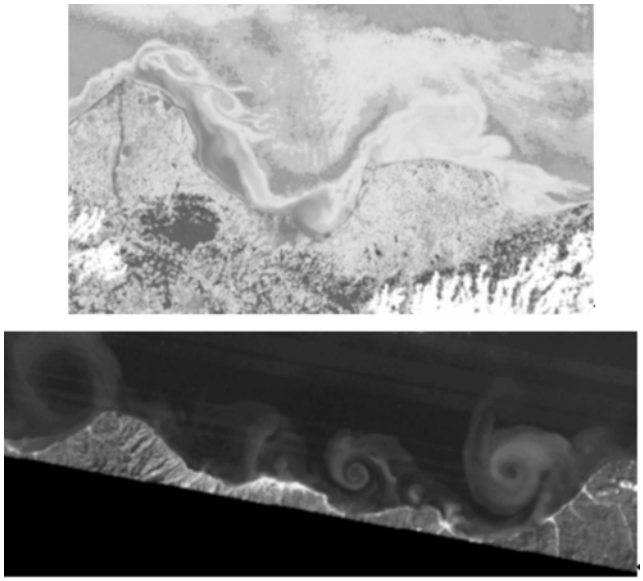

Fig. 1. Coastal surface circulation of the Black Sea observed by satellite images.

Results and Discussion

As bottom topography is known to be the main controlling agent of the Black Sea surface circulations, we can talk about wind curl effects to be the secondary in triggering relative vorticity for the Black Sea basin. In addition to these, along the Turkish shores, the shoreward side of jet is a regional of strong anticyclonic shear typically 40 cm/sn per each 10 km. An other derived result is the strong seasonal stratification cycle that probably has an important effect on coastal anticyclogenesis through nonlinear dynamics.

Reference

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