Geophysical Research Abstracts
Vol. 12, EGU2010-10548, 2010
EGU General Assembly 2010

Dynamics of the flow near the Bosphorus

Sukru Besiktepe (1), Ewa Jarosz (2), Mark Hulbert (2), Pietro Zanasca (1), and Andrew Quaid (2)

(1) NATO Undersea Research Center, Italy (besiktepe@nurc.nato.int), (2) Naval Research Laboratory, Stennis Space Center, USA

The Bosphorus (Strait of Istanbul) is the prime example of the strongly stratified long and narrow strait. Two-layer stratified flow through the strait is driven by the density difference between the Black and the Marmara Seas which maintains a net sea level difference between these seas. The upper layer is formed with the Black Sea waters and flows from Black Sea to Marmara Sea while the lower layer is formed with incoming Marmara Sea waters which originated from the Aegean Sea.

TSS-08 and TSS-09 experiments carried out which was covering the Strait of Istanbul as well as the adjacent basins in full. These two experiments allowed us to identify the dynamical processes which control the flow in the vicinity of the strait. The data from towed undulating vehicle, vessel mounted ADCP, hull mounted underway CTD and moorings are used to describe the sub-mesoscale flow characteristics in this area.

The Black Sea mean circulation is characterized as a basin scale cyclonic circulation which is known as Rim Current. Coastal waters also move cyclonically forming a boundary current which originates from the Rivers on the northwestern Black Sea. When the boundary currents in the basin encountered the Strait of Istanbul, two-way interaction occurs. As a result, transient sub-mesoscale eddy forms in the vicinity of the strait. The location and strength of this eddy defines the characteristics of the water going into the Strait of Istanbul. On return, the dense water outflow into the Black Sea spreads on the shelf bottom and cascades to greater depths feeding the intermediate layers of the Black Sea. This water is originated from the Aegean Sea. The surface exit flow from the Strait of Istabul into the Marmara Sea is in the form of jet, corresponding to separated flow. The Temporal variability of the flow in the straits is high, as is evident especially in the repeated sections in the Bosphorus using underway CTD. This high temporal variability results in the highly variable outflow conditions.