A FRESH LOOK AT DYNAMICS OF THE ADRIATIC SHELF-BREAK AREA

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Abstract

First results of extensive ADCP and CTD measurements, performed in the Adriatic shelf-break area between February and September 2006, are presented. Pronounced diurnal oscillations were observed, apparently related to internal tides and periodic upwelling and downwelling events. Moreover, inertial oscillations were documented. Finally, summertime change of the east-coast inflow to the Adriatic was recorded, lasting only one month at two ADCP stations, three months at one station.

Keywords : Adriatic Sea, Circulation, Upwelling, Tides.

The presentation focuses on the Adriatic shelf-break area. Previously, it has been found that the along-basin flow there is oppositely directed in the winter and summer seasons, that seasonally dependent circulation contributes to a strong temporal variability of thermohaline properties, and that barotropic-like currents reverse on a few-day scale [1]. More recently, it has been shown that during the stratified season diurnal internal tides are generated in the area by the interaction of diurnal barotropic tides with topography [2]. As the previous detection of internal tides was based on a limited data set, the project entitled "Internal Tidal Hydrodynamics and Ambient Characteristics of the Adriatic (ITHACA)" was initiated in order to provide a more complete information. The aim of the project was also to consider the way changes of background stratification and currents modify internal waves, and vice versa - to address a possible influence of internal waves on deductions based on measurements that are scattered in space and time.

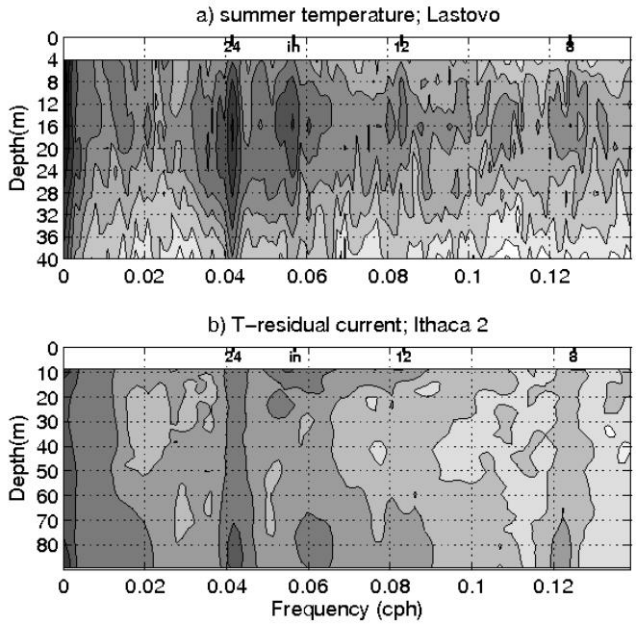

Fig. 1. Depth-frequency plots obtained from (a) temperature time series collected at Lastovo and (b) cross-basin currents recorded at a nearby station and detided by allowing for seven barotropic tidal constituents. Darker shadow implies higher spectral density. Also indicated are the 24-h, 12-h and 8-h periods as well as the local inertial period.

The field phase of the project lasted from February to September 2006. During the experiment (1) ADCP measurements were performed at three stations using trawl-resistant bottom mounts (called barnys), (2) thermistor data were collected on the islands of Lastovo, Sušac and Biševo utilizing 3 x 10 sensors deployed on steep cliffs opened to the southeast, (3) shipboard CTD surveys were carried out on four occasions at an along-basin transect comprising 13 closely spaced stations, (4) optical surveys were performed at thermistor stations while deploying and recovering them, (5) surface tides were monitored at the permanent Split and Dubrovnik stations and at one of the ADCP stations, and (6) meteorological conditions were documented by permanent stations in the area (Split, Dubrovnik, Hvar, Komiža and Palagruža).

The project was successful, as all the instruments were recovered except one of the thermistors. Preliminary analysis of the data collected has shown that diurnal temperature oscillations were particularly strong at one of the islands (Lastovo) and that corresponding baroclinic current variability was largest at a nearby ADCP station (Figure 1). Apparently, the diurnal signal was related not only to internal tides but also to periodic upwelling and downwelling events that were especially pronounced in July 2006. Inertial oscillations were also well visible in both the temperature and ADCP time series. Lower frequencies were dominated by the east-coast inflow to the Adriatic, which, however, underwent a summertime change - recorded in July 2006 at two of the ADCP stations, between May and July 2006 at one station.

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