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SOME RESULTS OF DIRECT MEASUREMENTS OF SEA CURRENTS IN THE  
ADRIATIC SEA AND IN THE STRAIT OF OTRANTO

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ABSTRACT

The knowledge of water masses dynamics is the base for the interpretation of change and interactions in the ecological system of the sea. In this paper the methodology and some preliminary results of direct measurements of sea current in the Adriatic Sea and in the Strait of Otranto, collected during cruises of R/V "Andrija Mohorovičić" from 1974 to 1976, are given.

RESUME

On présente quelques résultats des mesures directes des courants effectuées par le navire "Andrija Mohorovičić" dans les eaux profondes de l'Adriatique méridionale et du détroit d'Otranto, dans l'intervalle de 1974 à 1976.

Great number of scientists have contributed to the oceanography of the Adriatic Sea investigating (with great variety of methods) its current system. But obtained results are not comparable in some ele-

ments what sometimes have led even to opposite hypotheses. This is understandable to some extent because the Adriatic Sea is a closed and shallow sea often exposed to abrupt hydrometeorological changes and therefore not amenable to standard analysis.

It was known for a long time that direct current measurements at several depths and in long time series are necessary for the whole Adriatic Sea, in order to verify theoretical predictions. Along these lines some institutes and scientists have oriented their efforts. At several stations in the Adriatic Sea they measured sea currents in direct way periodically for several years. Unfortunately those measurements had some drawbacks. This is primarily the case with the accuracy of measurements from the anchored ship, the choice of stations, and the impossibility to measure simultaneously all physico-chemical parameters at several stations needed for the calculations of gradient currents.

With the purchase of modern current meters with automatic recording, oceanographic buoys and the big oceanographic ship, all necessary requirements were met for the systematic measurements of currents at various depths and under different conditions.

Recognizing the importance of understanding the dynamics of the Adriatic Sea, special attention was given to this type of measurements in the program of "Andrija Mohorovičić" cruises (1974-1976). Modern autonomous (mechanical, electrical, photoelectrical and electronical) current meters installed on oceanographic buoys, were used for 24 hours measurements and they measured at three to eight depths simultaneously, in 5 minute intervals, to the 1100 meter depths. Temperature and salinity were measured simultaneously for the calculation of gradient currents (dynamical depths).

It should be emphasized that there was not enough time, so far to elaborate and analyse completely all measured results and obtained results are therefore not representative enough to prove or disprove any of existing theories about current system in the Adriatic Sea. However results of measurements in the summer period (September) and

partly in the winter period (February) suggest rather convincingly the following conclusions :

1) A basic characteristic of the Adriatic Sea dynamics is the formation of three dynamical basins with some specific characteristics and pronounced interactions.

2) Basic circulation in all three water bodies is in cyclonic direction with periodic pronounced transversal movements (in some parts) from the eastern to the western coast. This is particularly pronounced in the summer time.

3) From direct measurements it can not be concluded that there exists currents strictly bounded within identified water bodies. On the contrary, at all stations movement of the whole column in the same direction was registered. The only exception was a deep bottom layer on a station in the Strait of Otranto.

4) Direct current measurements and gradient currents calculated from simultaneously measured temperature and salinity exhibit excellent agreement.

5) Direct measurements confirmed previous hypothesis about current velocity decrease from the surface to the bottom. But registered velocities differ from previously obtained results. For instance at the Strait of Otranto in September 1974 incoming currents in the top 50 meters layer were : maximum currents 1.01-0.85 knots, mean values 0.92-0.53 knots and resulting currents 0.69-0.53 knots, although it is generally supposed that in September prevail strong outgoing currents, predominantly along the west coast.

From the existing knowledge and from results of recent measurements performed by Hydrographic Institute of the Navy it can be concluded that further intensive and extensive direct measurements of currents are necessary for a better understanding of the current system of the Adriatic Sea and for the better usage of that knowledge in understanding the physical, chemical and biological changes of the Adriatic Sea.

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