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SOME DYNAMICS CHARACTERISTIC OF THE EASTERN ADRIATIC LITTORAL

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ABSTRACT

Results of investigations at a number of stations along the Yugoslav coast are analysed and compared to the dynamics characteristic of the open Adriatic.

RESUME

On a analysé les résultats des recherches océanographiques qui ont été faites le long du littoral de l'Adriatique orientale. On a ensuite comparé ces résultats obtenus avec les caractéristiques dans la zone de la haute mer de l'Adriatique.

Within the frame of various programmes, the Laboratory for physics of the sea, in collaboration with the Navy Hydrographic Institute, took observations at a number of coastal stations in Dalmatia. They included fundamental oceanographic data, current measurements (cca 50 000) and diffusion studies. This material was processed by standard methods including the analysis by the rotary spectral method after Gonella and Mooers. Diffusion was treated theoretically as well as by numerical

treatment and Rhodamin-B experiments. The large amount of information gave us possibility to understand some dynamics characteristic of the littoral compared to the open sea.

In the open Adriatic three distinct layers could be distinguished, while in the coastal region two layers are usually present, the current system in one of them is complementary to the other (at least partially). The surface layer is separated from the bottom layer by the thermocline. At this transitory level the higher noise level refering to tidal oscillations was noticed. On the other hand oscillatory energy with periods of a few days causes the energy loss.

In the surface layer, currents in the NW, W and N directions prevail. The first of those represents the incoming current along the eastern Adriatic coast, which, due to the direction of the coastal line, could be changed at some places to W and N directions. But the W direction seems to have another meaning as well. Along the largest part of the coast it represents the offshore current. As it is most frequent in winter it could be brought into connection with bora i.e. the NE wind which drifts water of the surface layer away from the coast.

In the bottom layer current directions in the second quadrant prevail. Directions towards the coast (NE, E) are particularly interesting as they bring the water from deep layers of the open sea to the coastal region, so establishing the coastal - open sea circulation.

The open Adriatic is characterized by pronounced seasonal oscillations in the current field. In the coastal region the dispersion of directions is generally larger and seasonal fluctuations are less pronounced. On the contrary, oscillations of few days period are more prominent in the coastal region than they are in the open sea.

Tidal currents have speeds in the range 5 to 1o cm/sec. Current vector oscillations perform an ellipse in the coastal region showing that longitudinal and transverse oscillations are present, while in the open sea tidal oscillations are linear and parallel to coastline. Low-frequency oscillations show the opposite characteristics. In the

open sea they describe ellipses of small excentricity, while in the coastal region they are almost linear with directions predominantly parallel to the coastline.

Speeds in the coastal region are somewhat lower than those in the open sea. Average speed in the open middle Adriatic is cca 20 cm/sec. and in the coastal region is almost half that in the open sea.

We have already seen that in the coastal region there is a pronounced dispersion of directions i.e. very expressed vorticity of the current field. To try to explain the way in which the vorticity of the current field modify the circular diffusion processes, a numerical experiment was carried out. A vorticity activity in the current field was observed in the model. The process flows with the mean velocity taking the isotropic coefficient of the Fickian diffusion process.The dye condition after one hour showed that the diffusion process has not circular symmetry, and the isolines of concentration have elliptical form. The dye rotates and the intensity of the diffusion process does not change as the area embraced by the concentration isolines was constant in time. The instantaneous point source has been experimentally investigated as well as pollutant distribution from continuous point sources.