Methods and means of organization of remote acoustic monitoring of the Black Sea and Mediterranean

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During last years it becomes inevitable that further progress in World Ocean studies is possible only with the use of principally new methods and means of ocean environment monitoring. The most useful can be the construction of hydroacoustical equipment for remote monitoring of ecological and hydrophysical processes for example in the Black Sea and Mediterranean. It is necessary to control, mainly, circulation the process of formation and variability of thermohaline structure, distribution of natural and anthropogenic particulate material, hydrochemical parameters, etc. The propose of observational system can be settled in case we can solve the following major tasks:

-to determine major mechanisms of sound dispersion, their specific peculiarities and their role in overall dispersion phenomenon;

-to access space-time structure of smallscale hydrophysical disturbances and their acoustic characteristics;

-to develop models of sound dispersion due to irregularities of different physical nature;

-to create physical base for remote sensing techniques of hydrofrequency acoustical diagnostic of hydrophysical processes;

-to study the possibility of monitoring of H2S boundary;

-to create a data base for forecasting conditions of sound dispersion in the water.

At present time, we developed a model of sound dispersion due to physical irregularities of sea water that takes into account it's complexity, spectral structure of irregularities and other factors. We have also studied the influence of temperature, salinity, current velocity peculiarities on characteristics of sound dispersion. Experimental studies have been conducted to investigate sound dispersion on temperature irregularities in a tank. These experimental results have confirmed theoretical studies.

Concerning experiments, special equipment and methodology have been developed for field acoustical measurements. Studies of sound dispersion characteristics and their relation to oceanological field structure has been performed, also.

Local dynamic experiment in the shelf zone of southern Crimean Coast

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Marine hydrophysical institute of the Ukrainian Academy of Sciences conducted local dynamic experiment (LODEX) in the shelf zone of Southern Crimean Coast (SCC) during the summer of 1991. The main objective of this experiment was to study the shelf flow dynamics in the presence of the developed seasonal thermocline. The principal forcing mechanism for the shelf flow in this region is a wind stress. According to this the main aims of the LODEX program were to investigate the physical processes caused by the local and remote wind forcing. Among them, an upwelling (downwelling) events and generation of subinertial coastally trapped waves are of a primary importance.

Experimental studies included:

1. Current and temperature measurements from 7 mooring buoys. Moorings were arranged along two lines oriented perpendicular to the local isobaths. One mooring buoy was placed upstream, another one was placed downstream from the experimental site.

2. Current, temperature and wind measurements from the oceanographic platform of the Experimental Department of MHI.

3. Current measurements from bottom installations on inner shelf (depths 10-15 m.). 4. 3 hydrological (CTD) surveys in the shelf-slope region of SCC from the RV "PROFESSOR KOLESNIKOV" (27 cruise), during which wind measurements and hydrochemical observations were perfomed as well. Surveys were organized as a system of sections which were oriented normally to the shelf break.

Obtained data have shown that the subinertial oscillations were well pronounced in the density and velocity fields on the shelf with periods of 11-12 days, 3-4 days and nearinertial one. Current oscillations at subinertial frequencies were better component, their amplitudes increased from the open sea to the coast and phase propagated from east to west which is in agreement with the properties of coastally trapped waves. These waves are essentially baroclinic because their propagation was accompanied by the temperature oscillations on the horizonts below the upper mixed layer.

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