різних етапах (технічного завдання на проведення дослідно-конструкторської роботи, макету та опитного зразка).

Це відкриє перспективу:

довгострокових систематичних спостережень за станом природно-заповідного фонду України для одержання повної, об'єктивної та своєчасної інформації щодо його поточних змін;

виявлення та оцінювання несприятливих факторів, які впливають на стан природно-заповідного фонду України, оцінювання масштабів погіршення цього стану, з'ясування причин і механізмів змін стану природно-заповідного фонду, визначення закономірностей їх сталого функціонування і прогнозування їх динаміки;

інформаційно-аналітичної підтримки рішень щодо управління станом природно-заповідного фонду України.

DEVELOPMENT OF METHODS FORECASTING OF UPWELLING WITH REMOTE SENSING BASED ON THE ANALYSIS OF THE REASONS FOR THE MANIFESTATIONS OF UPWELLING IN THE BLACK SEA

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The problem of a sharp decline in water temperature in the recreational zones often arises. The sharp decrease in the temperature of the water near recreational zones indirectly affects the level of tourism in a certain period. This phenomenon is associated with the process of upwelling.

In open waters of oceans and seas upwelling observed in the Central regions of the cyclonic circulation at the ice edge, during the passage of tropical cyclones, frontal sections, at the equator. However, the most powerful upwelling formed in the coastal areas of continents and Islands. The influence of coastal upwelling on the processes occurring in the oceans and seas is extremely high, which led to his active research in the last decade. As a result of intensive ascending motions, surface water, periodically or continuously enriched by nutrients, and as a result, in the narrow coastal zone is nutrient-rich environment for phytoplankton and zooplankton. At the same time, there is a separate reservoirs, for example the Black sea, where intensive rise of water may cause a negative effect — the flow in the surface layers of waters contaminated with hydrogen sulfide. Large-scale coastal upwelling affects the climate of surrounding land. The study of the structure of upwelling is important for an adequate parameterization of this phenomenon in global models of the interaction of ocean and atmosphere. In recent years has increased the need for detailed knowledge of the processes of upwelling in connection with the expansion of the range of problems of rational nature management in the coastal zone of the oceans and seas. However, while coastal upwelling some areas of the World ocean have been well studied, the structure and dynamics of coastal upwelling waters of the Black sea have been studied very poorly.

The problem of predicting the phenomenon of upwelling in the recreational zones

of the Black sea today is of great importance to maintain the level of tourism and clarify the tourist season for coastal parts of the territory of Ukraine . For operational adjustment of the length of the tourist season it is essential to monitor changes in temperature and salinity of waters in the Black sea. In this context, it is extremely urgent problem of development of effective system of forecasting of the phenomenon of upwelling along the coast of the Black sea, which belongs to Ukraine. Such a system is expedient to be based on extensive engagement of remote sensing of the Earth from space.

The development of methods of forecasting upwelling consists of two parallel stages :

1. The creation of the database contains information about the sea surface temperatures in this period, the salinity of the sea, speed and direction of the winds, and on the basis of these data calculates the deviation of sea surface temperature from climatic norm, the deviation of salinity from climatic norm and as a result the index of thermohaline anomalies.

2. The definition of upwelling areas according to remote sensing and detect the position of the water headshapes.

An important aspect in the development of methods to predict upwelling is the index thermohaline anomalies. Thermohaline circulation - circulation generated due to the differential water density, formed as a result of heterogeneity of distribution of temperature and salinity in the ocean. Index thermohaline anomalies, showed how much the temperature dropped sea in the period effects of upwelling, calculated on the basis of deviations of sea surface temperature and salinity variances, and, based on average sea surface temperatures and average salinity during the study period. The use of an index thermohaline anomalies allowed us to determine the level of reduction temperature of surface waters due to deviation decrease in temperature from the climatic norm.

Definition of upwelling areas according to remote sensing data allow to track the movement of headshapes water upwelling (Fig.1).

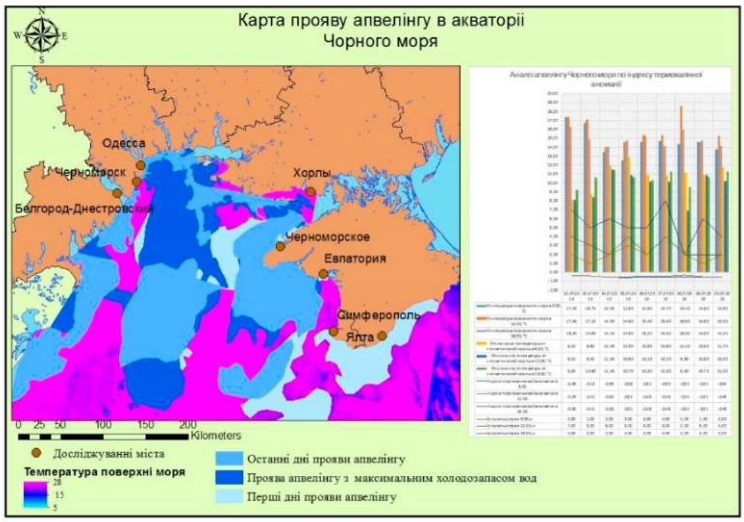

Figure 1 - map of the effects of upwelling in the Black sea

A method for predicting upwelling with minimum material and time costs allows