Information-analytic system of sea level*

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Abstract — We present the description of the first version of an information-analytic system designed for the systematization of the historical data of observations over the levels of the Black and Mediterranean Seas, diagnostics and prediction of possible variations of the sea level, and classification of the coastal regions according to the degree of flooding hazard caused by these variations.

A decision-making computer system aimed at the evaluation of the influence of surging on human activity in the coastal zone is now created at the Marine Hydrophysical Institute of the Ukrainian National Academy of Sciences within the framework of the project "Marine Expert Systems" (a part of the Ukrainian national programme of investigation and utilization of resources of the Azov–Black-Sea Basin and other parts of the World Ocean carried out under the guidance of the Ministry of Science and Technology of the Ukraine). The information-analytic subsystem of sea level is one of the elements of this system. The investigation of variability of the sea level is of great importance both from the scientific and practical points of view. On the one hand, it is of interest to study the dependences of various hydrological characteristics on the sea level since, as a rule, the time series of observations over the sea level cover longer periods of time. The investigations of variability of the sea level for different basins enable one to perform complex comparative analysis and make conclusions concerning the general regularities and local specific features of variations of the sea level. On the other hand, the accumulated data make it possible to predict the character and magnitude of future changes in the sea level and, hence, make practical conclusions concerning the degree of flooding hazard for individual coastal zones and possible consequences of this flooding.

In view of these arguments, in designing the information-analytic system of sea level, it was necessary to solve the following principal problems:

— creation of the most complete, open, and updatable computer database including the data of measurements of the levels of the Black and Mediterranean Seas for more than a century of observations (in this case, one can guarantee both the standard control of the quality of data included in the database, e.g., according to the procedures of the IOC of UNESCO, and expert estimates of these data), the data on the bathymetry of the basins and the topography of the coastal part of the continent, and other accompanying data;

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Figure 1. Structural scheme of the information-analytic system of sea level.

- creation of a customized system of control over the database;
- formalization of the data input (creation of unified data formats) required to make the system open;
- creation of a database of knowledge including both standard and special procedures of processing and analysis of the available data on the sea level and models aimed at the diagnostics and prediction of variations of the sea level and analysis of its influence on the human activity in the coastal zone;
- setting up of the required data output including various data retrievals, statistical and other estimations of the behaviour of the sea level, and recommendations on weakening of the influence of variations of the sea level on the economic and other human activities in the coastal zone.

The structural scheme constructed according to this programme is presented in Fig. 1. The system can be split into two interacting subsystems, namely, the infor-