



The approaches for the decision support in case natural hazards

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In spite of using highly automated systems of measurement, collecting, storing, handling, prediction and delivery of information on the marine environment, including natural hazards, the amount of damage from natural phenomena increases. Because information on the marine environment delivered to the industrial facilities not effectively used. To such information pays little attention by individual decision-makers and not always perform preventive measures necessary for reduce and prevent damage. Automation of information support will improve the efficiency management of the marine activities. In Russia develops "The Unified system of the information about World ocean" (ESIMO, <http://esimo.ru/>), that integrates observation, analysis, prognostic and climate data. Necessary to create tools to automatic selection natural disasters through all integrated data; notification decision-makers about arising natural hazards - software agent; provision of information in a compact form for the decision-makers; assessment of possible damage and costs to the preventive measures; providing information on the impacts of environment on economic facilities and recommendations for decision-making; the use of maps, diagrams, tables for reporting.

Tools for automatic selection designed for identification of natural phenomena based on the resources ESIMO and corresponding critical values of the indicators environment. The result of this module will be constantly updated database of critical situations of environment for each object or technological process.

To operational notify and provide current information about natural hazards proposes using a software agent that is installed on the computer decision-makers, which is activated in case critical situations and provides a minimum of information. In the event of natural disaster software agent should be able to inform decision-makers about this, providing information on the current situation, and the possibility for more and detailed information about natural hazard. Software agent must be able to be configured by the user to a specific object: a specific station or a drilling rigs that region or area, regardless of the size of the object. And depending on the selected settings and parameters it needs to apply the values of critical indexes.

There is a need for real-time display hydrometeorological information with compact scheme that reflects the environment indicators that affect industrial facility in the form of devices (thermometer, aneroid, footstock, speedometer, hygrometer, thermograph, barograph, rain gauge, wind vane, etc.) with the ability to display indicators exceed a critical value. This scheme is designed to provide maximum information in the shortest possible time reference that provides an intuitive interface (display by generally accepted standardized instruments).

Analytical services ESIMO combined with geographic information service provides information about area or point to decision-makers of showing the dynamics of changes of parameters in the form of graphics, diagrams, maps, tables. If the data sources are updated, analytical services automatically provides the relevance of the data in the analytical views of the complex. Analytical services works with database of integrated data and used for the preparation and presentation of the consumers of the federal and regional level for the analysis of information on the World Oceans. The analytic services show a set of indicators about the situation in the World Ocean. The complex provides the processing, analysis of qualitative and quantitative characteristics (indexes) of the marine environment and maritime activities of the Russian Federation.

To assess the need for preventive measures, decision-makers require information in the form of potential economic consequences of natural hazard, cost of preventive measures to prevent damage. We can use for that the economic and mathematical models.

When making the decision decision-makers must understand the possible consequences of natural phenomena and rely on the advice that they receive from a decision support system. Such information about the impacts and recommendations are based on the knowledge base (rules of "if, then"), formed on the basis of experience gained in the past. This should take into account not only the critical values for each object and technological process, but also the type of information (observations, forecasting, climate, and after the phenomenon), the level of decision-making, the season of the year, the climate zone where the object is located.

Within ESIMO created integrated database that containing the results of the monitoring of the marine environment.

The database includes the observation, analysis, and forecasting and climate data. Operational data is updated automatically at specified intervals of a few minutes to a week, depending on the frequency of observations. Climatic data is updated as needed, for example, once a year or once every five years. Integrated database contains a set of indicators related to a specific object, and to a certain geographic area, according to the observations made and the data entered data. In addition to hydrometeorological parameters database contains socio-economic information. At present, was created the database of critical values and information about the impacts of and recommendations for the 30 natural hazards, developed the data structure and software is under development.

The interaction of all components of an information support will reduce the economic damage from natural disaster on individual objects economy (ships, ports, etc.) and improve public safety through more prompt delivery of information to decision-makers and the public, besides receive more informative data (district with symptoms natural phenomena , assessment of possible damage, the impact of and recommendations).