

Development of Digital Atlas “Physical Oceanography of the Black Sea – 2020”

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In the framework of international and national projects, considerable experience in development and creation of various maps and atlases reflecting the state of the Black Sea environment has been accumulated in Marine Hydrophysical Institute, Russian Academy of Sciences. Selected maps and entire sections of such atlases as digital atlas “Physical Oceanography of the Black Sea” (2003), “Atlas of the Black Sea and Sea of Azov Nature Protection” (2006), “National Atlas of Ukraine” (2007), “Oceanographic Atlas of the Black Sea and the Sea of Azov” (2009), etc. can be given as examples. Data held in the Oceanographic data bank of Marine Hydrophysical Institute, Russian Academy of Sciences (MHI BOD) served as the informational basis while building maps for relevant sections of the atlases.

At present, digital atlas “Physical Oceanography of the Black Sea” is available online on the MHI BOD website (<http://bod-mhi.ru/climaticAtlas.php>) and contains about 350 maps in its three sections. The first version of the atlas was designed in 2003 in the framework of project “Rescue of Black Sea Hydrological Data, Creation Digital Atlas, and Studies of Seasonal and Interannual Variability of Black Sea”. The atlas was highly appreciated by users from different marine research institutions in Russia, Ukraine, and other states and remains to be actively used.

However, in more than fifteen years since the atlas release, the array of oceanographic data that can be used for building maps has increased from 105,000 to more than 165,000 stations; methods of mapping have been considerably improved; a new interface has been developed to provide users with more opportunities when working with the atlases. All of that promoted the development of a new digital atlas “Physical Oceanography of the Black Sea – 2020” with its possible location on the MHI BOD website.

Structurally, the new atlas will consist of four parts (temperature, salinity, density, geostrophic circulation) and include above 500 maps and sections.

The maps for the atlas “Physical Oceanography of the Black Sea – 2020” will be built based on the array of reanalyzed temperature and salinity data for the entire period of observations in the Black Sea calculated on the data kept in the MHI BOD. Spatial resolution of maps in the atlas will be improved in comparison with the previous one. Furthermore, special attention will be paid to the contemporary period (1991–2020) marked by a clear trend to warming and desalination of the upper layers in the Black Sea. For the 30-year period mentioned above, climatological averaging will be made, and seasonal empirical orthogonal functions (EOF) to compute average monthly thermohaline fields and oceanographic derivatives will be determined. It should be noticed that the time range under consideration corresponds to the next reference period set by the World Meteorological Organization to calculate climatological standard normals.

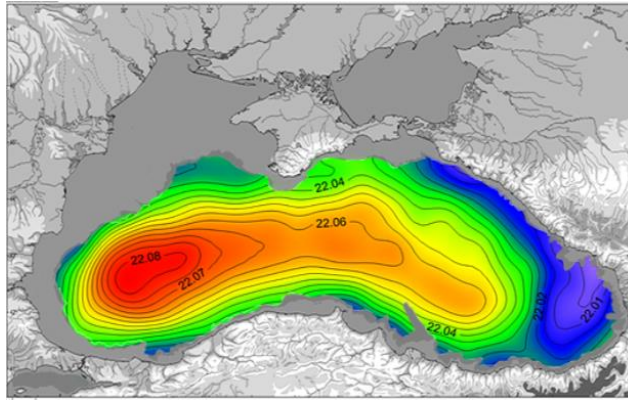


Figure 1: Salinity at the depth 500 m.

The atlas “Physical Oceanography of the Black Sea – 2020” will allow clarifying the understanding of oceanographic peculiarities of the Black Sea and further improve the information management of academic studies and marine economy in the Black Sea basin.

The work on creating the atlas “Physical Oceanography of the Black Sea – 2020” and developing MHI BOD databases is carried out within the state task on theme No. 0827-2018-0002 “Operative Oceanology”.