

STUDY OF THE RECENT CRUSTAL MOVEMENTS AND SEA LEVEL CHANGES IN WESTERN BLACK SEA REGION WITH SPACE AND *IN SITU* OBSERVATIONS

L. Pashova¹, V. Malciu², A. Palazov³, I. Yovev¹, D. Demireva³, T. Beljashki¹, D. Grozdev³, L. Buga²

¹ *National Institute of Geophysics, Geodesy and Geography, BAS, Bulgaria*

² *National Institute for Marine Research and Development "Gr. Antipa", Constanta, Romania*

³ *Institute of Oceanology "Fr. Nansen", BAS, Bulgaria*

Over the last three decades, the global monitoring has emerged as a prerequisite for understanding the impact of mankind on the Earth system to devise actions to mitigate the predicted global changes. At present, the sea level change is an important consequence of climate changes, concerning both society and environment. The problem of sea level rise is very important to understand the nature of processes, patterns, and interactions of the changing Earth in a local, regional and global scale.

In 2007 a research project "Scientific and technologic collaboration for the study of sea-level changes and vertical crustal movements at the western Black Sea" has been initiated from the National Institute of Geophysics, Geodesy and Geography, Institute of Oceanology "Fridtjof Nansen", and the National Institute for Marine Research and Development "Grigore Antipa" in the framework of bi-lateral cooperation between Romania and Bulgaria. The research activities of the international team were focused on interdisciplinary topics related to studying the sea-level variations and recent crustal movements in the western Black Sea region. The project finished in 2010. The main results obtained can be summarized as follow:

- The data and information about the geodetic and oceanographic studies in the last 20 years in the Black Sea region is collected, analyzed and systematized;
- New estimates of long term periodic components using monthly sea levels from the tide gauges in Varna and Burgas are obtained;
- There is a tendency of decreasing the vertical crustal velocity of land subsidence in the region of Bulgarian tide gauges, based on the analysis of precise leveling. The vertical crustal movements on the Romanian coast are with the same values determined by the previous studies;
- New "absolute" vertical velocities of the control geodetic points are obtained from several GPS campaign measurements, which are used for decoupling the true sea level variations from the land movements at the tide gauges. The results show that the eustatic sea level rise of the Black Sea is assessed to be ~ 0.8 mm/yr. This estimate is consistent with the global sea level rise of about 1-2 mm/yr for the last century;
- The differences between "zero" points for initial tide gauge stations for the Black Sea height system, Baltic height system, and for the European height system were analyzed. The mean sea level at Varna and Burgas tide gauges is below the geopotential surface of the geoid with ~ 11 cm. This value is based on the estimation of the gravity potential W_0 .

The collected geo-information in this study can be used in future investigation of the land/sea interaction processes to understand the environmental changes. The realization of the international research project contributes to the development of integrated management tools and to the building observational infrastructure, information system, and expansion of applications as key factors for the GMES program implementation.