



Changes in the precipitation and runoff regimes over the Eastern Europe

Alexanrer Matygin (1), Serguei Ivanov (2), Galina Ivus (2), and Julia Palamarchuk (2)

(1) Ukrainian Scientific Center for Ecology of a Sea, (2) Odessa Environmental University, Ukraine (svvivo@te.net.ua)

Last decades have shown considerable changes in all components of the Earth System including the atmosphere. Variations in the large-scale atmospheric circulation affect a regional water balance including the precipitation and runoff regimes. Finally, it results in changes in the coastal environment and thermohaline characteristics of shallow waters on the North-Western Black Sea (NWBS) shelf.

The study considers a relation between atmospheric circulation patterns and precipitation over two major river basins, the Danube and Dnepr. The Northern Hemisphere atmospheric activity is described in terms of the North Atlantic Oscillation and Angular Moment. The spectral approach elucidates the long term variability of the atmospheric indexes and area averaged precipitation over the two basins and runoffs on scales from interannual to decade. Results also indicate coherence between atmospheric activity and precipitation anomalies over Eastern Europe plateau. Except the extremely dry period over the Europe in earlier 90-s, the general tendency of vapour transport in the atmosphere shows the northwestward shift. In particular, amount of precipitation over the Danube basin has decreased, while over the Dnepr basin increased. A hydrological regime of rivers runoff in the NWBS shows general reduction in annual values, while winter flow increases and spring flow decreases. This can be explained by the fact that the snow cover becomes less important with regional warming. A relation of runoffs with precipitation amount and other factors, such as water consumption and withdrawing is also investigated. Changes in the hydrological regime affect the vertical thermohaline structure and circulation in the NWBS. Observations in coastal waters show that both the temperature and salinity changed remarkably for the winter, while there are no significant variations for the summer season. Changes of salinity in the upper and benthonic layers are of opposite signs leading to weakening of the vertical water exchange between two layers