



Computer-based technology for elaboration of morphometric characteristics of Volga reservoirs

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There are nine biggest Russian reservoirs in Volga basin. Total capacity is about 168 km³, effective capacity – 80 km³, total square is equal 24 000 km² and total length – 3 500 km. Water resources are used in hydroenergetic, navigation, water supply, fishing industry, etc. It is important to know current morphometric characteristics of all reservoirs.

For getting all morphometric characteristics we need bottom and coastal zone digital elevation model (DEM) for each reservoir. In 2008 in State Oceanographic Institute methodology and computer-based technology of creating DEM were developed and evaluated on Uglichsky reservoir.

The information base includes field survey data, remote sensing data and large-scale maps.

Bathymetric survey was made by crosslines with intervals 500 m or 250 m. Expedition team of State Oceanographic Institute made survey using special complex of echo sounder, GPS and specialized computer. This complex allows to determine X, Y, Z coordinates in a moment and display this information. 370 crosslines were measured and they included 416 000 survey data.

Large-scale maps were used for vectorization of coastline and relief data. For elaboration coastline in the most difficult zones were used remote sensing data. All received polygonal and line objects were transformed into point's data type with point's frequency 2.5-3 m. The total amount of points was 1 400 000.

Water area was broken up on small zones including 4 crosslines. For each zone grid was created (cell 5x5m) using method Natural Neighbor. Anisotropy depends on channel orientation. Further middle part of grid was clipped. DEM is the result of mosaic of small grids.

This technology allows to create bottom and coastline DEM for evaluation of actual morphometric characteristics of reservoirs that is useful for effective water management.

Next year State Oceanographic Institute plans to continue works on Gorkovsky, Volgogradsky reservoirs and several reservoirs of Moscow region.