

Optimization of computer-based technology of creating large reservoir's Digital Elevation Models

*Ekaterina Shikunova, Andrew Pavlovsky, Igor Zemlyanov, and Olga Gorelits
State Oceanography Institute, Moscow, Russia (eshikunova@gmail.com/+7499-246-64-48)*

Using Digital Elevation Model of bottom and coastal zone for large-scale anthropogenic water reservoirs is very important for sustainable water management in actual conditions of Global Climate Change. DEM is unified monitoring base for different types of reservoirs in varied types of ecosystems in various environmental and economical conditions. It may be used for getting current morphometric characteristics, pollution and biodiversity analysis, monitoring bottom relief changing and making management decisions.

In 2008-2009 State Oceanography Institute (SOI) carried out the DEMs for reservoirs of Volga river system. In 2008 in SOI was created DEM of Uglichsky reservoir, which is typical Russian reservoir. Methodology and computer-based technology were developed and evaluated.

In 2009 in SOI were created DEMs of Gorkovskiy, Volgogradskiy and six reservoirs of Moscow region. Such result was achieved by optimization of DEM's creating process.

Initially we used complex of GIS programs, which include GIS Map-2008 Panorama, ArcMap v.9.3.1, ArcView v.3.2a, Golden Surfer v.8, Global Mapper v.10.

The input data are bathymetric survey data, large-scale maps (scale 1:10 000, 1:25 000) and remote sensing data of high resolution.

Office analysis consists of several main milestones.

1. Vectorization of coastline and relief data from maps and remote sensing data using GIS Map-2008 by Panorama; ArcView v.3.2a.
2. Maps data elaboration with using bathymetric survey data. Because some maps are longstanding it is necessary to renew them.
3. Creating point's array including all data from maps, RSD and bathymetric survey.
4. Separation small calculation zones including four survey cross-sections.
5. Determine of anisotropy parameters, which depend on channel orientation.
6. Create shapes for clipping of correct grid zones. Each shape includes 2 cross-sections.

Milestones 2-6 realize in ArcView v.3.2a.

7. Creating grid's array using Golden Surfer v.8 for each zone by interpolation method Natural Neighbor.
8. Clipping of correct grid zones (middle part of every creating grid) using Global Mapper v.10
9. Mosaic of grid using Golden Surfer v.8
10. DEM creating using ArcMap v.9.3.1

To optimize process and increase efficiency we used batch processing combined with supplementary software. Supplementary optimization software was developed in SOI. It includes several programs.

Merge line is using as final step of vectorization. This program allows users to merge any line in shape-file on required distance.

Set Channel Angles allows us to automatically determine main anisotropy parameters for each part of reservoir.

Assign Channel to Area allows us to automatize process of creating shapes for clipping of correct grid zones.

Create Grid allows to use batch processing of grid creating with required input parameters.

Create GMScript allows us to clip of correct grid zones automatically.

Such way allows us to make computer-based technology universally. It can be used for anyone reservoir. It permits to create DEM's array with different type of input parameters in a shot time. It also allows users to create DEMs with different cell size.