On the UQG2011 quasigeoid solution for the Ukraine and Moldova area

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New quasigeoid computations with accuracy about 5 cm were assessed to be important for the adjustment of the Ukrainian geodetic network. The solutions UQG2011 for the Ukraine and Moldova area was based on the Tikhonov regularization method applied in two steps. The gravimetry-only quasigeoid was constructed before from digitized gravity anomalies (continental area) and gravity anomalies in the Black Sea and Azov Sea areas derived from altimetry data of ERS-1, ERS-2, TOPEX/POSEIDON, JASON-1, JASON-2, ENVISAT, and GFO missions (1992yr – 2005 yr) by means of the Tikhonov regularization. The UQG2007 quasigeoid was used successfully for the detection of gross errors in GPS-leveling data.

The UQG2011 solution consists of gravity anomalies and quasigeoid heights, which were evaluated by collocation method from heterogeneous data set: 3627 GPS-leveling quasigeoid heights plus the above-mentioned gravimetry data. All terrain reductions were based on the 3"x3" digital terrain model SRTM3. Comparisons of the UQG2007 and UQG2011 solutions with independent GPS-leveling data (given in the Baltic height system) show a good agreement with rms < 8 cm and rms < 4 cm, respectively. This noise level corresponds to estimated quasigeoid UQG2011 accuracy of greater quality than 4-5 cm for the Ukraine and Moldova area. Comparisons of the UQG2011 solutions with independent GPS-leveling data of the 1st and 2nd orders give a good accordance with rms about 1 cm and 2 cm respectively. Finally, the comparison with the European quasigeoid EGG08 leads to the separate areas with differences about 20-50 cm and the mean shift 25 cm caused by application of the Baltic height system.