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ABSTRACT VOLUME

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Volumes of neotectonic erosion and sedimentations for Greater Caucasus region: comparison natural data with theoretic models of geodynamics – statement of problem

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Values of near 50% shortening were found for Greater Caucasus (GC). The method was based on idea of a keeping of balance of volume of a sedimentary cover after sedimentation, at a folding formation and during of mountain building (Yakovlev, 2009). Result means that 15 km thickness column of the sedimentary cover became 30 km thickness after 50% shortening, and the part will be eroded away, when the sole of the column will have depth of 10–15 km after uplift. For such models (Yakovlev, 2009, 2015) rather big sizes of a neotectonic uplift were calculated, which on average for tectonic zones in GC reach of 10–15 km; in several points, it reached 19–22 km. The attempt to find the balance of volumes of substance at shortening of space, formation of mountains and accumulation of eroded rocks in foothill depressions was made under the idea of verification of geodynamic models. For the wide region around of GC three main models of formation of mountains were examined: with the maximum raising in 5–6 km (Milanovsky, 1968); at moderate shortening (Yakovlev, 2015); within plate tectonics models (Dotduyev, 1987). Uplift in 5 km and the corresponding erosion is conventional. The existing models of shortening of space in 5 times (Dotduyev, 1987) in this regard weren't analyzed earlier. It is rather obvious that 13–15 km of thickness of a sedimentary cover will turn into 65–75 km of new thickness of cover, which had to form abnormally large volume of eroded rocks.

The volume of sediments was counted in Black Sea basin from Indolo-Kuban depression, up to east part of the East Black Sea depression, and in depressions of the Northern Caspian Sea and of the Southern Caspian Sea. Volumes were calculated for the lower molasse, (Maikop series of 30 mln years) and for the upper molasse (of 15 mln years). Besides, volumes of uplift on GC on Milanovsky's model (for 0% of shortening) and on the balanced model (Yakovlev, 2015) were counted. For calculation, the map of neotectonic movement, which used Milanovsky's model (Grachev, 1997), was used. Map was divided into rectangles 30 × 20 minutes both areas of uplift and of an immersion (for Caspian Sea). For each rectangle, the corresponding amplitude of uplift in GC was determined by map and by balanced model. The total accumulated volume of the neotectonic sediments was counted as 2.6 million km^3, including 1.5 mln km^3 for the Southern Caspian Sea, 0.5 mln km^3 – for Northern one, and 0.6 mln km^3 for the Black Sea basin. The received volume of uplift for about 15 mln years (Grachev, 1997), taking into account the previous erosion, was considered as the volume of erosion during 30 mln years. This volume was 0.28 mln km^3 that makes 0.11 only from the volume of sediments. Erosion on the balanced model was counted as 0.95 mln km^3. It is 3.5 times more than previous model estimate and makes 0.36 from the volume of sediments. It is necessary to take into account also that basin of the Southern Caspian Sea, undoubtedly, was filled also with sediments from other structures of the Alpine belt (Elburs, Lesser Caucasus, Kopet Dagh, etc.). Of three (geodynamic?) models, volumes of erosion for the model of balanced structure (at moderate 50% of shortening) have better relation to counted volumes of sediments in nature than other two models have.

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