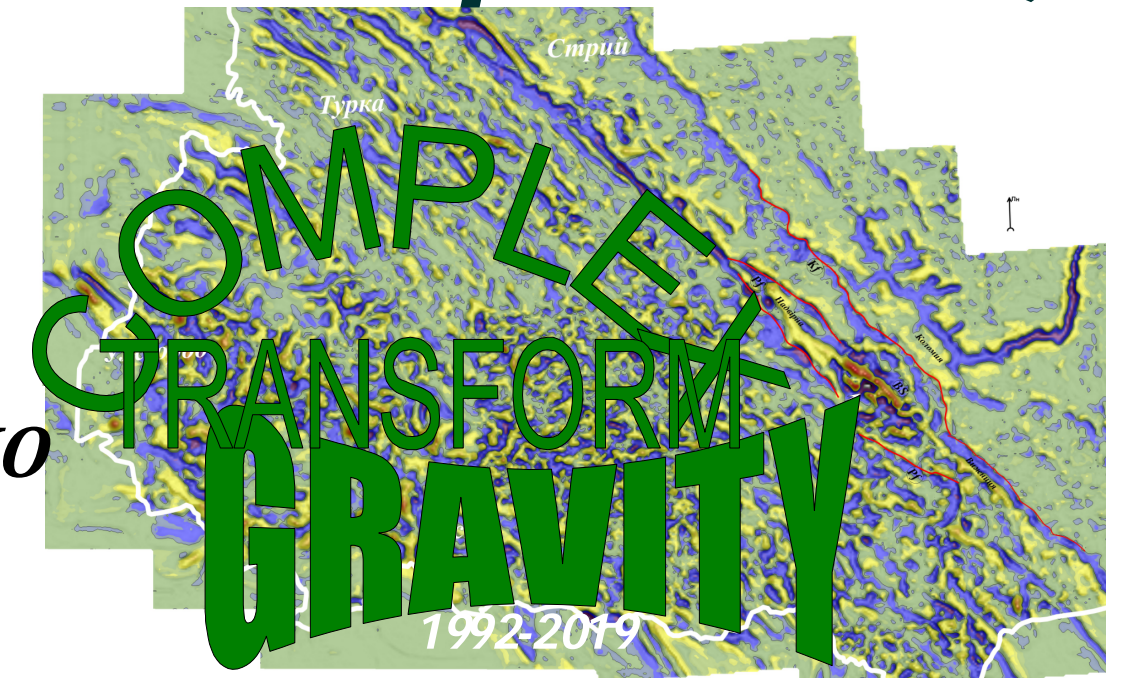


Experiments with averaging transformation of gravity field (on the example of the southeast Ukrainian Carpathians)

Експерименти з трансформацією осереднення поля сили тяжіння
(на прикладі південного сходу Українських Карпат)

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As practice shows, morphology of Bouguer gravity anomalies in scale 1:50000 and larger is high-informative for detecting and tracing tectonic zones, faults, and individual structural forms.

The transformations of gravity fields allow identifying and tracing local anomalies among other anomalies. Preliminary analysis of frequency and relative depth characteristics of anomalies and also the parameters of the transformations determine the physic-geological content of the localized groups of anomalies.

The variants of isotropic and anisotropic combined transformations of averaging, which, in accordance with their frequency and depth characteristics, are intended to detect in the gravity field of isometric or elongated local anomalies of a certain direction and the approximate depth of their sources are presented in the paper.

The practical results of the application of these combined transformations are also given.

Result of gravity transformations

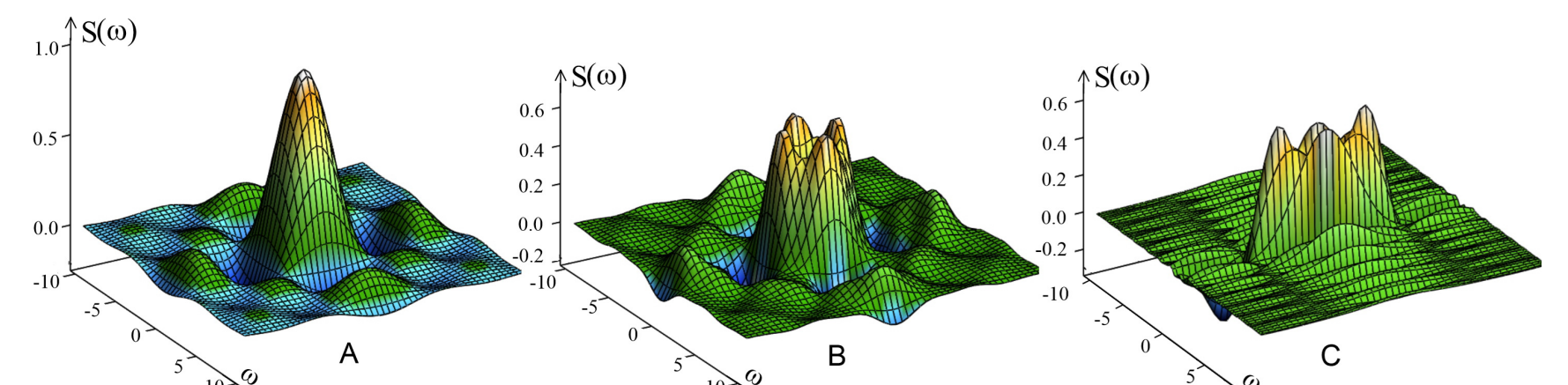
The geological-tectonic nature of the gravity anomalies is investigated taking into account the structural-tectonic structures (Fig. 1). The gravity anomalies of the southeastern part of the Ukrainian Carpathians are localized by averaging (Fig. 2A), difference averaging (Fig. 2B), and anisotropic difference averaging transformations of the northeast direction of the major axes of ellipses (transverse to the extension of the main tectonic zones and deep faults Fig. 3A) and the northwest (longitudinal, Fig. 3B). Recent transformations localize anomalies, oblong mainly across the large axis of the ellipses, as well as small isometric anomalies. Only in some cases, structures that were identified by prospecting data as promising (Fig. 1) have correlated with positive anomalies (Figs. 2, 3).

In our view, the predicted structures or their contours need to be refined by the morphology of the local anomalies. A number of structures are located within a broad northwestern anomalous bands of negative intensities (Figs. 2B, 3A).

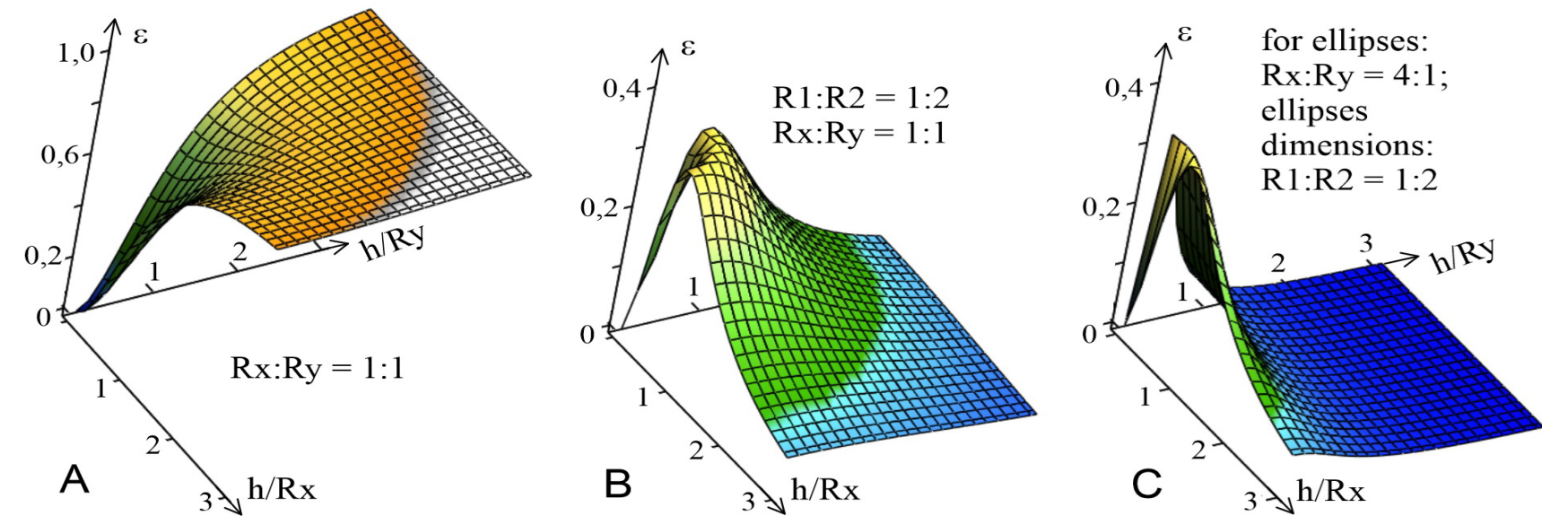
The bands are caused by long depressions of the substructure surface along the longitudinal deep faults (slope of the platform) or the deepening of certain tiers of Paleogene-Cretaceous folds (the front of the Folding Carpathians).

Within their boundaries (against their background) it is possible to detect relatively small local positive anomalies only on larger-scale gravimetric maps, such as 1: 10000 or use the results of anisotropic difference averaging, in which the northwestern anomalous bands (B) are significantly attenuated.

Most structures (Fig. 1) are located within the zones of positive anomalies, which, interestingly, prevail within the Folding Carpathians.



The frequency characteristics of averaging (A), difference averaging (B), and anisotropic difference averaging (C) transformations in 3D



The relative depth characteristics of averaging (A), difference averaging (B), and anisotropic difference averaging (C) transformations in 3D

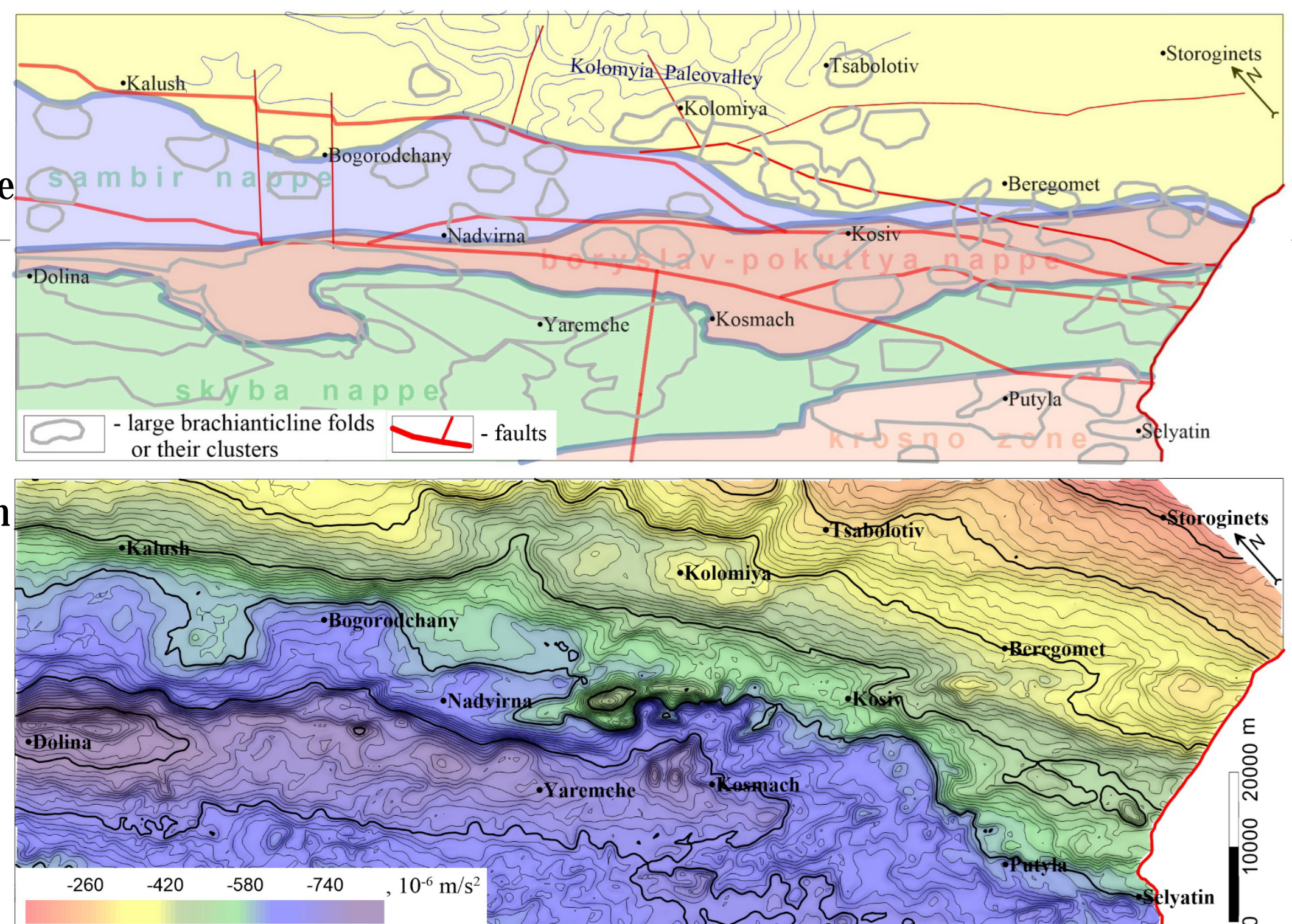


Figure 1. The tectonics (fragment of the map of V.V. Glushko, S.S. Kruglov et al., 1986) and the Bouguer gravity anomalies of the Ukrainian Carpathians southeast

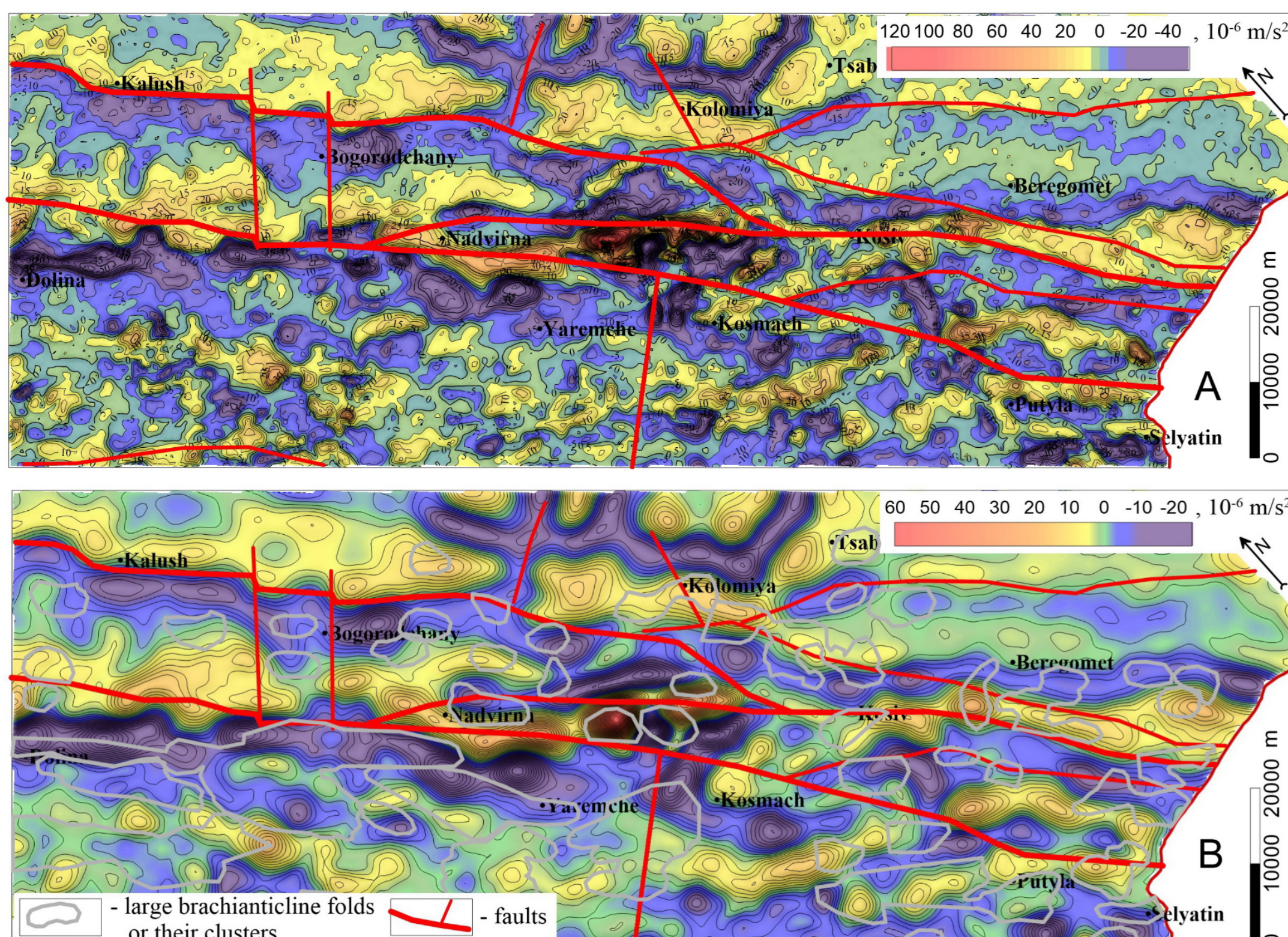


Figure 2. The local gravity anomalies (averaging radius - 5000 m) and difference gravity anomalies (averaging radii - 2500 and 5000 m) of the Ukrainian Carpathians southeast

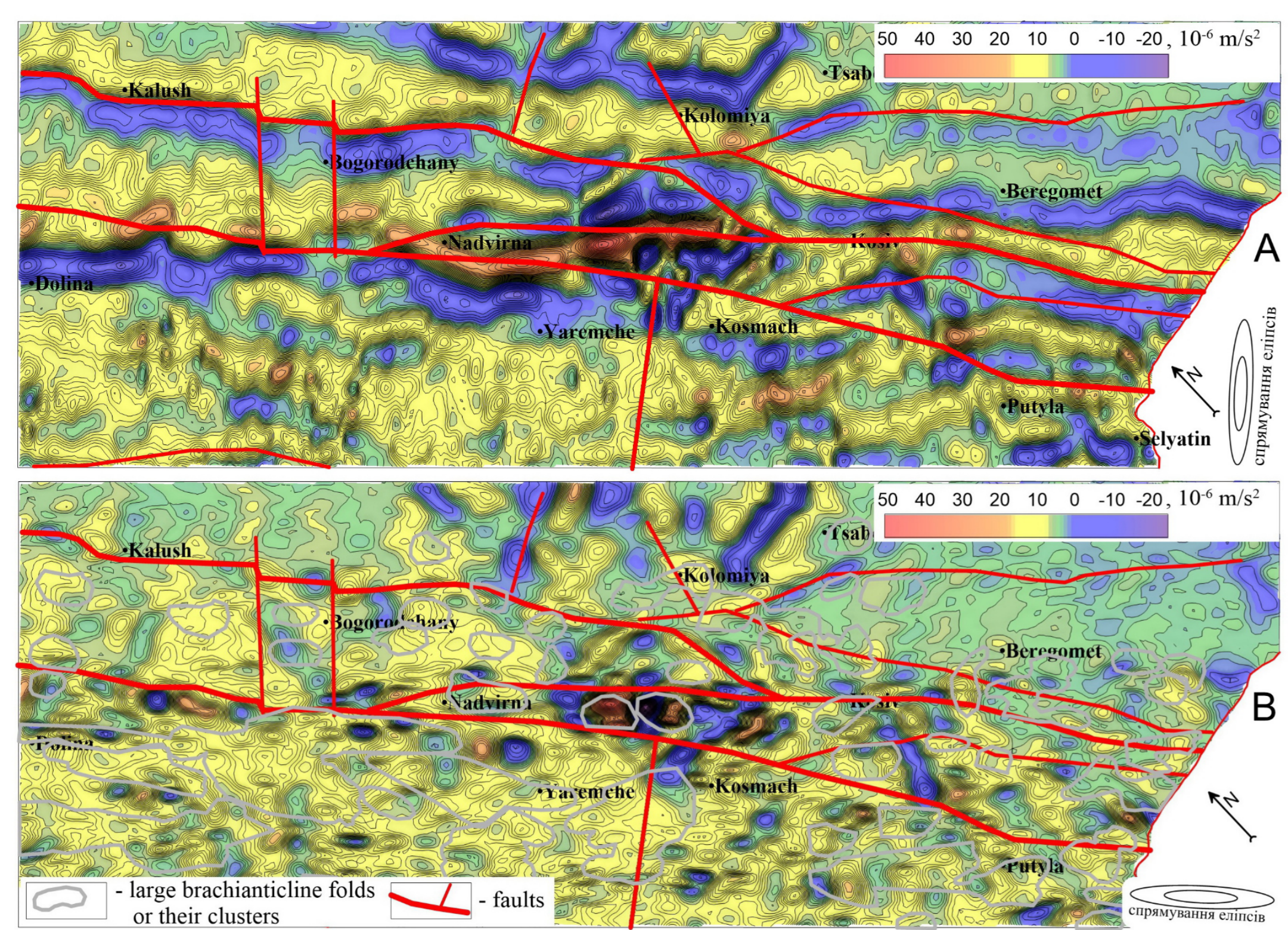


Figure 3. The anisotropic difference gravity anomalies of the southeastern Ukrainian Carpathians (A - mainly northwestern direction and isometric form, B - mainly northeastern direction and isometric form, radii of small ellipse: 1000:2500 m, radii of large ellipse - 2000:5000 m)