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The Cenozoic stress/deformation field of the Donets coal basin and Northern Azov region and its probable sources

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Studies of structure, development and dynamics of formation of the little-investigated Cenozoic (Alpine) deformations of the Donets Herzinic intraplate orogen (Donets Coal Basin, or Donbass) and Northern Azov region, which were accompanied by mass mesotectonic measurement, revealed traces of two independent Cenozoic orogenies: the Laramic one of the Early Alpine (Latest Cretaceous — Paleocene), and the Recent one of the Late Alpine (Neogene — Quaternary). The orogenies differ in area of manifestation and peculiarities of stress/deformation field. The first orogeny in its pure state developed only in the western Donbass and adjacent relic part of the Dnieper-Donets aulacogene where gentle folds of the Mesozoic strata of the WNW - ESE strike were formed. The folds (so-called Izyum-Kramatorsk structural unit) are sharply overprinted by the Eocene beds and confined to salt diapirs gradually uplifting from the Devonian. According the mesotectonic data, in the post-Cretaceous time they however developed under slight transversal compression with some horizontal shear. The Laramic movements occurred also to the east where they together with the Recent ones participated in formation of the Severodonetskij and Persianovskij border reverse faults of the Donbass. However, as a whole the Recent orogeny developed independently and far to the east of the Laramic one. The Donets-North Azov neotectonic swell which appeared at that time occupies not only the eastern Donets intraplate orogen arised from the Dnieper-Donets aulacogene but strongly crosses the southern aulacogene border extending far into the Ukrainian shield.

The different areas of the Laramic and Recent orogenic movements in the Donbass suggest that they raised from different sources. The eastern distribution of the Late Alpine deformation and its more intense manifestation (the well noticeable neotectonic uplift as well as the extension outside the aulacogene and the activization of the Ukrainian shield basement) point to its association with the powerful Late Alpine orogenesis of the adjacent Caucasus. This is also confirmed by an essential role of right-lateral shear which was established during our mesotectonic study (this is also characteristic of the western Greater Caucasus and Scythian platform). According to our data, the strike-slip components of the Severo-Donetskij and Persianovskij reverse faults are fixed in localisation of the quadrangles of compression and extension at the ends of the faults. This, applied to the both borders of the Donbass, right-lateral wrench shear caused a Z-shaped sygmoidal bend of axis of the Donets-Northern Azov neotectonic swell. A common limb of the sygmoid – the Volnovakha neotectonic megaanticline of the thansverse NE-SW strike – formed under NW-SE compression which compensated the general right-lateral shear.

On the contrary, a stress source of the Laramic compression may be located somewhere in the west and/or north of the Donbass. It was most likely caused by the known Laramic acivization and compression of the European aulacogens resulted from collisional stresses in the Alps and Dinarides, with the simoultaneous southward spreading pressure in the Northern Atlantic and Arctic started in the Paleocene.

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