Cretaceous–Tertiary deformations along a part of the Maritsa fault system between Pazardzhik and Sofia

Кредно-терциерни деформации по част от протежението на Маришката разломна система между Пазарджик и София

Ianko Gerdjikov¹, Alexander Radulov², Lubomir Metodiev²

Янко Герджиков¹, Александър Радулов², Любомир Методиев²

¹ Sofia University, Department of Geology and Paleontology; E-mail: janko@gea.uni-sofia.bg
² Geological Institute, BAS, 1113 Sofia, Acad. G. Bonchev str., bl. 24; E-mails: radulov@geology.bas.bg; lubo@geology.bas.bg

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The presence of a steep fault zone running along the Iskar River valley (SE of Sofia City) has been recognized since the first detailed geological studies in this area (e.g. Dimitrov, 1937). Later, the areal extent of the zone was significantly enlarged to include parts of the Ihtimanska Sredna Gora Mountain to the SE. In this way, a single fault section of the regional Maritsa fault system, named Iskar-Yavornishki fault (or shear zone according to the later contributions) was postulated, and continuously traced for about 65 km, from Sofia to Pazardzhik area (Boyadjiev, 1971). A more recent work has demonstrated the ductile character of the shearing along the SE part of the Iskar-Yavornishki fault, and the Late Cretaceous age of the latest movements (Georgiev et al., 2009).

The newly obtained field data, as well as the analysis of the previous reports related to the construction of the Iskar hydro-energy system (1948–1955) indicated that the Iskar-Yavornishki fault zone, originally regarded as a single structure, actually encompasses two different tectonic zones: Yavornishka shear zone (YSZ) and Iskar fault zone (IFZ) (Fig. 1). These ideas are also in agreement with the field data obtained by Sarov and Antonov (National Geofund, 2010, unpublished report).

We refer the SE section of the Iskar-Yavornishki fault zone that is located between Pazardzhik and Polyantsi village (near the town of Ihtiman) to the Yavornishka shear zone. Previously, it was studied in details by Georgiev et al. (2009), who demonstrated that it represents a ductile shear zone separating the Alpine metamorphic core (Rhodopean-type metamorphic rocks) and the high-grade metamorphic Variscan basement of the Balkan orogen. This zone was traced for about 35 km, but there are no data suggesting its NW continuation.

We refer the NW segment of the Iskar-Yavornishki fault zone, which is traceable between the Pancharevo district of Sofia city and the NE Iskar Dam margin, to the Iskar fault zone. In contrast to the YSZ, which is better studied, the data for the IFZ are too scarce and both confined to unpublished and partly preserved technical reports. In this framework, the total length of the IFZ is about 20 km (Fig. 1), and the dip of the fault rocks is steep (>65°). The zone possesses features of typical mature fault as it displays: (i) straight geometry in map view, (ii) thick fault core (up to tens of meters), (iii) wide damage zone and often numerous associated satellite shears. The only available site where the fault core is well exposed is situated nearly the Iskar Dam edge. This locality is accessible only in low water levels. Both the observations conducted on that site and the data from the damage zone indicate that the main translations along the IFZ occurred in brittle and low-temperature conditions (presumably below 300 °C).

Due to the absence of structural data from the fault core, the kinematics determination relies on mountain-scale data only. The latter associate with lateral offset of the contact between the high-grade and the low-grade metamorphic units of the Variscan basement. This contact, which is known as Gabrov Dol fault zone, is a regional-scale structural feature in Western Bulgaria (Bonev et al., 1995). Our field observations in the NE Iskar Dam shore confirmed the presence of this tectonic contact in the NE IFZ block (Fig. 1) originally announced by Bonev (1996). On the SW side of the IFZ, the Gabrov Dol fault zone crops out to the south of Pancharevo district (e.g. Antonov et al., 2011). Our data confirm dextral sense of movement along IFZ, but also suggest a minimum 16 km translation (Fig. 1). Most probably the age of the shearing along the IFZ is Tertiary, as inferred from the age constrains provided by crosscutting Eocene magmatic rocks (Georgiev et al., 2012).

It is important to note, that both the YSZ and the IFZ are separated by a poorly exposed domain.
that cannot provide any data about the interaction between these zones. Nevertheless, the newly obtained field data suggest that the YSZ and the IFZ represent separate structures, which are probably different in age.

References