



Tectonic position of the Ordovician rocks from Sredna Gora Zone, east of Sofia

Тектонска позиция на ордовишките скали от Средногорската зона, източно от София

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Keywords: Ordovician sediments, Sredna Gora zone, Late Alpine compressional phase, Lozen Mountain and Vakarel hills, Panagyurishte volcano-sedimentary strip.

The geological structure of Sredna Gora Zone east of Sofia represents a true patchwork of various stratigraphic units including diverse rocks with Paleozoic to Mesozoic age. Despite the long years of research, the extensive and complex geological evolution of the area is still poorly resolved. One of the intriguing questions is the tectonic position of the metamorphosed in very low-grade siliciclastic Ordovician sediments. These rocks occur in two localities: a narrow, WNW-ESE elongated and fault-bounded fragment (block) in Lozen Mountain and Vakarel hills (Dimitrov, 1937), and as tectonic slices that build up the hanging walls of late Alpine north-vergent tectonic zones at the westernmost edge of the Late Cretaceous Panagyurishte volcano-sedimentary strip (Fig. 1).

Ordovician rocks from Lozen Mountain and Vakarel hills

A large part of Lozenska Mountain and Vakarel hills is built of pre-Triassic rocks. At lowermost structural position occur high-grade Variscan basement, which uppermost part is strongly affected by shearing along extensional Gabrov Dol shear zone (Bonev et al., 1995). The hanging wall of the zone consists of variously deformed and weakly metamorphosed Ediacaran – early Cambrian meta-basites (Frolosh unit). These basement units are overlain by Upper Carboniferous molasse sediments, whereas the primary transgressive contact

is rarely preserved due to the strong Alpine tectonic overprint. The low-grade Ordovician sequence is dominated by phyllitized pelites, siltstones and sporadic quartzites. The Ordovician age is reported based on palynological data (Kalvacheva, 1979). Previously, differing ideas have been proposed about the tectonic position of these Ordovician rocks. Ivanov (1998) interpreted them as forming large-scale allochthonous fragment, called Vakarel klippen, whereas Kozhoukharov et al. (2003) and Vasilev (2004) reported a preserved unconformity along the contact with the high-grade Variscan basement. Our investigations show that all observed contacts of the Ordovician rocks with the other rock units are tectonic, most often marked by steep strike-slip brittle-ductile faults that can be regarded as part of the Late Cretaceous–early Tertiary northernmost branch of the Iskar fault zone (e.g., Gerdjikov et al., 2015). However north of the village of Gabra (south of peak Chukite, in the valley of river Gabra and west of it) field relations indicate that Ordovician rocks tectonically overlie Upper Carboniferous molasse sediments. Both units are affected by penetrative foliation that is dipping steeply to the north. Lineation is marked by aligned chlorite and white mica and is variously oriented, but is mainly down-dip. Asymmetric pressure shadows and shear bands indicate top-to-the-N to NW sense of shear. The observed penetrative fabric in this part of the southern contact of Lozen Mountain-Vakarel Ordovician Block indi-

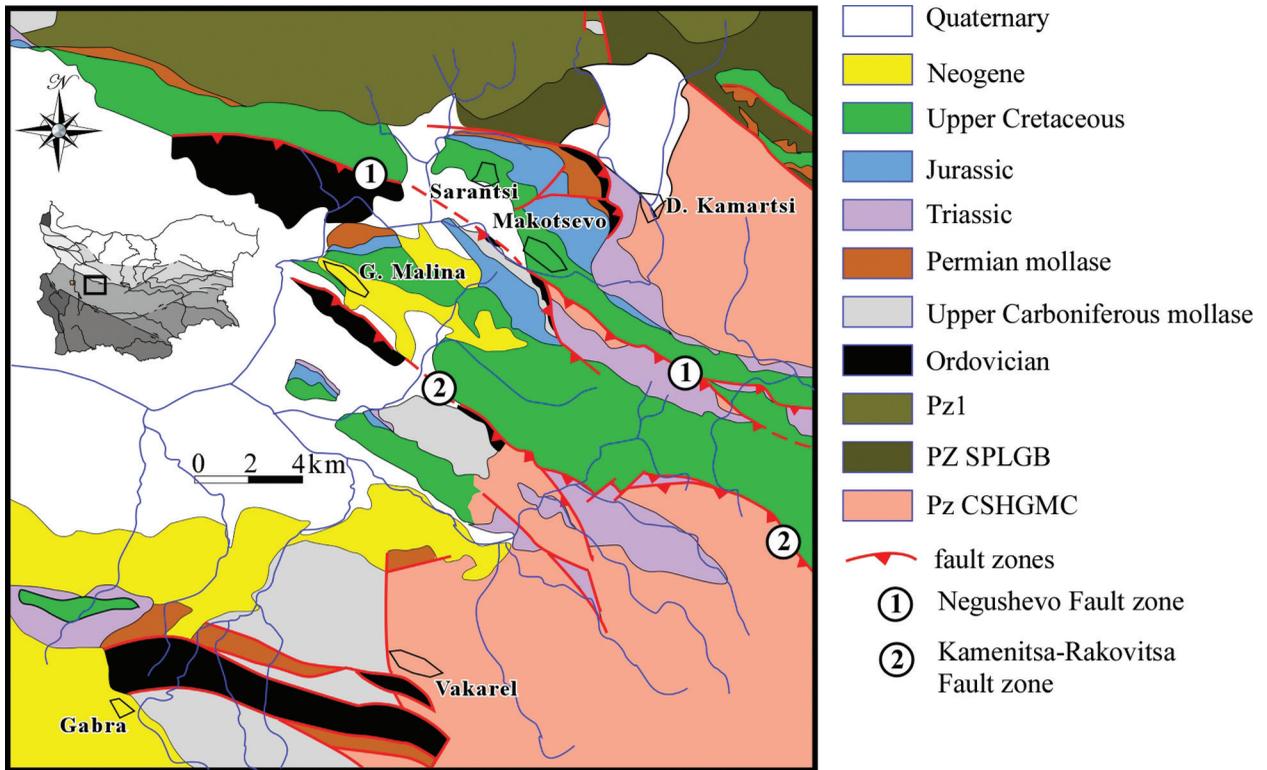


Fig. 1. Geological map of the Sredna Gora Zone east of Sofia. Abbreviations: CSHGMC, Central Sredna Gora High-Grade Metamorphic Complex; SPLGB, Stara Planina Low Grade Basement; Pz1, Lower Paleozoic sediments, West Balkan tectonic zone.

cates extensional, top-to-the-N shearing, that cannot be related to thrusting, even if significant tilting of the zone is assumed. This high-strain fabric is most probably related to an Alpine extensional event because it was also observed in the underlying Upper Carboniferous sediments. Extensional tectonics can hardly emplace Ordovician rocks on the top of Carboniferous ones, thus the tectonic evolution of the area is definitely polyphase. For certain, the preserved relations south of Gabra village reflect tectonic events that are older than the dominating strike-slip tectonics.

The Ordovician rocks from westernmost margin of Panagyurishte strip

The Ordovician rocks cropping out along the westernmost edge of the Late Cretaceous Panagyurishte volcano-sedimentary strip are not so well studied (Fig. 1) and their age is based on lithological similarities and correlations. Thus, the Ordovician (meta)sediments are described as Grohoten Formation by analogy with similar sediments from the West Balkan Zone (Bontscheff, 1910; Poushkarov, 1927; Bončev, 1940; Ivanov, 1940). The Ordovician rocks build up the hanging walls of both Kamenitsa-Rakovitsa and Negushevo steeply dipping

to the south fault zones. Along the zones they are presented mostly by competent massive quartzites and the deformation is localized mainly in the Upper Cretaceous sediments from the footwall. Calcite fibres as well as deflections of the cleavage toward the fault planes, imbrications and duplex structures indicate top-to-the-N, NW sense of shear. Therefore we suggest that the thrusting was related to the late Alpine compressional phase.

Although often compared and correlated with similar Ordovician sedimentary sequences from the West Balkan Zone (Angelov et al., 2010, and references therein) the studied here rocks present some significant differences. First of all, the Ordovician sediments from the Sredna Gora Zone are metamorphosed at low-grade unlike their counterparts from the Balkan, which are non-metamorphosed. Another difference consists of the studied here tectonic position of both units. In the West Balkan Zone the non-metamorphosed Ordovician sediments are overlying unconformably the Ediacaran–early Cambrian rocks of Berkovitsa volcano-sedimentary complex and are covered by Silurian sediments. Our new investigations show that most of the contacts of the Ordovician rocks along the Sredna Gora Zone east of Sofia are tectonic and their oldest cover is of Mesozoic age. These observations clearly show

that: 1) the Ordovician sediments from Sredna Gora Zone could not be used as a stratigraphic marker for the age of the high-grade basement rocks in the area; 2) They occupy a distinct tectonic position to the high-grade Variscan orogenic core and most probably represent specific Lower Paleozoic tectonic element.

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