Multiple-controlled salients of the Balkanides thrust belt geometry, an example from the Central Balkanides

Комплексен контрол на „арките“ в геометрията на Балканидния гънково-навлачен пояс, пример от Централните Балканиди

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The curves (also known as salients, recesses, arcs, oroclines, virgations, festoons, bends, oroflexes (see Marshak, 2004 for overview) origin understanding is important for restoration of thrust belts evolution. To characterize the thrust-belt geometry it is necessary to define the geological factors controlling it. In most cases, the geometry is relating to one orogenic phase or polyphasal basin evolution. There are many cases documented for the main fold-thrust belts but for the Bulgarian territory, the changes in the geometry of the belts are not commented so far although they are informative for their origin especially for the central part of the Balkanides. Macedo and Marshak (1999) summarized the salients/recesses on six types: 1 – basin-controlled; 2 – margin-controlled; 3 – detachment-controlled; 4 – fault-controlled; 5 – intersection curves and 6 – slab-controlled. The map-scale thrust planes curves in the Central Balkanides between the Shipka and Tvarditsa passes cannot be related only to one of the above-mentioned types, because their origin is complex and fits in more than one category. Here, the Balkanides fold-thrust belt resulted from six compressional phases (structural events) and five to six basin systems evolution, developed along the Moesian platform margin (Fig. 1).

There are several reasons for the complexity of this area. It is obvious that the last major compressional event (Late Alpine Illyrian phase) overprint is the main factor controlling the thrust geometry but the Early Alpine (EA) basins evolution and Variscan fabric influence are significant as well. The triple junction of the first-order tectonic units in the area (Central Balkan–Fore-Balkan, East Balkan and Srednogorie tectonic zones; Ivanov, 1998), all of them with specific characteristics of lithology, evolution, style of deformation and geotectonic position, is necessary to be analyzed as well.

Setting aside the other factors and stressing on the Late Alpine (LA) evolution, the main curves are outlined by Stara Planina thrust, Bedek thrust, Shipka-Sliven thrust and Voynezha-Ostrets wedge. They have different apex orientation and are clock-wise rotated eastward (Fig. 1). The formed by dextral transtenssion back arc basin of the East Balkan (EB) and its closure by sinistral transpression is one of the reasons to interpret all curves as basin-controlled.

The Shipka-Sliven Unit of the Srednogorie (SR) and EB zones are limited by the Yantra fault zone from the west and this is in general, the boundary between the thin-skinned thrusting eastward vs. thick-skinned to the west during the Early and Late Alpine deformation (detachment and fault-controlled).

The different characteristics of the Variscan basement and Mesozoic cover of the three units outcropped in the studied area, as lithology, facies, thickness, age, etc; combined with the other factors, allow us to interpret the interaction of the different thrust slices as non-parallel (non-coeval) intersecting or overlapping.

The Jurassic–Lower Cretaceous passive-margin basin evolution and facies belts distribution indicate salient formation against the basin depocenter. The basin dextral transpression closure indicate basin-controlling but also with thin-skinned thrusting east of Tvarditsa pass vs. thick-skinned thrusting to the west EA tectonics. This is the reason to suppose detachment control on one side and margin control on the other, due to the Early and Late Alpine basin systems have developed along or over the Moesian platform rim.

The “indenter” characteristics of the Stara Planina thrust, composed of high-grade metamorphic rocks from the Srednogorie zone basement as Late Alpine structure, are obvious. The shearing and foliation ori-

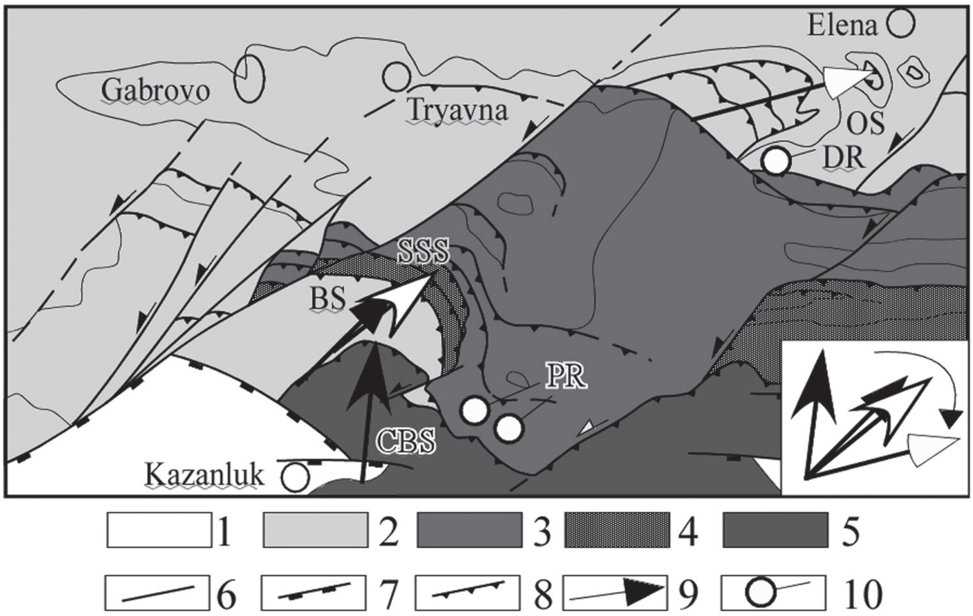

Fig. 1. Schematic tectonic map of the studied area with salients apexes and recesses orientation: *1*, Pliocene-Quaternary overimposed basins; *2*, Centralbalkan–Fore-Balkan zone; *3*, East Balkans zone; *4*, Srednogorie zone (Tundzha-Topolnitsa unit); *5*, Srednogorie zone (Shipka-Sliven unit); *6*, fault; *7*, normal fault; *8*, thrust; *9*, salient apex orientation; *10*, recession orientation
CBS – Centralbalkan thrust salient; BS – Bedek thrust salient; SSS – Shipka-Sliven thrust salient; OS – Ostrets salient; DR – Drenta recession; PR – Pchelinovo recession

entation in the studied area also confirm the curves because their dip direction varies from SW to the E and despite of this different geometry they have formed during general northward compression. The indenter tectonics are even more prominent in Variscan and Early Alpine events and the Late Alpine evolution just confirm the different levels of detachment of the already exhumed metamorphic basement by tectonics.

The Alpine history and geometry of the central part of the Balkanides thrust belt central part, with concentration of salients, allow us to characterize the curves as multiple-controlled due to:

– the influence of the relatively stable Moesian platform margin control;

– detachment control, mainly due to geological evolution and position of the Central Srednogorie Variscan metamorphic basement and rheology;

– Early and Late Alpine basins evolution (basin-controlled);

– fault control of oblique and lateral ramps as the Yantra fault zone and related structures (Belopalanski, Ptichevski fault zones, etc.);

– the transition from thick-skinned thrusting west of the Shipka pass (Yantra fault) to thin-skinned one eastward, confirms either the margin, detachment, basin, and fault control and at the same time the intersection and overlapping of the thrust slices with different characteristics (slab-controlled).

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