

The Balkan island-arc association in West Bulgaria

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The island-arc association, connected genetically and spatially with the Balkan and Sredna Gora ophiolites, is formed by sedimentary-volcanic and intrusive complexes (Haydoutov, 1999). The first complex (Berkovica Group) is more extensively exposed in NW and Central Bulgaria, Yugoslavia and Romania. The intrusive complex (the Strouma Diorite Formation - SDF) forms comparatively large areas in SW Bulgaria. The Balkan ophiolite - island-arc assemblage builds up the basement of the Balkan terrane. The Berkovica Group is covered unconformably by the terrigenous Dalgi Del Group of Lower Ordovician (Arenigian according Kalvacheva, 1986) age. The Balkan ophiolite - island-arc assemblage is in tectonic contact with the high-grade metamorphites from several fragments of the Thracian entity — Rhodopean and Serbo-Macedonian massifs, as well as the Ihtiman block.

Sedimentary-volcanic complex (Berkovica Group). The metamorphosed in green schist facies sedimentary and igneous rocks form almost equal parts of the complex. The volcanic suite of the complex comprises spilites, keratophyres, and pyroclastics. The volcanites are distributed unevenly in the complex. Various data indicate multistage igneous activity. Petrologic features show that the spilites represent ca-alk tholeiites. The content and the distribution of the major and trace elements in the keratophyres indicate the presence of two types of ca-alk volcanites among them — andesites and rhyolites. The relation of the igneous rocks with the ophiolites demonstrates the ensimatic character of the complex.

Intrusive complex (Strouma Diorite Formation). The SDF is a specific, irregularly meta-

morphosed igneous complex (Haydoutov et al., 1994). Variable composition and multistage formation are typical features of this complex. It is formed by gabbro, gabbrodiorites, diorites, and granites, as well as dikes. Inside the intrusive complex several tectonic blocks of sedimentary-volcanic rocks were established. The close association of SDF with numerous ophiolite blocks and xenoliths is striking. The major elements content in the different rock types reflect their ca-alk character. Combined trace element and Sm-Nd isotope data document an origin from less depleted source material in comparison with the Balkan ophiolite in an ensimatic arc setting. All the above-considered features of SDF indicate that the complex was formed in the roots of an immature ensimatic island-arc.

No clear spatial relationship between the two complexes has been established so far. In the same time the problem for the relation of both complexes is significant for elucidating the evolution of the basement of the Balkan terrane. First of all this problem is demonstrated by the relation of both complexes with The Balkan ophiolites. The relationship of the Balkan ophiolite with the superimposed island arc is variable. In general it is tectonic. Almost all investigated ophiolitic bodies, however, are intensely intersected by island-arc magmatites. In the Tchiprovci region unconformable disposition of the mafic tuffs from the base of the island-arc association over the stratified section of the pillow lava unit is established. The ophiolite blocks from SW Bulgaria are intersected all over by SDF. The described relationship clearly indicate that both considered associations are closely spatially and genetically interconnected

and that the island arc has been superimposed over the ocean crust.

Decisive for considering the problem for the relation of both complexes is their age. Based on occurrence of Archaeocyathides in the carbonates of the Vlahina complex (correlate of Bercovitz Group in Serbia) the age of the sedimentary-volcanic complex is Cambrian (Kalenic, 1966). In the literature there exist data for U/Pb age determinations on single zircon grains from the intrusive complex. The crystallization ages of granodiorite and diorite are both in the range of 550+/-5 Ma. Granite body within the diorite yielded an age of 545.1 +/-6.4 Ma (Graf et al., 1999).

All these data reveal that the considered complexes were formed during a period of time of about 50 Ma. Taking into account that the growth rate of a volcanic arc, averaged over a normal 20 to 80 Ma life span of an arc system (Howell, 1989), both complexes might be formed in one such system.

Based both on radiometric and biostratigraphic constraints the age of the Balkan island-arc association straddles the Precambrian-Cambrian boundary (540 Ma — Bowring et al., 1998). This clearly indicates that the as-

sociation is formed during a Pan-African event, as Kröner (1984) considers it.

References

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