PETROCHEMICAL PECULIARITIES OF THE CHAM DERE PALEOGENE MAGMATIC GROUP, EASTERN RHODOPES

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ABSTRACT. The Cham Dere Group unites the acidic magmatic rocks of the late extensional Paleogene magmatism in the Northeastern Phodopean Depression. This group includes the sequentially formed Borovitsa rhyolite, Bryagovo rhyolite, Panichkovo trachyrhyolite, Murgen trachyrhyolite, Gradishte trachyrhyodacite, and Tri Mogili dyke complexes. The rocks of Cham Dere Group fill up the Borovitsa caldera (volcanic-tectonic depression; Иванов, 1960). Several extrusions, tens of dykes and rare tuff spots crop out beyond the caldera boundaries as well (Fig. 1). They are localized predominantly in east-northeast direction from the caldera and mainly along the Bukovitsa fault sheaf (Topolovo-Pilashevo fault belt, Боянов, Маврудчиев, 1961).

The following complexes have been separated in Cham Dere magmatic group (Георгиев, Милованов, 2006b): Borovitsa rhyolite, Panichkovo trachyrhyolite, Murgen trachyrhyolite, Gradishte trachyrhyodacite, Tri Mogili dyke, and Bryagovo rhyolite ones. The rocks of Cham Dere Group display explosive facies and those of Panichkovo, Gradishte, and Tri Mogili – effusive and subvolcanic ones.

Results

In respect to SiO₂ content the rocks of Borovitsa, Panichkovo, Murgen and Gradishte complexes are related to
Fig. 1. Map of magmatic complexes in the Northeastern Rhodope Depression

The group of acidic rocks – dacites, rhyodacites, and rhyolites. The rocks of Tri Mogili complex fall in the groups of both medium acidic and acidic rocks – basaltic andesites, andesite, dacites, and rhyodacites.

The specified magmatic complexes are characterized with similar values of the contents of the principle oxides. Only Tri Mogili complex differs with higher Na₂O contents (Fig. 2), which results in low values of the K₂O/Na₂O ratio. Tri Mogili and Gradishte complexes display also higher values for the MnO content.

On the K₂O/SiO₂ diagram (Fig. 3) the analyses for the majority of the acidic varieties fall in the field of the shoshonite series (high-potassium dacites, rhyodacites, rhyolites). The medium acidic varieties of Tri Mogili complex fall predominantly in the field of the high-potassium subalkaline series (high-potassium trachyandesites and trachites) and partially in the field of the shoshonite series (shoshonites and laticies).

The rocks under study are characterized also by an increased total alkalinity. The majority of the rocks plotted on the diagram (Na₂O+K₂O)/SiO₂ occupy the field of the trachyte varieties (Fig. 4). The rocks of Tri Mogili complex are characterized also by relatively highest alkalinity.

Discussion

The rocks of Borovitsa, Panichkovo, Murgen, and Gradishte complexes are characterized with similar regularities.
Fig. 2. Harker diagrams of the main oxides
Fig. 3. K$_2$O/SiO$_2$ diagram (according Dabovski et al., 1991)

Fig. 4. (Na$_2$O+K$_2$O)/SiO$_2$ diagram (according Le Bas et al., 1986)
in the distribution of the major oxides. This supports the idea about common source (magma chamber) of the initial magma. The trends of distribution on the K$_2$O/SiO$_2$ dispose mainly in the field of the shoshonite series.

Tri Mogilly complex is characterized with higher values for potassium and even more higher ones for sodium. In the case of the more basic varieties the distribution trend of potassium on the diagram falls in the field of the high-potassium subalkaline series. This complex is characterized with highest total alkalinity in comparison with the rest dyke complexes and all volcanic magmatic complexes from the late extensional.
stage of Eastern Rhodopes (Georgiev, Milovanov, 2003, 2004; Георгиев, Милованов, 2005).

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