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BLAGIOGRANITIC ROCKS IN ALBANIAN OPHIOLITES

J. Bebien*, B. Barbarin*, N. Daytajh*, A. Ivanaj***, J. Lancelot***, H. Maluski***, B. Platevoet*, M. Shallo** and I. Turku**

ABSTRACT

Acid plutonic rocks are located in the northern part of the eastern Albanian ophiolite belt, where they are commonly associated with the subvolcanic rocks of sheeted dike complexes. Quartz diorites, tonalites, trondhjemites and microdiorites can be associated in the various exposures. Two main groups are distinguished amongst these plagiogranitic formations. The first group consists of apatite-rich rocks that display relatively high Y-, Zr-, and REE-contents. The second group forms relatively large plutons and consists of rocks that contain a fairly An-rich plagioclase, iron-rich augite, and scarce apatite, and that are very poor in Y, Zr and REE. Lead isotopic data are similar to those previously obtained on the nearby ophiolite of Vourinos (Greece) and to those of some island are volcanics. Therefore, the plagiogranitic rocks in the eastern Albanian ophiolites bear a strong resemblance to the most evolved members of the boninite and tholeiite suites in subduction environments.

INTRODUCTION

Albanian ophiolites are noticeable rocks regarding their abundance and diversity (ISPGJ-IGJN, 1982 & 1983, Shallo *et al.*, 1987, Shallo, 1992). Two parallel belts are distinguished (Fig. 1). The western belt is characterized by lherzolitic tectonites and by plutonic and volcanic sequences resulting from the consolidation of Ti-rich, olivine tholeiite magmas (MORB type). On the other hand, the eastern belt is made up of harzburgitic tectonites including huge chromite concentrations, and of plutonic and volcanic sequences resulting from the consolidation of Ti-poor, quartz tholeiite or boninitic magmas (Shallo, 1990 & 1992).

Most surveys have been focussed on the ultramafic and volcanic components of the ophiolite complexes because these rocks contain economic, chromium and copper ore-deposits. However, the acid components, although less common, provide basic information on the genesis of the ophiolitic complexes in which they occur. They have been intensively investigated by Albanian geologists, which have specified their "stratigrafic" position in the ophiolite sequence and their petrological characteristics.

PETROLOGY

Acid plutonic rocks (plagiogranites) are mainly located in the northern

* Département des Sciences de la Terre, Université de Paris-Sud, 91405 Orsay cedex, France.
** Fakulteti Gjeologjizsë dhe Minierave, Universiteri Politeknik, Tiranë, Shqiperi.
*** URA Geochronologie, Geochimie, Pétrologie, Université de Montpellier II, 34095 Montpellier cedex 5, France.

part of the eastern Albanian ophiolite belt, where they occupy a surface of about 120 km^2. They form little- to medium- size massifs and are commonly associated with the subvolcanic rocks of sheeted dike complexes. Quartz diorites, tonalites, trondhjemites and microdiorites are associated in the various exposures. These rocks consist of zoned plagioclase, quartz, calcic pyroxene, amphibole and magnetite. Secondary alterations result in the development of albite, actinolite, chlorite and epidote. The FeO*/MgO ratio (FeO*=total iron) is high and increases with the SiO_2-content from the microdiorites to the tonalites.

Besides these similarities, diversity in the plagiogranites leads to the distinction of two main groups whose features are summarized on Tabl. 1.

One of these groups is represented by the **Kimez massif**, located near the western border of the eastern ophiolite belt. It consists of apatite-rich quartz diorites and tonalites that display relatively high Y-, Zr- and REE-contents. These rocks are note very different from the acid rocks collected from the mid-ocean ridges, and bear a strong resemblance to quartz diorites observed in the Guevgueli ophiolites (Northern Greece)

Table 1: Main characteristics of plagiogranitic rocks in Albanian ophiolites.

	KIMEZ plagiogranite	**SHEMRI plagiogranite**
Geological setting	In the Eastern ophiolitic belt Relationships with the sheeted dikes and the volcanic rocks	
Field relationships	Small plutonic complexes or enclaves Mingling between mafic and felsic magmas	
Rock types	Quartz diorite to tonalite	Tonalite to trondhjemite
Texture	granophyric	isogranular fine to coarse-grained
Mineral contents	Az+Pl+Px+Amph+ Magnetite+Ilmenite Abundant Apatite	Qz+Pl+Px+Amph+ Bt+Magnetite Scarce Apatite
Mineral chemistry	Plagioclases with normal Zoning (An55 to An20) or Albite	Plagioclases with calcic core (An 85) and oscillatory-zoned border (An60 to An20)
	Augite (Wo_{41} En39 Fs_{20})	Iron-rich augite (Wo_{41} En_{20} Fs_{39})
Chemical features	High Fe*O/MgO Very low K_2O	
	SiO_2: 61 to 64 % TiO_2: 0.93 to 1.26 % $P2O_5$: 0.24 to 0.32 % Y : 57.2 to 60.4 ppm Zr : 195 to 207 ppm La : 7.36 to 8.58 ppm La/Yb : 1.11 to 1.20	SiO_2 : 70 to 80 % TiO_2 : 0.19 to 0.30 % $P2O_5$: 0.04 to 0.07 % Y : 29.5 to 31.4 ppm Zr : 24.4 to 36.2 ppm La : 0.90 to 2.07 ppm La/Yb: 0.24 to 0.47

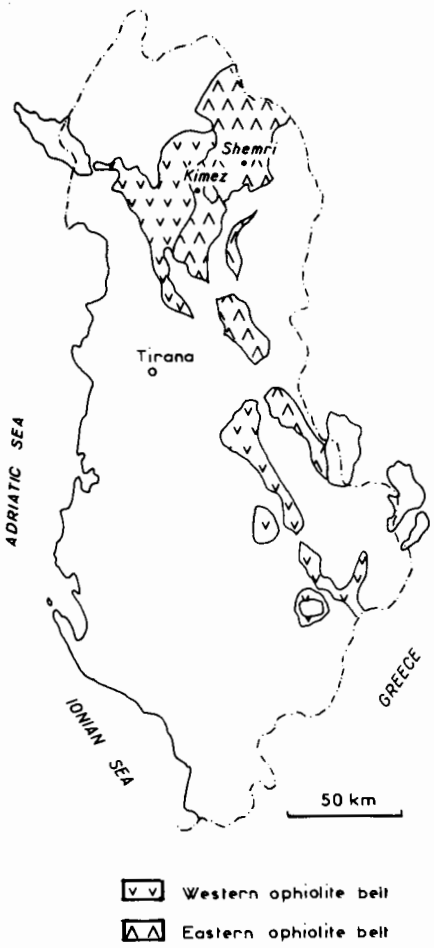

Fig. 1: The two ophiolite belts in Albania. Location of the Kimez and the Shemri areas.

which are interpreted as remnants of a Jurassic back-are basin (Bebien, 1991).

The other group is represented by **Shemri massif**, which forms a relatively large pluton in the central part of the eastern ophiolite belt. It consists of rocks that contain a fairly An-rich plagioclase (plagioclase cores can reach An85 in some tonalites), iron-rich augite, and scarce apatite. These rocks show many similarities with the most evolved members of the boninite suites of the island arcs.

ISOTOPIC GEOCHEMISTRY

Lead isotopic data are obtained from three plagioclase sets separated from three tonalite samples (Ivanaj, 1993). Results are similar to those previously obtained on the nearby ophiolites of Vourinos (Hamelin et al., 1984): the 207Pb/204Pb and 208Pb/204Pb ratios are higher than those in the mid-ocean ridge rocks, and similar to those of some island arc volcanics. U-Pb dating on the scarce apatites in tonalite samples yields a Middle Jurassic age (166+22Ma).

CONCLUSIONS

Data obtained from the acid plutonic rocks complement and corroborate some of the results provided by the survey of the other components of the Albanian ophiolites. They confirm the similitude, already underline by various studies, between the Albanian eastern ophilite belt and formations found in subduction environments, but they also illustrate the wide range of magma series present in this eastern belt. The isotopic study specifies the features of these ophiolites, and strengthens the Jurassic age previously defined using stratigraphic arguments and K-Ar dating of phlogopites from ultramafic rocks (Tashko & Gjata, 1990).

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