The role of anorthite contents on the generation of granitoid, enclaves and gabbro in the Ağaçören Intrusive Suite: Central Anatolia, Turkey

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Ağaçören Intrusive Suite (AIS) is represented the main intrusive body of the south western part of Central Anatolia and is composed of granitoid, gabbro and young dykes. Gabbroic rocks crop out paralel to the elongation of the suite and has sinuous contact with granitoid. Mafic microgranular enclaves are common features of the granitoid and they are dioritic and monzodioritic in composition. Acicular apatite, bladed biotite and quartz ocelli are the typical features of these encalves suggesting to a magma mixing/ mingling process for their origin. The anorthite contents of the plagioclases in the granitoid and its enclaves show an increase from the rim towards the core. The enclave plagioclases and core compositions overlapping with the composition of the gabbro plagioclases. These compositional similarities of the plagioclases suggest that the enclaves are derived from gabbroic magma and crystallized within the felsic magma which produced the Ağaçören granitoid.

Introduction

The Central Anatolia consists of metamorphic rocks, mafic to ultramafic rocks, slices of Mesozoic ophiolitic melange, felsic and intermediate plutonic rocks and cover units. The metamorphic units of the Central Anatolia are tectonically overlain by Mesozoic ophiolitic rocks (Özgül, 1976) which represent the remnants of Neotethyan Ocean floor. The magmatic rocks intrude both the metamorphic and the ophiolitic units of Central Anatolia. The Ağaçören Intrusive suite (AIS) is one of the intrusive body of Central Anatolia. The aim of this research is to put out the genetic relationship between granitoid, enclaves and gabbro of AIS on the bases of the anorthite contents of the plagioclases.

Method

More than 300 thin sections from different rock uints of the Ağaçören Intrusive Suite (AIS) were studied under the microscope. 46 thin sections were selected for mineral analyses. The analyses were carried out using the Electron Microprobe -EMP- Analyser (JEOL JXA-8600 Superprobe) at the Geology Department, Leicester University (UK).

Geology

The Ağaçören Intrusive Suite is exposed as a large magmatic body and consists of Çokumkaya gabbro, Ağaçören Granitoid and young dykes. The Ağaçören Granitoid is further differentiated into 9 subunits as quartz monzonite, Monzonite, biotite granite, microcline granite amphibole biotite granite, biotite amphibole granite, quartz monzonite porphyry, granite porphyry and alkali feldspar granite. The Ağaçören Granitoid as other granitoid of Central Anatolia contains abundant mafic microgranular enclaves (MME) (Kadioglu and Gulec, 1996a). They increase in abundance and sizes from the northern and southern margins of the intrusive body towards the central parts. These enclaves have sharp contacts with host rock and mainly composed of amphibole, biotite and plagioclase minerals in hand specimen. The gabbro is exposed at different parts of the intrusive suite but its largest exposures are at the northern and southern parts of the suite. The contact relationships between the granitoid and the gabbro mostly conceal with the soil covers. However in some localities where the contact is clear they have sinuous contacts with the granitoid. These gabbroic rocks are interpreted as an intrusive bodies within the granitoid (Kadioglu and Gulec, 1996b). Almost all subunits of the Ağaçören Granitoid and Çokumkaya Gabbro are cut by dykes different in length, width and in composition.

Petrography

The monzonite, quartz monzonite and quartz monzonite porphry are composed of plagioclase,

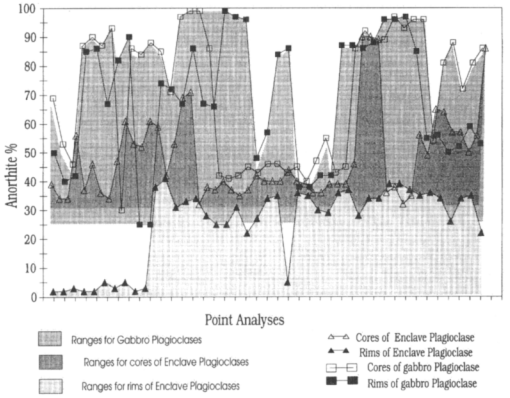

FIG. 1. Comparson of anorthite contents of plagioclases from the gabbro and the enclaves.

orthoclase, amphibole, biotite, relict of pyroxene and quartz minerals and they crop out at the northern part of the suite. The biotie granite is exposed at the northern and southern part of the suite and mainly composed of biotite, quartz, plagioclase and orthoclase minerals. Amphibole biotite granite and biotite amphibole granite have the same mineral composition with different ratio of biotite and amphibole minerals. Mafic microgranular enclaves have subophitic textures and are mainly composed of plagioclase, amphibole, biotite and characterized by the presence of blade shaped biotite, quartz ocelli, acicular apatite poikilitic plagioclase phenocryst. The Çokumkaya gabbro consists essentially of plagioclase + amphibole ± biotite ± pyroxene. The mineralogical composition of the gabbro changes from dioritic varieties with intermediate composition for plagioclase minerals (oligoclase, andesine) at the contacts, to amphibole gabbro with more calcic plagioclase (andesine, labrodorite, bytownite) and with small amounts of pyroxene at the central part of the exposures.

Mineral chemistry

The determination of the plagioclase mineral, the points usually lying along a line of section from the rim to the core of the minerals. The anorthite contents in the cores are, in most cases, different than those in the rims of plagioclases in the enclaves and the host granitoid. The anorthite contents of the plagiocalse rims in the enclaves generally overlap with those obtained from the plagioclase rims in the host rock. This similarity suggests that the plagioclase rims of the encalves and the host granitoid crystallized from the same magma. On the other hand, the anothite contents of the cores of the enclave plagioclase generally overlapwith those obtained from the cores of the gabbro plagioclases. However the rims of the enclave plagioclase have anorthite contents distinctly lower than those recorded in the rims of the gabbro plagioclases (Fig. 2.).

Conclusion

The Ağaçören Intrusive Suite consists of three major rock units, the gabbro, the granitoid and young dykes. Almost all the subunits of the granitoid contain Mafic Microgranular Enclave with various sizes and abundances. The MME characterized by the presence of acicular apatite, blade biotite, quartz ocelli and poikilitic feldspar megacryst which are the evidences for a magma mixing/mingling origin (Vernon, 1991 and Hibbard, 1991). The microprobe analyses reveal compositioal overlap between the anorthite contents of granitois and enclaves. Plagioclases display an increse in their anorthite contents from rim to core in both the granitoid and the MME. The composition of the plagioclase rims in the MME and in the granitoid are almost identical to each other. The cores of the MME plagioclases, on the other hand, are compositionally more akim to those of the gabbro. This suggests that the gabbro and the enclaves probably come from the same magma, the latter being subjected to a higher degree of interaction with the granitic magma during the course of its crystallization.

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