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作品名稱

Basalt prism of Santa Maria Regla river, Huasca,
Mexico

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Abstract

The purpose:

To study the basaltic prisms to understand their formation.

Tasks:

To study chemical and mineral composition, textures and density of basalts of central and peripheral parts of prisms, to reveal the possible difference as a consequence of the formation of Benard cells.

Basalt prisms have 6-5-4-face shape with a diameter 10 -50 cm and height of 30-40m. They are divided by transverse fracture in blocks of 20-50 cm. Prismatic jointing of basalts widespread throughout the world. There are many theories about its origin. We decided to collect data to identify the most appropriate of these. We suppose that if the hypothesis about the role of Benard cells is correct then the properties of basalt in the central and peripheral parts of the prisms must be different. If we consider the center of the prism as the center of the cell, where the hot matter rise, spreading out to the periphery and lower in the peripheral part, it is likely that the density of basalt forming in the center must be lower than at the periphery and later crystallization should lead to a slightly more acidic basalt in the middle. We determined the density of basalts of different parts of prisms. And the density of central part basalts was equal to 2.502g/sm³ and of peripheral part basalts was equal to 2.907g/sm³. X-ray fluorescence analysis showed that basalt of central part contain 12,91% Si and of peripheral part only 10,17%. Basalt of central part is depleted of Fe, Mn, Ti, Mg compared with of peripheral. We investigated samples and thin sections of basalts under the microscope MIN-8. For basalts of peripheral part flow texture expressed by the orientation of the

microlites are characteristic. In the central part flow texture are poorly expressed but we can see many phenocrysts.

Our data reveal a significant and expected difference between the basalts of central and peripheral parts of prism, that are the evidences in favor of the hypothesis about the role of Benard cells in the formation of basalt prismatic jointing.

評語

This study examines the possible formation mechanism of the basalt prism collected at the Santa Maria Regla river, Husaca, Mexico. The student examined the central part and the peripheral part of a basalt prism sample to verify the hypothesis of Benard cells formation. The results indicate that the density of the basalt prism is low at the center. This result is in favor of the Benard cells formation hypothesis. He also found that the composition varies from the center to the peripheral part of the basalt prism. Variations have also been found along the axis of the basalt prism.

Suggestion: Further study by controlled laboratory or numerical experiments is encouraged.

For a basalt, it's unusual to have a chemical difference in short distance.

The abstract did not mention the mineral compositions of the basalts in two area. It's difficult to judge the significance of the chemical differences between two basalts.