CENTRAL VOLCANIC DOMES OF THE CHIAPANECAN VOLCANIC ARC: A PETROLOGICAL STUDY (PRELIMINAR RESULTS)

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1) Introduction

The Chiapanecan Volcanic Arc it is a sequence of volcanic structures mainly dominated by domes and maar. The vulcanism was accompanied by flow asches and blocks. It has an NW–SE,orientation and it is associated with the Motagua – Polochic fault system. The Chiapanecan Volcanic Arc it is located in southern Mexico (Fig. 1). Between Venustiano Carranza and San Cristobal de las Casa cities in the Chiapas state,can be recognized domes with dacitic and andesite composition. It is assumed than this arc is connected with the Transmexican Volcanic Belt and the Central American Volcanic Arc.

2) Field descriptions

The volcanic domes mainly consist of granular (Fig. 2) to porphyroclastic rocks. With euhedral piroxene, amphibole and plagioclases. Sourrounding the volcanic domes pyroclastic flows can be found (Fig.3)

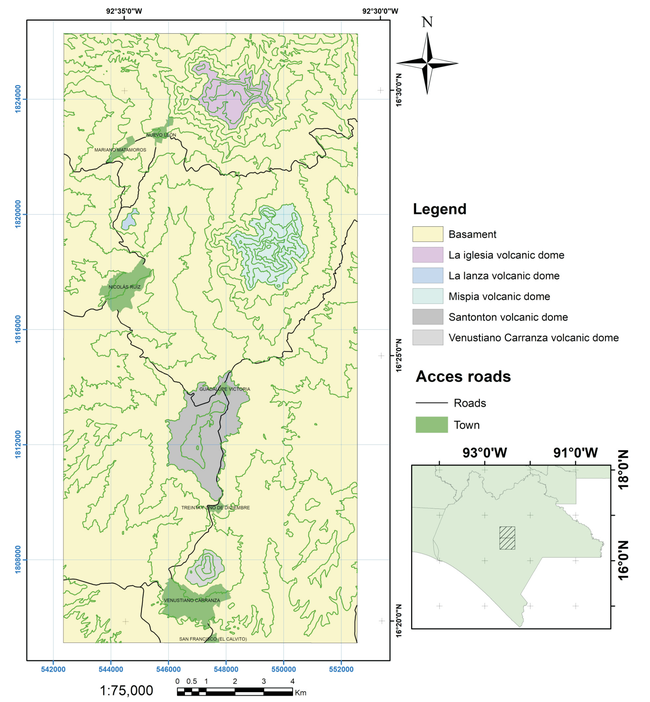

Fig. 1 Geological map of the studied area

Fig. 2 Granular texture on andesitic rock.

Fig. 3 La Lanza volcanic dome with an pyroclastic flow.

3) Petrography

Most of the volcanic samples have a porphyritic (80% to 85%) texture and cryptocrystalline matrix (7% to 42%). Samples AC17-3, AC17-2(ch), AC17D-5, have a microcrystalline matrix (8% to 35%).

There are five types of phenocryst: a) euhedral plagioclase crystals (8% to 47%), with zonation, and polysynthetic twinning b) subhedral feldspar (2% and 18%), c) euhedral amphibole (1% to 38%), some crystals develop oxidized borders, and inclusions of feldspar, d) euhedral pyroxenes (1% to 15%), with simple twinning and reaction rims, e) euhedral titanite with simple twinning and prismatic habit.The samples present opaque metallic phases as pyrite and ilmenite with cubic and granular habits, respectively. Sample AC17D-4 present a xenolith, mainly composed by amphibole (37%), pyroxene (27%) and plagioclase (33%). Samples have not quartz content.The cryptocrystalline matrix mainly consists of glass (95% to 98%) and microcrystalline feldspar. By the other hand the microcrystalline matrix consist of quartz and feldspar microcrystals.
The sample AC17D-8(to) consist of pyroclastic material composed by ash (73%), psammite (1%) and volcanic (1%) lithic fragments with lathwork texture, it is also possibly to recognize quartz (24%) with ondulouse extinction and accretional lapilli.

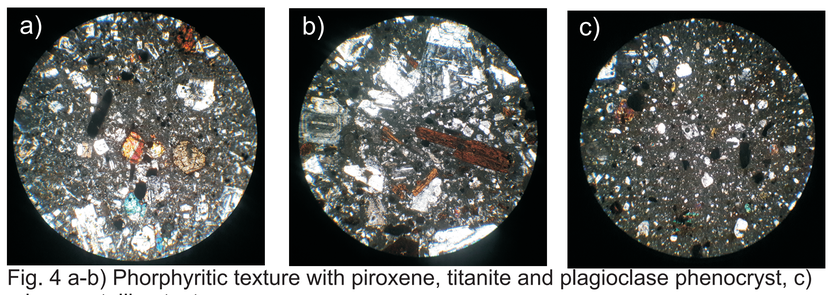

Fig. 4 a-b) Phorphyritic texture with piroxene, titanite and plagioclase phenocryst, c) microcrystalline texture

4) Discussion and conclusions

The petrographic analysis of volcanic rocks from the Chiapanecan Volcanic Arc domes indicates that the petrogenesis of the rocks are related to a volcanic event of intermediate composition that goes from andesitic to dacitic composition. According to Mora et al. (2007) the composition of the magmas are calc-alkaline with large amounts of potassium. The presence of hydrated minerals such as amphiboles by 30 to 40% indicates that the magma that formed the rocks contained a large amount of volatiles. Plagioclases with zoning, could have developed due a long evolution of the magma during its stay in the magmatic chamber. Also suggesting a slow cooling volcanism that generate the zonations in the plagioclase, as well as in pyroxenes and amphiboles.
Large metallic opaque minerals were found ibetween a 20 to 25%. The mineral phses consist of pyrite and ilmenite,associated with the presence of titanite.
Some samples were have a 50 to 60% of ferromagnesian oxidized crystals. These minerals are characterized by the presence of a remnant center of the unaffected crystal and the development of oxidized bordes. This effect can be attributed to the humid climate and the abundant of vegetation in the studied area. The estimation of their LOI values and alteration index values will be evaluated through upcoming geochemical data.
Based on the texture, the size of the minerals and various deposits found in the area; the vulcanism of the area can be divided into three main events:
1) during the first event the magmatism generated the plagioclase crystals, pyroxene, amphibole and feldspars which reached large sizes ranging from 2 microns to 1 mm in length and defined forms like the octahedral and hexagonal prisms of pyroxene and amphibole. With the obtained data it is proposed that shallow depth magmatic chamber.
2) a second event where the magma reaches the surface and promotes a rapid cooling generating a microcrystalline to cryptocrystalline matrix,
3) finally a pyroclastic process which is possibly produced by the contact of the magma with a body of water (aquifer), which caused a strong vulcanic event that deformed the already formed crystals and generated avalanche deposits, bombs and blocks. Mora et al. (2007) likewise mentions that the direction of the pyroclastic deposits is towards the southeast.
The generation of this type of magmatism can be related with the Cocos plate subducting under the North American plate. Which generates a calc-alkaline magmatism mentioned by Mora et al. (2007). This explains the presence of hydrate minerals, since subduction provides the volatiles for the generation of the domaining mineralogy.

References and Acknowledgements

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We want to thank to UASLP and FAI 2017 project for funding this research.