GEOPHYSICAL MONITORING OF PACAYA VOLCANO

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ABSTRACT

The purpose of this project has been to develop and implement an infrastructure of experimental geophysical sensors for the monitoring of precursor signals related to eruptive activity of the Pacaya volcano, with the purpose of detecting signals that arise prior to eruptions.

Sensors were implemented to monitor the activity of Radon gas using standard acrylic detectors, which measure the radon activity in a weekly fashion During the February 29, 2000 eruption, a precursor signal was detected with one week of anticipation. A network of geo-electrical sensors was implemented with the purpose of detecting geo-electrical self-potentials As in the case of radon, the goal has been to detect induced electrostatic potentials that arise within the ground days or weeks before an eruption During days before and after the February 29, 2.000 eruption large signals were observed. These signals continued up to March 15 of the same year 2000. Two simple magnetic coils were also placed to detect precursor signals induced as a result of the fluctuation in the Earth's magnetic field However, no anomalies where detected which can be assigned as precursors to the eruption.

Additionally, geo-electrical and geo-magnetic sensors where implemented in San Lucas, Sacatepéquez to monitor spurious signals that can be induced by the solar activity, that can affect the sensors in Pacaya volcano. The solar activity is capable of changing the Earth's magnetic field, inducing signals in the magnetic sensors In this sense the San Lucas station is considered as a reference station with respect to the station installed in El Patrocinio in the Pacaya volcano foothills

This article presents a technical description of the equipment implemented and the hypothesis proposed to support the research project, as well as the results and conclusions with relation of this type of geo-physical monitoring.

INTRODUCTION

Pacaya volcano is an active volcano located in the Amatitlan municipality, 35 kilometers south of Guatemala city. It is a strombolian volcano and it has an altitude of 2,500 meters above sea level Until 1961 the volcano had remained inactive. However, in 1961 it began its most recent cycle of activity that has lasted more than four decades.

Due to the fact that many communities are located on the foothills and are at risk, it is necessary to maintain surveillance of its activity to characterize it and to alert these communities in case of an eruption.

In this research three techniques were deployed to monitor volcanic precursors related to magmatic eruptions: radon activity, self-potential measurements, and measurement of magnetic anomalies in the Earth's magnetic field