



New structure detected at Poás Volcano (Costa Rica) after the Cinchona Earthquake (January 2009)

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Poás Volcano (Costa Rica) is bounded to the north by the Alajuela Fault and to the south by the San Miguel Fault; the East- West limits are Barva and Viejo-Porvenir-Platanar volcanoes respectively. Within this area, several active faults have been identified. These faults belong to an active tectonic belt called the Central Costa Rica Deformation Belt (CCRDB); where there are two main fault systems, sinistral faults of east to northeast trending and northwest-trending dextral faults. Volcanism is typically phreatic with rare phreatomagmatic eruptions. The aim of this work is to determine the relationship between tectonics and volcanism at Poás Volcano.

High resolution gravity mapping is used in the present study. It consists of about 200 gravity stations with a 50 meters spacing around the active crater. This high density of stations was designed to identify shallow structures in the area. The results are merged here with previously published gravity data from the summit region of Poás. Poás Volcano is marked by a wide negative Bouguer anomaly, upon which a positive anomaly across the crater bottom sits. The Bouguer anomaly calculated in this study is approximately 9mGal relative to the rest of the summit region.

We show here the first evidence of a NS trending negative Bouguer anomaly of about -14mGal extending more than 500 meters to the north of the active crater. This anomaly was not detected in the previous studies and we suggest here that it is a new feature resulting from the failure and movement during and after the Cinchona 6.2 earthquake that struck Poás in January 2009. The negative anomaly could be the result of low density sedimentary filling of a new opened fracture. The orientation is coincident with the perpendicular 3σ cracks generated by the earthquake. In relation to the coulomb stress change map created from the earthquake, Poás volcano seemed to be located in an area in distension and, therefore, this structure should be extensional. Moreover, the volcano is aligned with other volcanic structures in the area, and the orientation of the axis containing them runs NS; thus, this minor structure could be associated with a major extensional structure that focuses the volcanic activity in the area.

Local structures close to the active crater might affect the volcanic activity on Poás, and might also have an effect on geophysical monitoring measurements. Hence knowledge of local structures close to the active crater will help to improve the monitoring of the volcanic processes taking place. This recently observed feature may be transient, so the Bouguer gravity network will now be extended farther from the active crater with the aim of delineating it more closely.