

High precision leveling as a volcano deformation monitoring tool and altimetry control

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There is a remarkable difference between ellipsoid and geoid in Chile, we present the implementation of geometric and geodetic leveling survey in Villarrica volcano, measured by high precision digital electronic level and GNSS equipment. The aim of this study is to compare the differences between two height systems (geoidal and ellipsoidal) in order to implement the high precision leveling as a monitoring tool to study the vertical deformation, experimented by the volcano over the time. In a first stage, we applied the global geoid model (EGM2008), comparing 4 lines of control measured along the North, South, East and West flank of the volcano. The results showed that the 2 longitudinal lines (North-South orientation) had a better fit to the geoid model than the 2 transverse lines (East-West orientation). Differences measured along longitudinal lines do not exceed 2 cm, whereas, differences up to 4 m were observed along the transverse lines. This study is the first approach to establish a methodology to obtain local geoid models that fit to both systems allowing improve the GNSS monitoring through altimetry control, in the most active volcanoes in Chile.