



Cities on Volcanoes 9
November 20-25, 2016
Puerto Varas, Chile

'Understanding volcanoes and society: the key for risk mitigation'



Improving Volcanic Deformation monitoring using GPS Signal to Noise Ratio

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Keywords: GPS, SNR, outlier, volcanic deformation.

Volcanic deformation is an important phenomenon to evaluate the potential eruption in active eruptive systems, that's why most of volcano observatories watch deformation data from GPS in real time. However GPS data can contain outliers. For instances, the snow, commonly present in many volcanoes, may cause this GPS data outlier. The Signal to Noise Ratio (SNR) is the ratio of the signal power sent by satellite and the noise power of the receptor. It has been showed the utility of the SNR for scientific surveys, but is usually use to find outliers in GPS data. GPS data outliers are important to detect false information from the volcanic deformation, which could be crucial in critical moments. We used the analysis of SNR, using the SNR_CODE developed by Kristine Larson, to identify snow outliers in deformation data from GPS stations in Villarrica and Llaima volcanoes, both presenting a high level of activity during the last decades, in a populated area of the lake district of the Araucania region. The results indicate some periods of low SNR during the winter. In one GPS station the very low SNR was related with antenna covered by snow, making deformation data useless during a long time period. In other GPS station, some specific anomalies can be related with low SNR and not to changes in the volcanic behavior, so these periods could be filtered from the GPS series. SNR analysis has proved to be a useful tool to check the GPS deformation data on Chilean volcanoes.