



## **New high-definition thickness data obtained at tropical glaciers: preliminary results from Antisana volcano (Ecuador) using GPR prospection**

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The study of tropical glaciers has been a significant contribution to the understanding of glacier dynamics and climate change. Much of the data and results have been obtained by analyzing plan-view images obtained by air- and space-borne sensors, as well as depth data obtained by diverse methodologies at selected points on the glacier surface. However, the measurement of glacier thicknesses has remained an elusive task in tropical glaciers, often located in rough terrains where the application of geophysical surveys (i.e. seismic surveys) requires logistics sometimes hardly justified by the amount of obtained data.

In the case of Ecuador, however, where most glaciers have developed on active volcanoes and represent sources/reservoirs of fresh water, the precise knowledge of such information is fundamental for scientific research but also in order to better assess key aspects for the society. The relatively recent but fast development of the GPR technology has helped to obtain new highdefinition thickness data at Antisana volcano that will be used to: 1) better understand the dynamics and fate of tropical glaciers; 2) better estimate the amount of fresh water stored in the glaciers; 3) better assess the hazards associated with the sudden widespread melting of glaciers during volcanic eruptions.

The measurements have been obtained at glaciers 12 and 15 of Antisana volcano, with the help of a commercial GPR equipped with a 25 MHz antenna. A total of 30 transects have been obtained, covering a distance of more than 3 km, from the glacier ablation zone, located at  $\sim 4600$  masl, up to the level of 5200 masl. The preliminary results show a positive correlation between altitude and glacier thickness, with maximum and minimum calculated values reaching up to 80 m, and down to 15 m, respectively.

The experience gained at Antisana volcano will be used to prepare a more widespread GPR survey in the glaciers of Cotopaxi volcano, whose implications in terms of volcanic hazards are largely more significant. Other ice-cladded ecuadorian volcanoes, like Cayambe or Chimborazo, could also be considered in future research..