



Rapid vanishing of glaciers in Colombia, its implications for hazards from volcano-ice interactions and related monitoring strategies

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Colombian glaciers have experienced a rapid retreat in the past decades. Belonging to the tropical glaciers, the vanishing Colombian ice masses were declared unique and threatened ecosystems on earth by the 2001 IPCC report. Several peaks in the Sierras of Colombia have already lost their glacier cover during the past decades. Today, high-altitude glaciers still exist in the Sierra Nevada de Santa Marta, in the Sierra Nevada de El Cocuy and on the volcanoes of Nevados del Ruiz, Santa Isabel, Tolima and Huila. According to field measurements, and analysis of aerial photographs and satellite images, the Colombian glaciers lost 50% and more of their area in the last 50 years. Glacier shrinkage continued to be strong in the last 15 years with an area loss of 10 to 50% though no clear acceleration trend could be observed so far. In the framework of a recently initiated research project, the glaciers on top of volcanoes are a particular focus. Still significant ice masses exist on Nevado del Ruiz and Nevado del Huila with volumes in the order of 10^7 to 10^8 cubic meters of ice. Both volcanoes are active and thus give reason to concern about potential hazards originating from volcano-ice interactions, such as lahars. Nevado del Ruiz has been under detailed monitoring since the 1985 disaster including recent radar-based ice thickness measurements. Nevado del Huila, however, is technically and due to political conflicts difficult or impossible to access. Therefore, it is planned to monitor the volcano and its glaciers by high and very-high resolution satellite imagery. Volcanic activity can be observed by thermal radiometers such as mounted on ASTER. Very-high resolution

satellite images from QuickBird or SPOT-5 allow a detailed analysis of the glaciers. Generation of DEMs derived from remote sensing instruments, i.e. from SRTM and ASTER, serve as an essential input to models simulating mass movements such as lahars and debris avalanches. In view of the serious hazard potential prevailing on Colombia's glacier-clad volcanoes, it is crucial to use the latest technology to achieve an improve an improved hazard assessment and prevention.