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Dramatical reduction over two Ecuadorian Glaciers related with volcanic activity 1999-2016

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The glaciers located on Cotopaxi and Chimborazo volcanoes in the Ecuadorian Andes, have lost a total ice area of 54.8% and 69% in the last 50 years. This long term trend is well correlated to observed climatic changes in the region. However, the area losses have been enhanced by the activity of Volcán Tungurahua since 1999 and more recently, by the last volcanic pulse of Cotopaxi. The main effect of this volcanic activity is glacier surface albedo variations due to ash deposition. During the last eruption of Cotopaxi (august 2015-january 2016), near 50% of the total glacier area was covered by ashes. In the long term, Chimborazo glaciers have been covered up to 60% by ashes erupted by Tungurahua. Apart from the ash deposition effects, several new hot spots have been detected near the top of Cotopaxi, many of them also enhancing ice melt. The ice cover of both volcanoes has been frequently monitored, including seismic, mass balance, gas emissions, energy balance, etc. New insights of this monitoring program will be presented.