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Integration of multiple geoscientific investigation methods for a better understanding of a water system: the example of Chimborazo glaciers melting effects on the Chambo aquifer, Ecuador

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The identification of the processes underlining natural systems often requires the adoption of multiple investigation techniques for the assessment of the sites under study. In this work, the combination of information derived from non-invasive sensing techniques, such as geophysics, remote sensing and hydrogeochemistry, highlights the possible influence of global climate change on the future water availability related to an aquifer in a peculiar glacier context, located in central Ecuador. In particular, we show that the Chambo aquifer, which supplies potable water to the region, does not contain fossil water, and it's instead recharged over time. Indeed, the whole Chambo river basin is affected by the Chimborazo volcano, which is a glacerised mountain located in the inner tropics, one of the most critical places to be observed in the frame of climate impact on water resources. Thanks to the infomation gathered by the various surveying techniques, numerical modelling permitted an estimate of the recharge, which can be fully originated by the runoff from Chimborazo melting glaciers. Actually, the retreat of the glaciers on top of the Chimborazo is an ongoing process presumably related to global climate change.