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Landslides and hydrogeology in a volcanic island revealed from transient electromagnetic data, San Cristobal, Galapagos Archipelago

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Large landslides have a major effect on the morphology of insular volcanic edifices; their relationship with groundwater flow has to be investigated. The internal geological structure of San Cristobal Island, Galapagos Archipelago, is poorly known, and the presence of perennial springs and rivers has not yet been explained. In the framework of the GIIWS project a 3D subsurface resistivity mapping of the island performed by a helicopter-borne transient electromagnetic method, combined with geomorphological, tectonic and hydrogeological investigations, now gives a consistent interpretation of the internal structure of the edifice and its hydrogeological potential. On the southern windward mountainside, south-easterly trade winds contribute to weathering and groundwater recharge, leading to a weakened edifice. We inferred landslide occurrence based on the geometry at depth of the lower resistivity layers confirmed by both tectonic and hydrogeological field surveys. These results shed new light on tectonic processes, structural geometry and related groundwater circulations within ancient volcanic edifices subjected to major landslides.