



Morphological analysis of the Irazu-Turrialba Volcanic Massif (Costa Rica)

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Morphological studies of active volcanic systems are of primary importance to characterize the relationships between volcanic and tectonic features. In this work, a morphological investigation, performed at the Irazu-Turrialba Volcanic Massif (ITVM), a huge (500 km³) volcanic complex located in the southern end of the Costa Rica Central Volcanic Range, is presented and discussed. The last activity of Turrialba (3340 m a.s.l.) volcano dates back to 1864-1866, whereas that of Irazu (3432 m a.s.l.) took place in 1963-1965, both events being characterised by strombolian-vulcanian eruptive phases. At Irazu Volcano frequent mass movements (i.e. debris flows and lahars) were associated with the eruptions. In terms of volcanic hazard, Irazu is regarded as a major threat since it is located at 24 and 14 km from the cities of San Jose (24 km) and Cartago (14 km), respectively. The ITVM, whose volcanic products (mainly basaltic andesites and andesites) are emplaced since the Pleistocene, is outlined by the presence of several eruptive centres and sector collapse structures, indicating a complex history that, despite its proximity to the two biggest cities in Costa Rica, has not been studied in detail. On the basis of a digital elevation model, slopes and aspect maps were generated along with a morphometric analysis of the drainage network, which pointed out the existence of several anomalies and recent disturbances. Several tectonic lineaments, some of which considered as corresponding to NW-SE and NE-SW fault systems, have been recognised. By coupling the field observation, that has allowed to identify at least two debris avalanches in the southern flank of the ITVM, with the tectonic lineaments we may hypothesise that local tectonic-induced seismic events have played an important role in the mass failure events.