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Long-term landscape evolution of the Basal Complexes of Fuerteventura and La Gomera Islands, Canary Archipelago

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Abstract

The Canarias archipelago consists from seven volcanic islands located at the northwestern African margin. Among them only Fuerteventura and La Gomera islands show distinctive wide exposures of the basal complex (BC) that is characteristic with complex geological history. The basal complex was exposed on the western part of Fuerteventura and northwestern sector of La Gomera because of giant landslide(s) which have removed most of the shield stage volcanic rocks (Ancochea et al., 1996; 2006; Stillman, 1999). Generally, landslides are a common feature in the earlier constructive stages of the entire archipelago and many other volcanic islands (McGuire, 1996).

Integration of low temperature thermochronological data, and time-Temperature (t-T) numerical modelling have proven to be a powerful tool for reconstructing the thermal and tectonic history, defining and quantifying long-term landscape evolution in variety of geological settings. Therefore, zircon and apatite fission-track techniques and t-T paths modelling were applied to 36 samples representing the main rock units of the BC on both islands. Fuerteventura BC has experienced two very rapid cooling/exhumation events. While, La Gomera BC shows one long-lived very fast cooling/exhumation event. Interestingly, these very rapid cooling/exhumation events are synchronous with these major landslides. There are many reasons for the major landslides on such a volcanic island (see e.g. McGuire, 1996)., But, the most sufficient triggers for these huge mass wasting/landslides events on Fuerteventura and La Gomera are recommended to be the continuous igneous intrusions and dikes which have the potential to decrease the edifice stability, igneous extrusions which add new materials at the surface leading to over-steeping and overloading (McGuire, 1996), and major climatic changes of the Middle Miocene Climatic Optimum (Herold et al., 2011).

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