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Construction-Destruction of Volcanic Island in the Atlantic Ocean; Fuerteventura, Canary Islands

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Fuerteventura shows exceptional features within the Canary Islands; it is the oldest, eastern-most and nearest to the African continent, the occurrence of wide exposures of submarine seamount stage rocks on its western side, it's unclear erosional history, and its longer time span volcanic activity. In the Western Fuerteventura, by 17.5 Ma huge landslides have removed about 3500 km3 of lavas and volcanoclastics of the shield stage to expose more than 300 km2 of submarine rocks of the Basal Complex (Stillman, 1999). 3 Jurassic to Cretaceous sandstone samples of marine origin, which represent the seamount stage of Fuerteventura gave zircon fission-track (ZFT) ages of 58.5±7.3 to 50.0±9.3 Ma, zircon (U-Th-Sm)/He (ZHe) ages of 20.6±1.6 to 18.5±1.4 Ma, and apatite fission-track (AFT) ages of 46.3±30.0 to 14.5 ±4.0 Ma, respectively (Wipf et al., 2010). Other 3 samples from the Miocene intrusions gave ZFT age of 15.6±3.6 to 21.5±4.3 Ma and ZHe age of 13.4±0.5 to 15.0±1.2 Ma and AFT ages of 12.0±2.1, to 14.1±4.9 Ma, respectively.
The aim of the ongoing study is to reconstruct the long-term landscape evolution of Fuerteventura and to unravel the confusion of its erosional record. Therefore, different thermochronologic techniques were applied on 18 samples from the Central Volcanic Complex and Northern Volcanic Complex in Western Fuerteventura. Resetting ZFT ages at ∼50 Ma may document starting the doming in the Basal Complex since the Early Eocene. Then, this region was cooled (uplifted) slowly from ZFT closure temperature to ZHe closure temperature in ∼30 Ma with cooling rate of 1.5–3°C/Myr (Wipf et al., 2010). Afterward, rapid exhumation has started ∼20 Ma to uplift the samples from depths equivalent to depths of AFT closure temperature in less than 5 Ma with cooling rate of 50–70°C/Myr. The Lower Miocene intruded samples show a rapid uplift from depths equivalent to ZFT closure temperature to AFT closure temperature in ∼3.6-7.4 Myr with cooling rate of 13–27°C/Myr as response to the previously documented huge landslides.

References

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