Geophysical Research Abstracts,
Vol. 10, EGU2008-A-03152, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-03152
EGU General Assembly 2008

EXHUMATION HISTORY OF FUERTEVENTURA, CANARY ISLANDS, SPAIN

M. Wipf (1), U. A. Glasmacher (1), A. Emmerich (2) ,T. Bechstädt (1)

(1) Institute of Geology and Palaeontology, Im Neuenheimer Feld 234, Heidelberg University, Germany (martin.wipf@uni-heidelberg.de / phone: +496221544843)

(2) RWE-Dea, Hamburg, Germany

While the basal complex of Fuerteventura has been reported to be of Late Cretaceous age (Balogh et al.; 1999) the majority of published K-Ar-ages from volcanic rocks are younger. They can subsequently be grouped into three classes; older than 20 Ma, 14-16 Ma and 5-3 Ma (Ancochea et al.; 1996). These age groups roughly correlate with the active periods of the three volcanic centres of the island (i.e. the Southern-, Central- and Northern Volcanic Complex). Intrusives as well as Cretaceous siliciclastic sedimentary rocks from the basal Betancuria complex in western-Fuerteventura were sampled and analysed with low-temperature thermochronometric methods such as fission-track, and (U-Th)/He dating, in order to reveal the islands exhumation history. Additionally, a DEM from Fuerteventura was built (SRTM 90 data) to gain a better understanding of the transport direction of the produced sediments. While massif landslides towards the west have been reported (Stillman; 1999), sediment transport towards the east is poorly constrained. A first order analysis of the DEM shows however that eroded material has also been transported towards the east and northeast. This means that potentially significant amounts of sediment derived from Fuerteventura have been deposited in the Tarfaya Basin, located between Morocco and on the Canary Islands. The understanding of the thermal parameters and the time-temperature (t-T) development of this island is therefore essential for the quantification of the sedimentary flux to the Tarfaya basin. As this basin contains potential source areas for hydrocarbons (HC) the quantification of the sedimentary input and the subsequently related thermal evolution is pertinent for the understanding of HC generation in time

and space.

The obtained thermochronometric data yields a very slow rate of cooling in the order of 1.5-2.5 ˚C/Myr from ∼40-18 Ma for the Late Cretaceous sediments. On the other hand intrusive bodies that are associated with the early Miocene activity of the central volcanic complex of the island show initial cooling rates of 50-65 ˚C/Myr from ∼20-15 Ma. Following the intrusions the rate of cooling of the sediments increased to 20-30˚C indicating an enhanced rate of exhumation and erosion. It can be speculated that this increase is associated with the activity of the Central Volcanic Complex. After ∼15 Ma rates slowed down again to 3-6 ˚C/Myr and cooling paths experienced are similar for both the intrusives and the sediments. Eventually the sediments must have reached the surface in the early Pliocene because palaeosols that are covered by basalt flows dated at ∼5 Ma are observed. The data obtained in this study for central Fuerteventura is difficult to reconcile with the cooling history suggested by previously obtained fission-track and K-Ar data from the north-western part of the island. This contradiction is likely to indicate that the exhumation history of Fuerteventura is more complex than previously believed. These heterogeneities need, however, to be accounted for in order to reliably quantify the sedimentary input from the island of Fuerteventura to the Tarfaya Basin.