

DETRITAL APATITE FISSION TRACK STUDIES OF SANDSTONES FROM THE VICTORIA LAND BASIN OF THE WEST ANTARCTIC RIFT SYSTEM, ANTARCTICA

Silva, R.G.¹; Paulsen, T.²

¹ Universidade de Brasília; ² University of Wisconsin Oshkosh

ABSTRACT: The Victoria Land Basin is located at the south portion of Antarctica, flanking the Transantarctic Mountains, in the West Antarctica Rift System. Uplift of the Transantarctic Mountains has occurred in the last 180 Ma during multiple phases of extensional tectonism associated with breakup of the Gondwana supercontinent. Initial magmatism and extension occurred along the Mountains during Jurassic rifting, and sub-sequent rift basin development in the Ross embayment portion of the West Antarctic Rift System occurred during the Cretaceous and Cenozoic. This initial tectonic setting enabled the Victoria Land Basin to be filled with detrital sediments from the uplifted rocks of the Transantarctic Mountains without extensive transport. As a result from the thick masses of ice that cover potential outcrops in Antarctica, the study of tectonic and basin evolution of the area is hampered. One of the best ways to study the geologic sequence of the area, then, is by core sampling, indirect geophysical methods and detrital sample analysis. Fission track studies of rocks in the Transantarctic Mountains indicated an episodic uplift history, with two initial Cretaceous uplift phases at 125 Ma and 85 Ma, followed by a phase in the Cenozoic beginning around 50 Ma. Some works suggest rates of exhumation associated with the Cenozoic uplift phase were markedly higher than those in the Cretaceous, whereas other authors have challenged this view suggesting rapid Cretaceous uplift followed by slower Cenozoic uplift. Cenozoic sandstones belonging to the Victoria Land basin contain grains of apatite, which can be analyzed via fission track analyses to determine the ages and rates of cooling of the parent rocks from which they were derived through weathering and erosion. This work presents new analyses of detrital apatite fission track results that were obtained from rift basin sandstones with the intent of better understanding the exhumation history of the Transantarctic Mountains in Antarctica. In addition to that, Cenozoic uplift events younger than the proposed ages in previous works were indicated by detrital apatite fission tracks. These younger apatite fission tracks have longer mean track lengths and smaller standard deviations than the observed for Cretaceous ones, a result consistent with more rapid denudation during this time interval.

KEY-WORDS: UPLIFT; LOW-TEMPERATURE; GEOCHRONOLOGY