



Cenozoic burial and exhumation of the interior highlands of Brazil: Palaeo-thermal evidence from the Eocene Fonseca Formation, Minas Gerais

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A rare insight into the Cenozoic development of the highlands in the interior of Brazil is possible due to an outlier of the Eocene Fonseca Formation, near Belo Horizonte in the state of Minas Gerais. This sediment is in a small, graben-like basement structure *c.* 800 m a.s.l., and is unconformably overlain by undated, ironstone conglomerate of the Chapada de Canga Formation (Sant'Anna et al., 1997).

Organic material from the Fonseca Formation has yielded a T_{max} value of 427°C. This is equivalent to a vitrinite reflectance of 0.4 to 0.5%, indicating a maximum palaeotemperature between 66°C and 83°C. AFTA data from a basement sample near the Fonseca outcrop reveal three cooling events, (1) from >110°C, beginning at around 150 Ma, (2) from 100°C to 85°C, beginning between 145 Ma and 70 Ma and (3) from 80°C to 60°C, beginning between 50 Ma and 10 Ma. The peak palaeotemperature in the most recent event is highly consistent with the T_{max} value, confirming that the youngest event post-dates deposition of the Fonseca Formation.

The estimated post-Fonseca palaeotemperatures are equivalent to burial under 1.5–2.0 km of cover, for a palaeo-geothermal gradient of 25°C/km, or 0.7–1.0 km of cover, for a gradient of 60°C/km. Because the Fonseca Formation was deposited by a meandering river system (Sant'Anna et al., 1997), more extensive areas must have been covered by these thick deposits of Eocene and younger sediment. A likely scenario is thus that even the highest summit in the area, Pico do Sol (2.1 km a.s.l.), was once under this cover. Furthermore, predominantly early Eocene ages (Spier et al., 2006), for the formation of laterite less than 100 km from the outcrop of the Fonseca Formation, most likely reflect exposure prior to deposition of (and burial by) the Fonseca Formation.

Sant'Anna, L.G., Schorscher, H.D. and Riccomini, C., 1997. Cenozoic tectonics of the Fonseca Basin region, eastern Quadrilátero Ferrífero, MG, Brazil. *Journal of South American Earth Sciences*, 10(3-4), 275-284.

Spier, C.A., Vasconcelos, P.M. and Oliveira, S.M.B., 2006. Ar-40/Ar-39 geochronological constraints on the evolution of lateritic iron deposits in the Quadrilátero Ferrífero, Minas Gerais, Brazil. *Chemical Geology*, 234(1-2), 79-104.