Thermotectonic History of the Maastrichian Reservoir in the Campos Basin from Apatite fission track

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In thermotectonic evolution studies of a sedimentary basin it is important to identify the periods that are associated with significant heating episodes during burial followed by cooling due to exhumation and erosion. Apatite fission track data provide important constraints on the timing and duration of heating/cooling events as well as maximum paleotemperatures. These data combined with other thermal indicators can, therefore, be used to reconstruct detailed thermal histories of sedimentary basins. Our investigations are based on the thermal analysis of 55 cuttings samples, of which 45 have also been analyzed with apatite fission track dating, in addition to eleven cores analyzed for vitrinite reflectance and spore color. The vitrinite reflectance (0.37–0.48 %Ro), spore color and Thermal Alteration Index data indicate that the organic matter in this oil reservoir shows no thermal degradation. The host rocks of the Maastrichtian reservoir in Campos Basin experienced their maximum post-depositional temperature at 65 Ma. Thermal modeling also indicates that temperatures during the maximum burial period of the reservoir in early Paleocene times were attained shortly (ca. 5 Myr) and reached 75°C after deposition. The generation of hydrocarbon in this reservoir was ceased at ca. 61 Ma when the rocks reached temperatures below 60°C, after the start of the uplift phase, and no more generation occurred until the Recent.The apatites are partially annealed and the fission trcak ages represent thermotectonic events that occurred in the source terrain. The youngest ages provide a minimum age of 45.9 ± 5.5 Ma due to significant track annealing in the rocks during the last magmatic event in the basin. The thermotectonic history was controlled by subsidence, subaerial unconformity, and thermal expansion and uplift of the basin. The termination of the cooling episode caused the inversion of Lower Albian normal faults and the second heating phase is indicated by growth fault formation during Early Paleogene, and later reactivated during the Neogene.