

**Thermal history of the Scotian Basin, offshore Nova Scotia, Canada:
evidence from apatite fission track analysis**

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Forty apatite samples of sandstone from ten exploration wells in the Scotian Basin, offshore Canada, are used for fission track analysis and thermal history reconstruction. The sample depths range from 1000 to 5500 m. Fission tracks in all apatite samples are at least partially annealed. Apatite fission track ages for samples from the Logan Canyon Formation are generally older than their stratigraphic ages. These data indicate a high degree of track retention and therefore record the time of cooling in the detrital source area. Samples from deeper formations (Missisauga, Mic Mac and Verrill Canyon) give apatite fission track ages younger than their stratigraphic ages (some give zero ages), indicating partial to total annealing of fission tracks in apatite.

Computer forward modelling of well-constrained data

indicates heating to palaeotemperatures of 80 to 110°C prior to cooling, at some time during the interval 110 to 60 Ma in the Scotian Basin. This thermal overprinting in apatite samples is common throughout the study area and coincides with the time at which peak oil generation began in some wells. Zircon fission track data from fifteen samples in four wells suggest that these samples have never experienced temperatures higher than $235 \pm 25^\circ\text{C}$ since deposition.

The causes of this thermal anomaly are very likely to be the high heat flow during 150 to 90 Ma and fluid migration related to the process of oil generation in the Scotian Basin, during which release of overpressured hot fluid is expected to have occurred.