



Phanerozoic uplift and subsidence history of the Canadian Shield and Hudson Bay intracratonic basin

Nicolas Pinet

Geological Survey of Canada, GSC, Québec, Canada (nicolas.pinet@canada.ca)

In tectonically active settings, geological processes that shape the earth surface can be quantified, at least in a preliminary way. However, this quantification remains challenging in continental interiors such as the Precambrian Canadian Shield for which most geological models infer a slow and more or less continuous Phanerozoic exhumation, punctuated by minor sedimentary and ice sheet loading events.

With a preserved sedimentary thickness of up to 2500m, the Hudson Bay Basin, the largest intracratonic basin in North America, recorded a multistage episode of subsidence during the Upper Ordovician-Upper Devonian period. However, subsidence analysis, sedimentary xenoliths in kimberlite pipes and organic maturation data, all indicate that the sedimentary record is incomplete and the present-day outlines of the basin are erosional limits only.

New and published apatite fission track (AFT) data put additional constraints on the exhumation history of the Canadian Shield. Thermal histories from AFT data record cycles of heating and cooling that are coherent with the sedimentary record preserved in the Hudson Bay Basin, but also indicate geographic variations in the timing and degree of Phanerozoic heating episodes. Such variations suggest that the Canadian Shield did not react as a single entity during the last 500 My and experienced epeirogenic movements related to continental- and regional- scale geological processes. However, interpretation of the amount and timing of maximum heating is complicated by the fact that the respective effects of higher surface temperatures, changes in the paleo thermal gradient and changes in depth due to burial remain difficult to assess. The on-going project aiming to collect new AFT data to unravel the exhumation history of the Canadian Shield would put new insights on the four-dimensional exhumation patterns at the continental scale.