# Thermochronological models for the cooling history of Neoproterozoic post-collisional granites

A.E. VERNIKOVSKAYA[1]*, V.A. VERNIKOVSKY[1], N.YU. MATUSHKIN[1], O.P. POLYANSKY[2] AND A.V. TRAVIN[2]

[1]Trofimuk institute of petroleum geology and geophysics SB RAS, Novosibirsk, Russia
(*correspondence: VernikovskayaAE@ipgg.nsc.ru)
[2]Sobolev institute of geology and mineralogy SB RAS, Novosibirsk, Russia

The heat transmission modeling during acid magma intrusion into metasedimentary layers was performed on the example of the Neoproterozoic post-collisional A-type leucogranites of the Yenisey Ridge (western framing of the Siberian craton). These plutons (volume up to 350 $km^3$) have a plate morphology, subvertical orientation and were formed at a depth of more than 10 km. They originated from high-temperature magmas of mainly continental crustal nature. The $^{40}Ar/^{39}Ar$ mica age from the leucogranites, which reflects the time of the cooling of the plutons, is 8-30 m.y. younger than the U-Pb zicon age of their forming. A combination of heat transmission modeling and K/Ar isotopic system behavior modeling allowed for the first time to verify the cooling models of a granite. With the increase of the depth the K/Ar isotopic system becomes more opened, and the modeled integral K/Ar age curve deviates stronger from the concordia. We propose that after the plutons were formed they remained at the initial depth for up to 30 m.y. During this period the obtained differences between $^{40}Ar/^{39}Ar$ mica ages and U-Pb zircon ages were reached. And then the plutons were subjected to exhumation and their K/Ar mica isotopic systems were closed. For the studied plutons such agreement becomes possible at depths 13-14 km. The leucogranitic pluton's exhumation is coeval with the beginning of the formation of the active continental margin alkaline magmatic complex.

# Half-precessional dynamics of monsoon rainfall near the East African equator: Implications for Indian Ocean ITCZ migration over the past 25,000 years

D. VERSCHUREN[1]*, J.S. SINNINGHE DAMSTÉ[2], J. MOERNAUT[3], I. KRISTEN[4], M. BLAAUW[5], M. FAGOT[1], G. H. HAUG[6] AND CHALLACEA PROJECT MEMBERS

[1]Limnology Unit, Ghent University, 9000 Gent, Belgium
(*correspondence: dirk.verschuren@UGent.be)
[2]NIOZ, P.O. Box 59, 1790 AB Den Burg, The Netherlands
[3]RCMG, Ghent University, 9000 Gent, Belgium
[4]GFZ Potsdam, D-14473 Potsdam, Germany
[5]Queen's University Belfast, BT9 6AX Belfast, UK
[6]ETH Zürich, CH-8092 Zürich, Switzerland

We present a detailed reconstruction of hydrological changes near the equator in East Africa from before the LGM to the present, using proxies extracted from the sediment record of Lake Challa on the lower east slope of Mt. Kilimanjaro (3° S, 36° E). Our results show that monsoon rainfall in this region varied at half-precessional (~11,500-year) intervals, because the southeasterly and northeasterly Indian Ocean monsoons, which together create the bimodal seasonal distribution of equatorial rainfall, were strengthened in alternation when the inter-hemispheric insolation gradient was maximized. Dry conditions prevailed when neither monsoon was particularly strong, and minima in local March or September insolation weakened the rain season that followed. The distinct timing of late-glacial drought on the equator (20.5-16.5 ka BP) does not fit well with NH glaciation being its primary driver. It is best attributed to partial failure of the short rain season due to modest local September insolation, perhaps exacerbated by the southeasterly monsoon being weakened by northern cooling still affecting the North African land mass. Our data further highlight that orbital-scale ITCZ 'migration', or shifts in its mean annual latitudinal position, mainly relates to variation in how far the ITCZ is displaced into the NH or SH during summer and winter; the cross-equatorial position of the East African region with twice-annual ITCZ passage is not much affected. On (sub)millennial time scales the temporal pattern of hydrological change on the East African equator bears clear signatures of northern high-latitude climate variability, but on the orbital time scale it mainly responded to low-latitude insolation forcing. Important keys to this history are the low-latitude position of its continental regions of convergence and its relative isolation from the Atlantic Ocean domain, where strong meridional overturning circulation more tightly coupled tropical climate regimes to high-latitude climate dynamics.