

An organic geochemical reconstruction of North American temperature gradients over the Cretaceous-Paleogene boundary

Lauren K. O'Connor

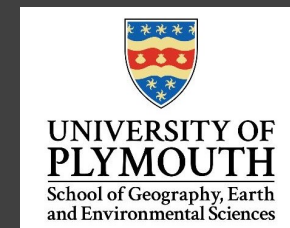
Rhodri M. Jerrett, Greg D. Price, Bart E. van Dongen,
Emily D. Crampton-Flood, & Sabine K. Lengger



The University of Manchester

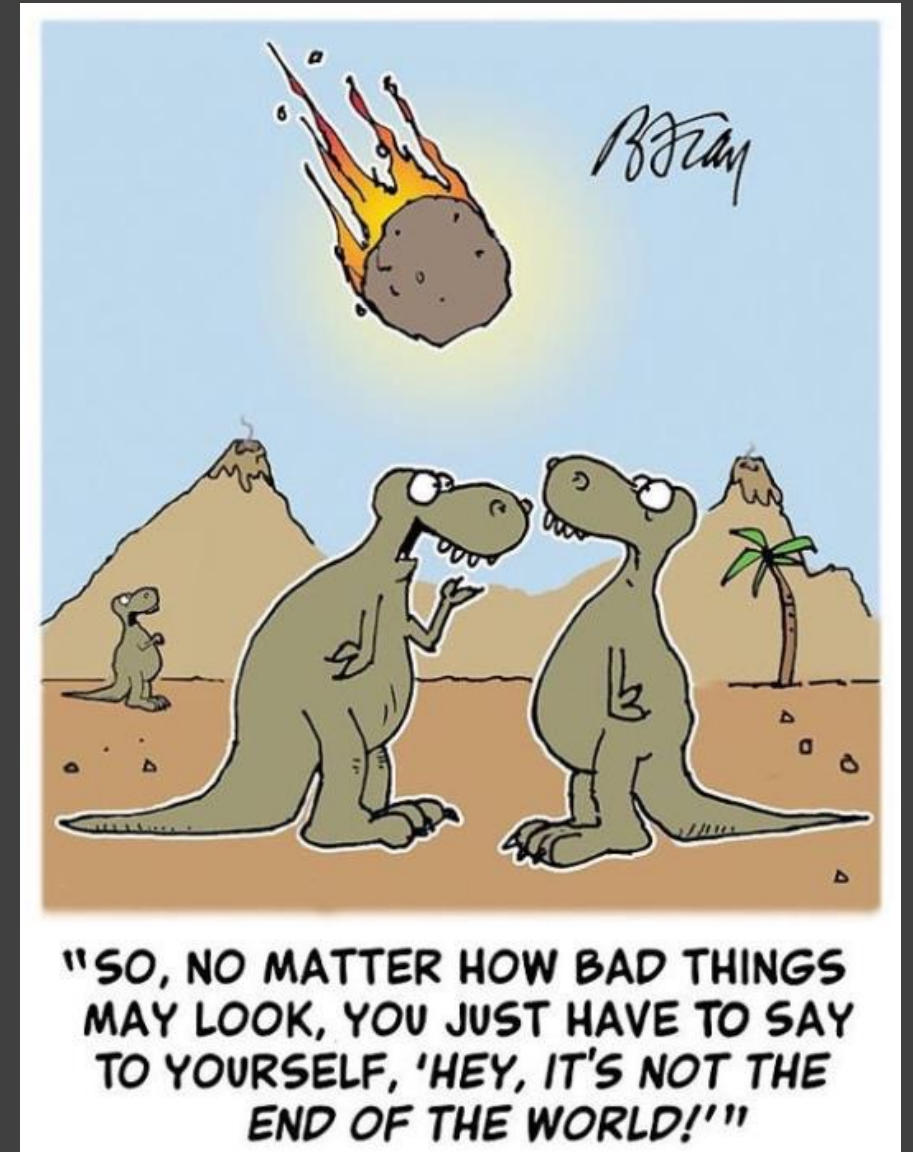


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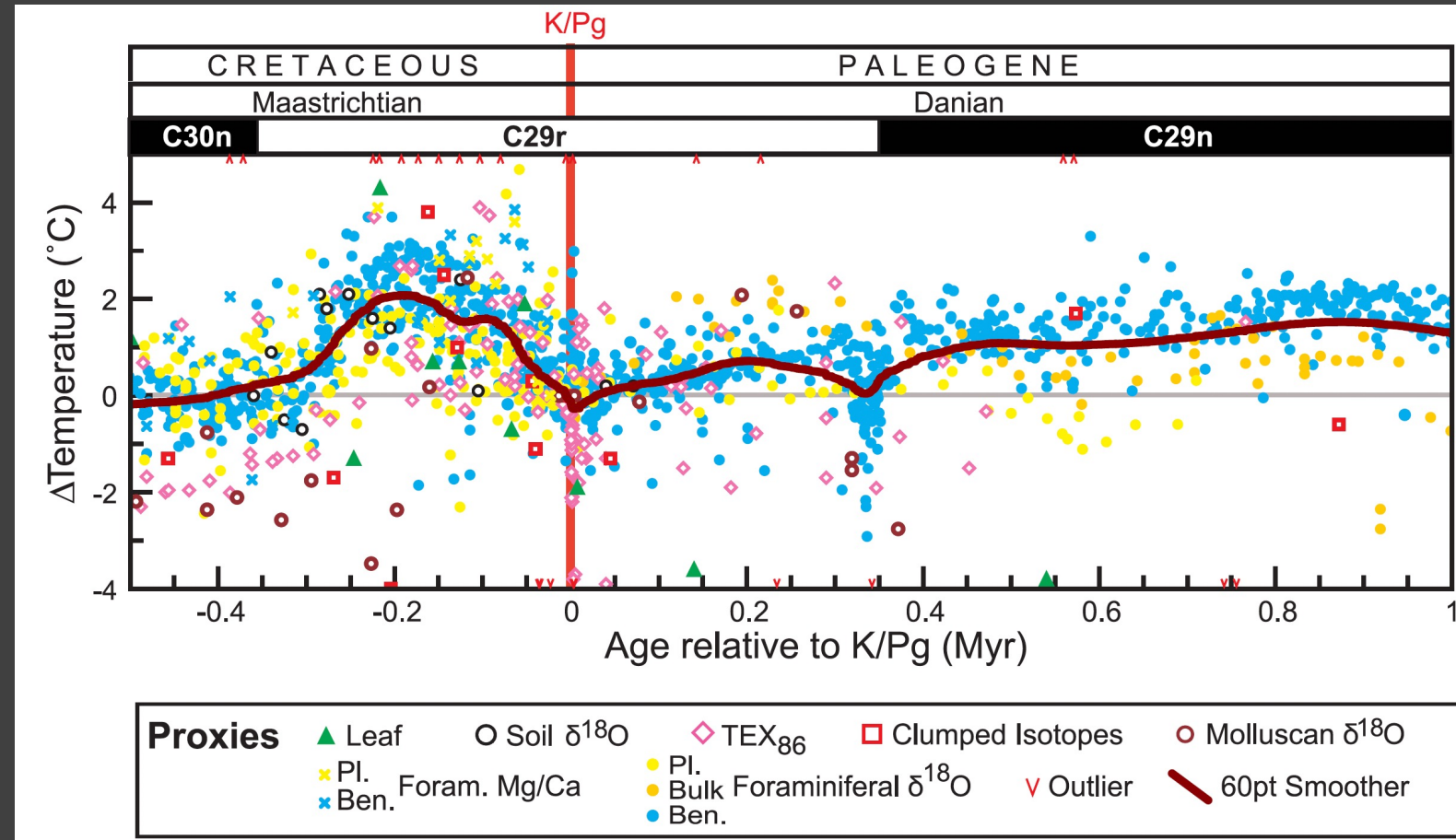
K-Pg Boundary climate

- 66 million years ago
- Greenhouse period
- K-Pg interval affected by bolide impact & Deccan Trap volcanism: climatic effects of these debated
- Short-term perturbation due to bolide impact superimposed on pre-existing global warmth?



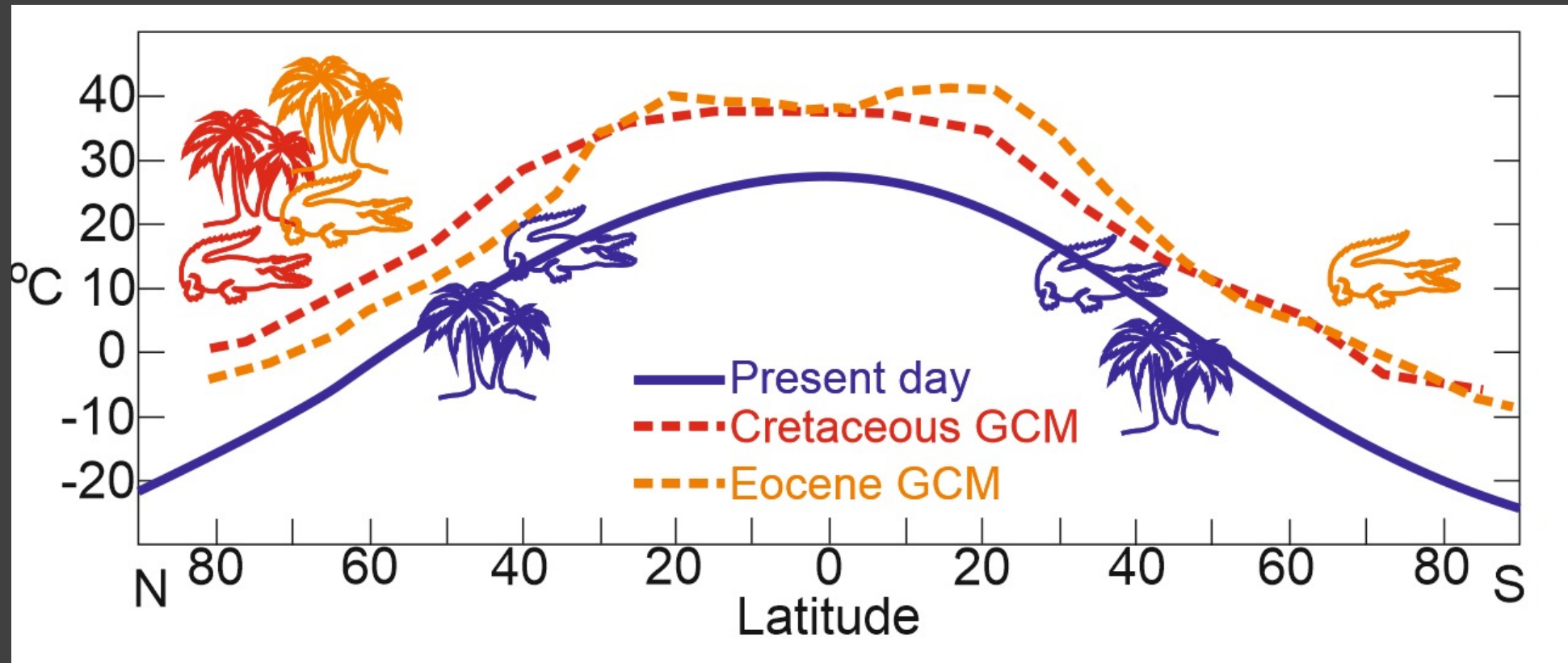
K-Pg Boundary climate

- Most temperature data are from the marine realm
 - These records are too low-resolution for precise correlation
 - Interproxy comparison issues
- Difficult to correlate precisely for latitudinal comparisons



Equable Earth?

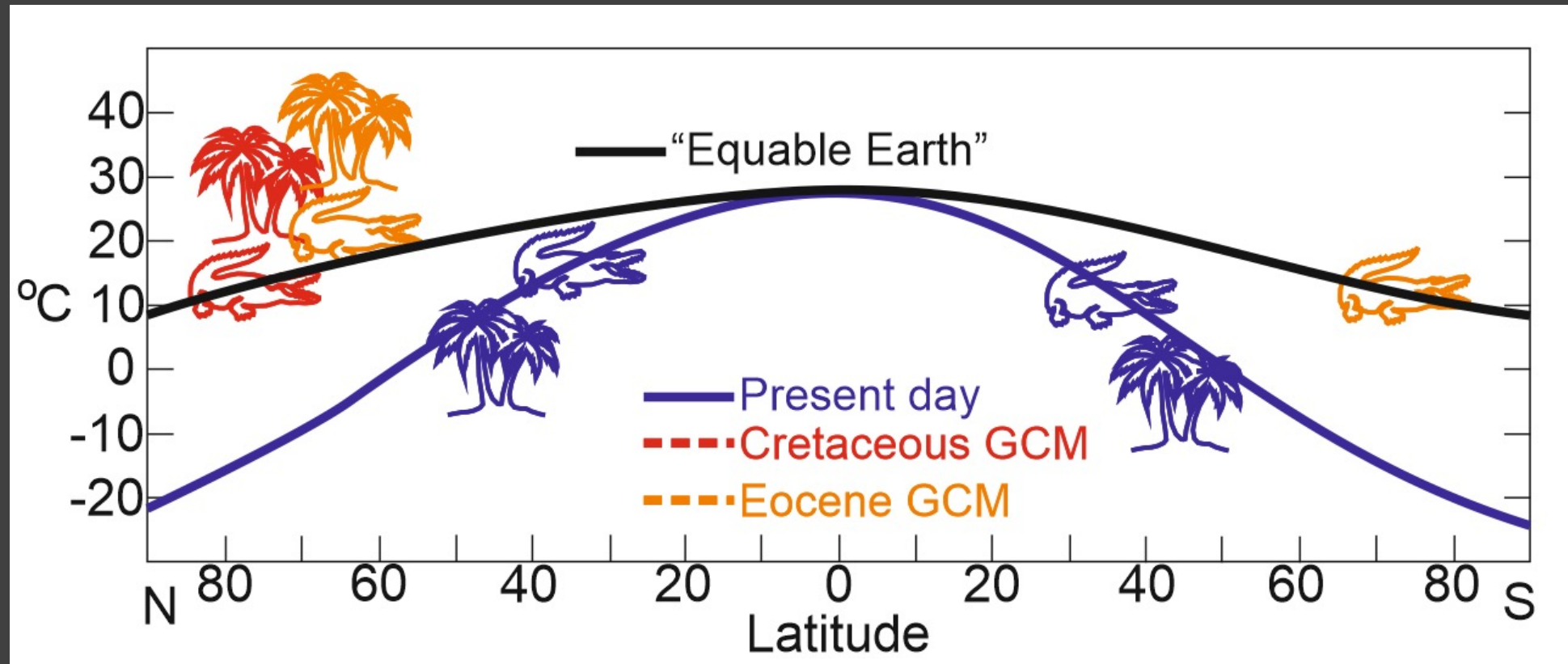
The notion that the equatorial-to-polar temperature gradient collapsed (or was greatly reduced) during greenhouse times.



NEED: multiple high-res temperature records from same interval and using same proxy from across latitudinal transect

Equable Earth?

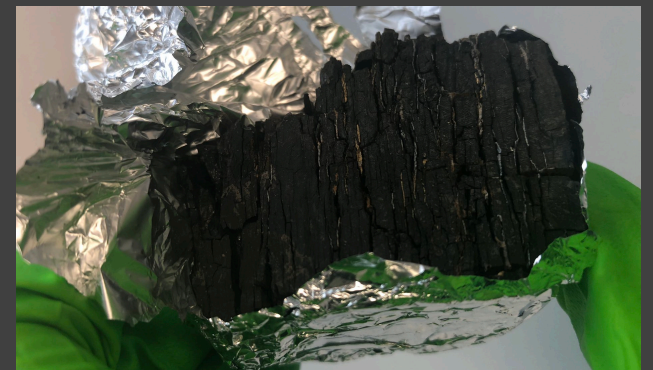
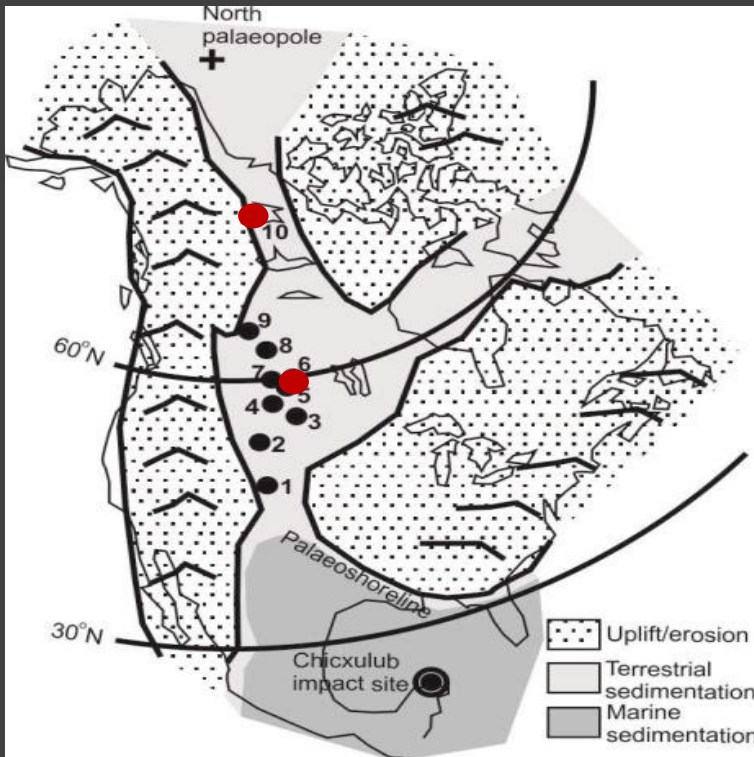
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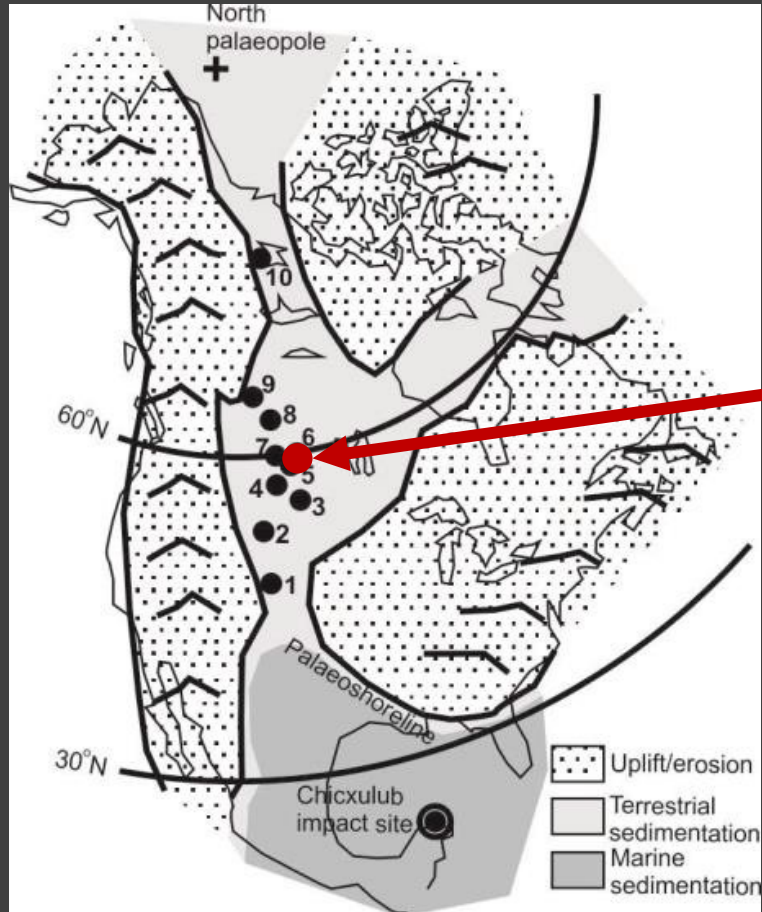
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Objectives

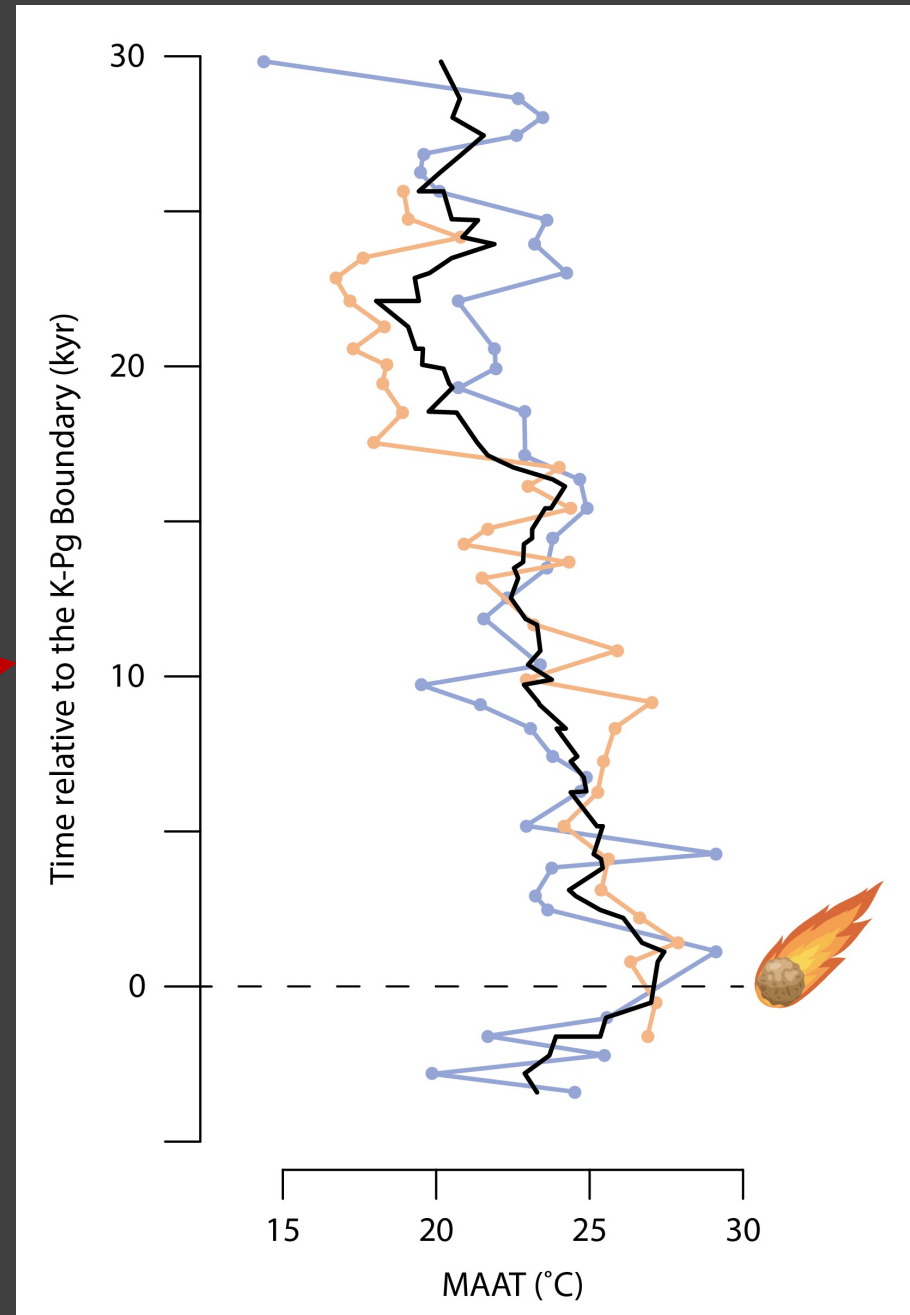
- Aim: systematic reconstruction of time-equivalent mean annual air temperatures (MAAT) from coals for a clear latitudinal transect
- Why coals? a) *in situ* organic matter deposition, b) steady(ish) sedimentation rate, c) presence of brGDGTs



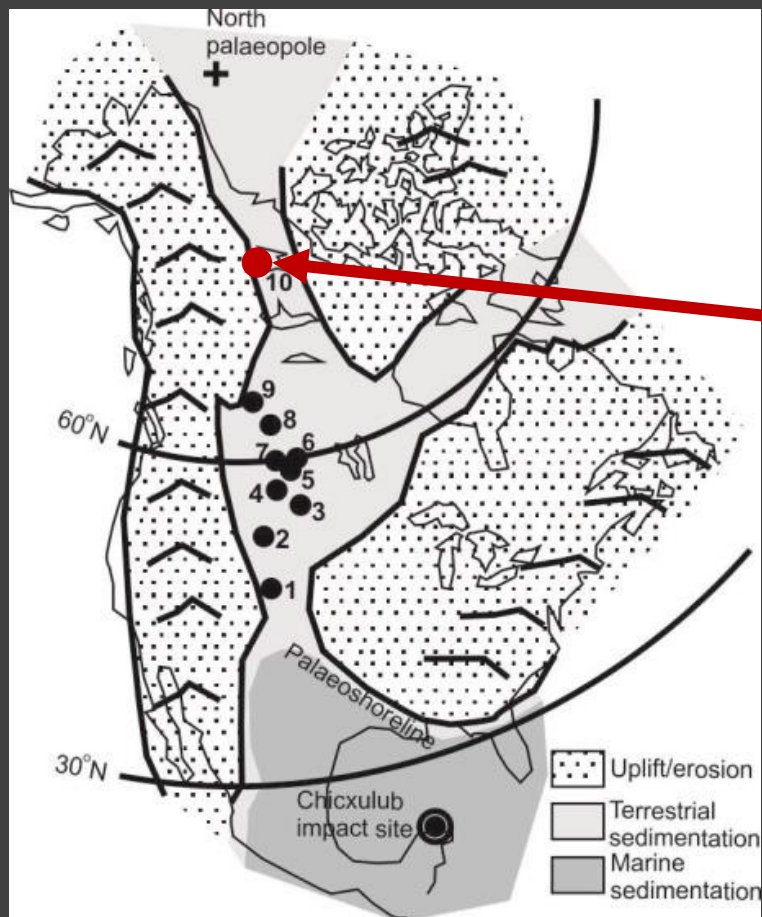
Saskatchewan (55°N)



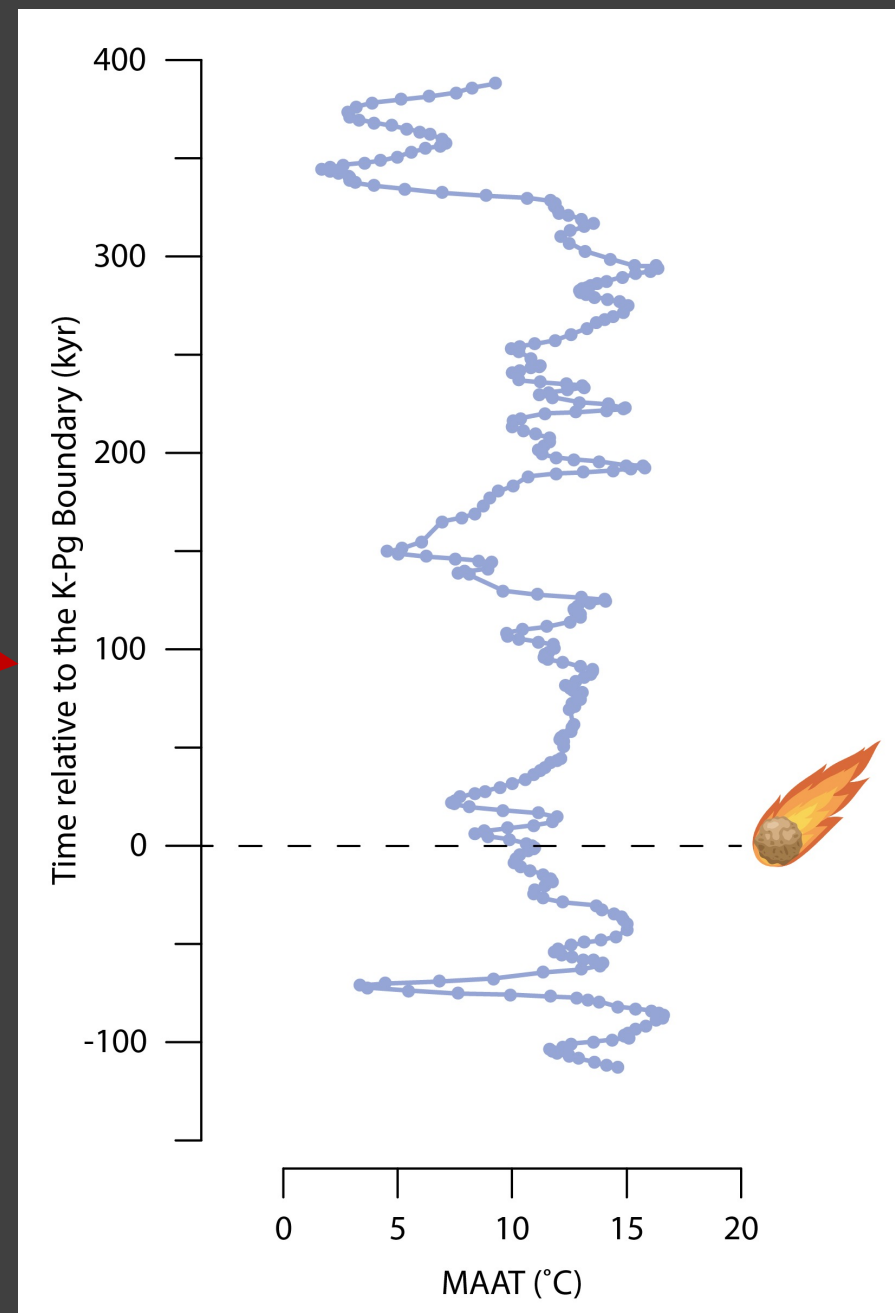
O'Connor & Crampton-Flood, et al., *under review*



Police Island (75°N)

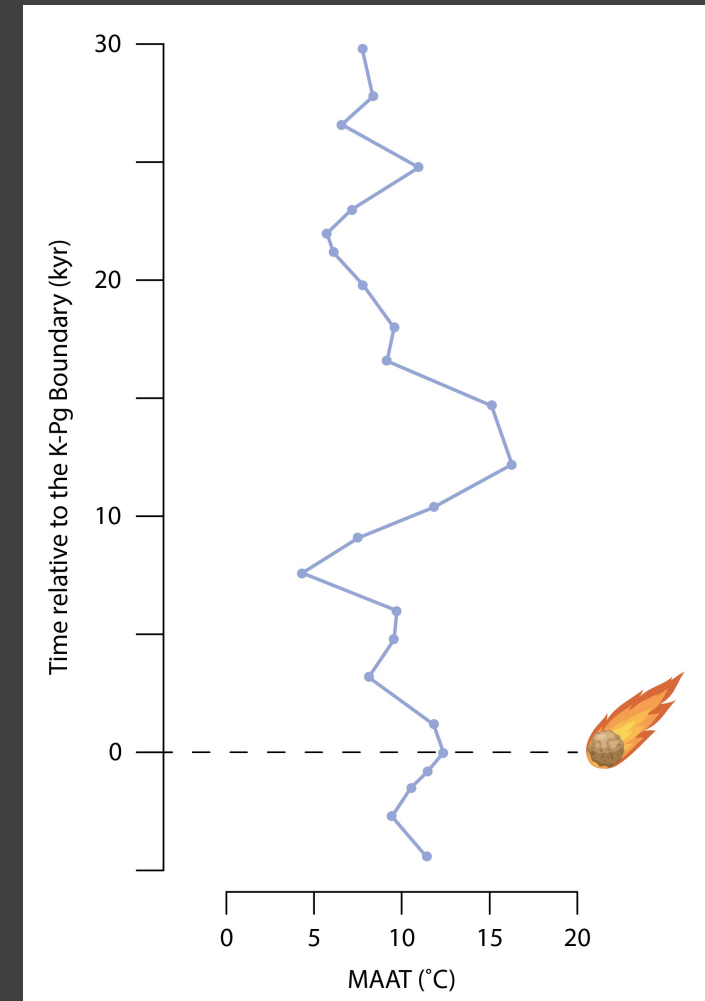
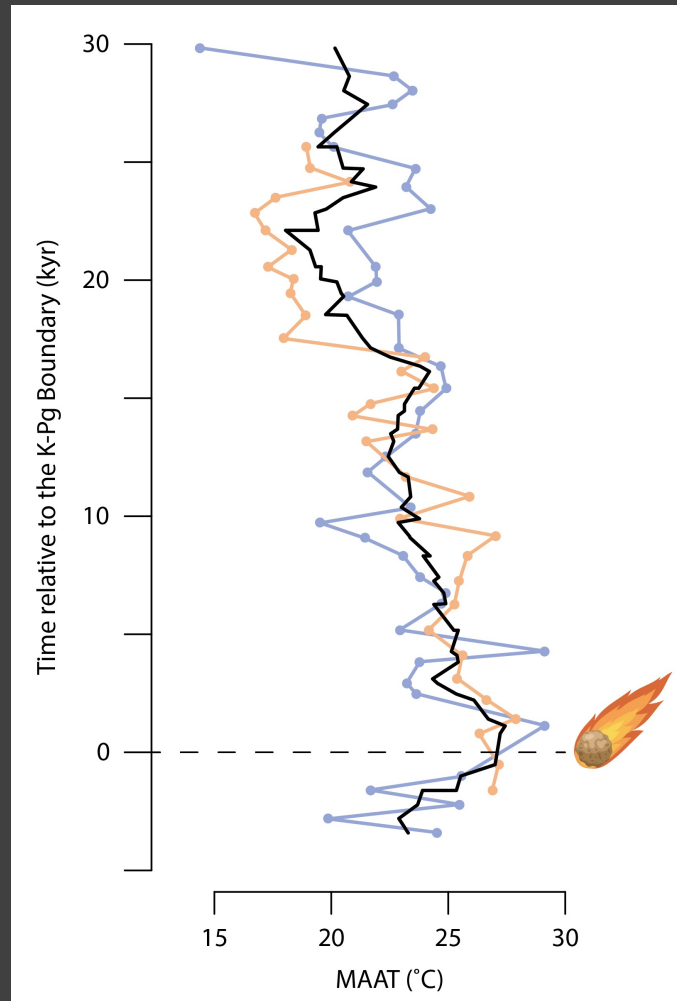


O'Connor, et al., *in prep*



Not-so-equable Earth?

- Assuming the same sedimentation rate at both sites...
- Saskatchewan: 15–29°C (av. 23 °C)
- Police Island: 4–16°C (av. 10 °C)
- Latitudinal gradient = 0.8°C per degree latitude



Conclusions & future work

