



Gradients in precipitation and seasonality between Central and Eastern Asia (Mongolia, Northern Vietnam) during the Oligocene with implication for earlier monsoonal circulation

Madeline Boehme (1), Michael Krings (2), Jérôme Prieto (3), and Simon Schneider (2)

(1) University Tuebingen, Institute for Geoscience, Tuebingen, Germany (m.boehme@ifg.uni-tuebingen.de), (2) Bavarian State Collection for Paleontology and Geology, Munich, Germany, (3) University Munich (LMU), Geo- and Environmental Science, Munich, Germany

Today Central and Eastern Asia are characterized by strong contrast in the amount and the annual distribution of rainfall as well as the seasonality in temperature, which is attributed to the uplifted Tibetan Plateau generating monsoonal circulation. Whereas Central Asia is characterized by strong continentality with cold winters and little rainfall concentrated in a short rainy season, the southern part of East Asia exhibit a paratropical climate with high amounts in precipitation distributed relatively even through the year.

Palaeontological data (vertebrates and plant remains) from the Eocene and Oligocene of Mongolia and Northern Vietnam indicate that a strong gradient in precipitation and seasonality between Central Asia and East Asia was already established during the Oligocene, which emphasise the establishment of substantial monsoonal circulation at that time.

Fossil amphibians and reptiles from Mongolia (45° N, 101° E; Böhme 2007) indicate a strong and abrupt drying and winter cooling at the Eocene-Oligocene boundary consistent with previous results (Dupont-Nivet et al. 2007). Late Eocene assemblages are characterized by crocodiles, salamanders and diverse aquatic turtles, whereas Early Oligocene faunas constitutes of pelobatid frogs, agamid and anguid squamates, diverse species of lizards, and an ercine boide snake. The environmental preferences of both contrasting assemblages point to a severe climate event around 34 myr ago, resulting in the lost of permanent freshwater bodies under humid and winter mild climate and the spread of open landscapes without permanent freshwater bodies under a dry arid to semi-arid climate with only a short rainy season.

Oligocene reptiles, macro- and micro-botanical remains, as well as palaeosols from Northern Vietnam (22° N, 107° E; Böhme et al. *subm.*) suggest warm-humid, (para-) tropical climates with low seasonality in temperature and precipitation. Besides a high diversity in semi-aquatic turtles and the presence of large-sized longirostrine crocodiles we found diverse ferns, including arborescent Osmundaceae and planosol paleosols similar to those which developed today in this region.

Böhme, M. 2007. Oligocene-Miocene Vertebrates from the Valley of Lakes (Central Mongolia): Morphology, phylogenetic and stratigraphic implications - 3. Herpetofauna (Anura, Squamata) and palaeoclimatic implications: preliminary results.- *Annalen des Naturhistorischen Museums Wien* 108A: 43-52.

Böhme, M., Prieto J., Schneider, S. (submitted): Cenozoic basins of Northern Vietnam: biostratigraphy, vertebrate and invertebrate fauna.- *Journal of Asian Earth Sciences*.

Dupont-Nivet, G., Krijgsman, W., Langereis, C.G., Abels, H. A., Dai, S. and Fang, X. 2007. Tibetan Plateau aridification linked to global cooling at the Eocene-Oligocene transition.- *Nature* 445, 635-638.