



## **New palynological evidence from the Eocene-Oligocene transition in the Xining Basin (Tibet, China): High altitude conifer taxa as possible indicators of early uplift and climatic cooling**

**C. Hoorn** (1), G. Dupont-Nivet (2), M. Konert (3), W. Krijgsman (2), C.G. Langereis (2), H.A. Abels (4), S. Dai (5), X. Fang (5,6)

(1) Institute for Biodiversity and Ecosystem Dynamics, University of Amsterdam, Kruislaan 318, 1098 SM Amsterdam, The Netherlands

(2) Paleomagnetic Laboratory "Fort Hoofddijk", Department of Earth Sciences, Utrecht University, Budapestlaan 17, 3584 CD Utrecht, The Netherlands

(3) Sediment analysis laboratory, Department of Earth and Life Sciences, Vrije Universiteit Amsterdam, De Boelelaan 1085, 1081 HV Amsterdam, The Netherlands

(4) Stratigraphy-Paleontology, Department of Earth Sciences, Utrecht University, Budapestlaan 4, 3584 CD Utrecht, The Netherlands

(5) Lanzhou University Key Laboratory of Western China's Environmental Systems, Gansu 730000, China

(6) Institute of Tibetan Plateau Research, Chinese Academy of Science, P.O. Box 2871, Beijing 100085, China

Continental aridification and the intensification of the monsoons in Asia are generally attributed to uplift of the Tibetan plateau and to the land–sea redistributions associated with the continental collision of India and Asia, whereas some studies suggest that past changes in Asian environments are mainly governed by global climate. The most dramatic climate event since the onset of the collision of India and Asia is the Eocene-Oligocene transition, an abrupt cooling step associated with the onset of glaciation in Antarctica 34 million years ago. However, the influence of this global event on Asian

environments is poorly understood.

Using magnetostratigraphy and cyclostratigraphy, we showed that aridification, which is indicated by the disappearance of playa lake deposits in the northeastern Tibetan Plateau, occurred precisely at the time of the Eocene–Oligocene transition (Dupont-Nivet et al., 2007, Nature vol. 445, p. 637-638). These results suggest that this global transition is linked to significant aridification and cooling in continental Asia as recorded by palaeontological and palaeoenvironmental changes, and thus support the idea that global cooling is associated with the Eocene–Oligocene transition.

However, new insights provided by pollen recovered from gypsiferous beds of the playa deposits further suggest that global cooling and plateau uplift actually might have coincided. The sudden and regional appearances of representatives of the Pinaceae family -and in particular that of *Picea*- which dominate the palynological record is interpreted to indicate a change to cooler and/or higher altitude conditions in the surrounding paleoenvironments. This change occurring at ca. 38 Ma, predates by 4 My the major Eocene-Oligocene aridification but is in close correspondence to increasing sediment accumulation rates and may thus be related to regional uplift of the Tibetan Plateau.