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Tibetan uplift prior to the Eocene-Oligocene transition, insight from chronostratigraphic and palynologic analyses

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To unravel the interplay between Tibetan uplift and global climate, proxy records of Asian paleoenvironments constrained by accurate age models are needed for the Paleogene period. Uplift of the Tibetan Plateau and the Himalayas since the onset of the Indo-Asia collision is held responsible for Asian aridification and monsoon intensification, but may also have gradually cooled global climate, leading to the 34 Ma Eocene-Oligocene transition, an abrupt cooling step associated with the onset of glaciation in Antarctica. New insight is provided by integrated chronostratigraphic and pollen analyses of an exceptional Paleogene record from playa lake deposits of the Northeastern Tibetan Plateau (Xining Basin) constituted of red bed / gypsum alternations. Aridification is indicated by the disappearance of gypsum deposits occurring precisely at the time of the Eocene–Oligocene transition (Dupont-Nivet et al., 2007, Nature vol. 445, p. 637-638). In addition, regional orographic uplift is indicated by the sudden appearance of representatives of the Pinaceae family - and in particular that of Picea (Dupont-Nivet et al., 2008, Geology, vol. 36, p. 987-990). Cyclostratigraphic analysis indicates that the conifer appearance coincides with a change in the dominant orbital cycle forcing the paleoenvironment (see Abels et al., this session). These results suggest that threshold conditions for the vegetation change were reached after the long-term combined effects of regional uplift and gradual global cooling. Regional uplift at least 4 m.y. before the Eocene-Oligocene transition is consistent with the idea that the associated increase in rock weathering and erosion contributed to the Eocene-Oligocene transition