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Editorial

# Introduction to the "Asian Climate and Tectonics" special issue

## 1. Context

This special issue was initiated following the 1st "Asian Climate and Tectonics" conference hosted in the Netherlands from April 26 to April 29 2010 as part of the Utrecht-Asia seminar series funded by Utrecht University. This seminar is presented on a short documentary:

www.youtube.com/watch?v=6jY-pS9l80E
Or
www.geo.uu.nl/~forth/people/Guillaume/AclitecWeb.htm.

The meeting gathered international scientists from transdisciplinary backgrounds including geodynamics, tectonics, climate modeling, thermochronology, stratigraphy, geochemistry, paleoclimatology, paleontology, and geophysics who are working towards understanding the interactions among climate, tectonics and surface processes in the ideal natural laboratory of Asia.

The interplay between climate and tectonics in the context of Eurasian geodynamics and associated orogens (e.g., Himalaya, Tibetan Plateau, Tian Shan, Gobi-Altai, and Pamir) belong to one of the most significant and fascinating issues within modern Earth sciences (van Hinsbergen et al., 2011; Yin, 2006, 2010). Major paleoenvironmental changes, such as continental aridification and monsoon intensification have often been attributed to surface uplift and/or to evolving land-sea distributions associated with Eurasian tectonic processes, not least the India-Eurasia collision (Bosboom et al., 2011; Ramstein et al., 1997; Zhang et al., 2007). Moreover, global Cenozoic cooling with decreasing atmospheric $CO_2$ levels has been attributed to erosion and weathering of the uplifting mountain ranges, following a period of subduction in the Tethys Ocean and the onset of a series of continental collisions (Ruddiman and Kutzbach, 1989). However, it is not only the solid Earth that affects the climate since recent findings suggest that monsoons and global climate have had a prevailing role in denudation rates shaping Eurasian orogens, in altering Asian environments and in triggering biotic events (Clift et al., 2008; Dupont-Nivet et al., 2007). This context challenges the geosciences community to establish unequivocal relationships between tectonism, global climate and major environmental changes in Asia.

## 2. Content

At the forefront of this special issue are three papers dealing with climate models and ideas. These papers set the context of the issues at stake and are naturally followed by reports presenting new results constraining tectonic and climate paleoenvironments from a variety of regions across the India-Eurasia collision zone: Southwest China (one paper), Central Himalaya (two papers), Himalayan foreland (three papers), Pamir (one paper), Tian Shan (one paper), Altyn Tagh (one paper) and northeastern Tibetan Plateau (two papers).

The issue starts with a review by *Matthew HUBER* of the history of the Indo-Asian monsoon within a global context. He presents results from fully coupled Eocene simulations in which Tibetan Plateau height is varied. This is nicely complemented by the study of *Zhongshi ZHANG* et al. employing a different global climate model to simulate the Early Eocene climate in China. In light of these modeling results, it is interesting to follow the proposition of *Mark ALLEN and Howard A. ARMSTRONG* that Himalayan tectonic changes were at least in part a response to monsoonal intensity variations due to shifts in the location of the Intertropical Convergence Zone (ITCZ) and the northward drift of continental India.

The bulk of the issue is constituted by the following studies providing paleoenvironmental constraints that allow us to test models proposing links between climate and tectonic processes.

Neogene climate proxies from Southwest China using stable isotopes by *Dana BIASATTI* et al. provide interesting constraints on monsoon evolution. The Neogene Gyryong Basin, located within the Central Himalayan range, is investigated by two complementary studies by *Yang WANG* et al. and *Yadong XU* et al. reporting stable isotopes, cyclostratigraphy, palynology and sedimentologic results with surprisingly low paleoelevations implications. These results are interesting to compare to the Neogene Himalayan foreland basin deposits of the Siwaliks that have been investigated in terms of their thermochronology, petrography and magnetostratigraphy by *Matthias BERNET* et al. (Nepal), *Romain GUILBAUD* et al. (Nepal) and *François CHIROUZE* et al. (Arunashal Pradesh). Moving to the north of the India-Eurasia collision zone, the Cenozoic development of the Pamir is nicely documented by a multidisciplinary approach involving stratigraphy, zircon-based provenance, and stable isotopes by *John BERSHAW* et al. indicating an Eocene–Oligocene isotope shift and mid-Miocene deformation. From further west between the Pamir and Kyrghiz Tian Shan, *Johan DE GRAVE* et al., report a comprehensive thermochronological investigation enlightening the protracted Paleozoic to Cenozoic history of the poorly studied regions of the Trans-Alai, Turkestan-Alai and southeastern Ferghana Basin. Moving to the left lateral Altyn Tagh Fault, which forms the northern edge of the Tibetan plateau, *Hong CHANG* et al., report successful magnetostratigraphic dating of a section straddling a marked depositional change attributed to the tectonic activity of the Altyn Tagh Fault, although the

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contribution of Pliocene global climate deterioration cannot be excluded. From lake Quaternary catchments further east on the northeastern Tibetan Plateau, *Janneke IJMKER* et al. report a thorough methodological provenance study based on factor analysis of major element geochemical data paving the way to a rigorous environmental interpretation of terrestrial sediments. Finally, *Zhicai WANG* et al., report magnetostratigraphic analysis of strata recording Middle Miocene activity of the western Qinling fault where it links into the far Eastern corner of the Tibetan Plateau.

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