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Palaeoenvironmental and palaeoclimatic reconstructions of the Northern Tianshan piedmont during the Neogene : a sedimentological study of Junggar basin series (Northwestern China).

A. Gallaud (1), E. Lallier-Vergès (1), L. Barrier (2), R. Augier (1), C. Di-Giovanni (1), J. Charreau (3) and Y. Chen(1)

(1) ISTO, University of Orleans, Orleans, France, (2) IPGP, Paris, France, (3) Department of Geological Sciences, University of Indiana, Bloomington, USA
(Audrey.Gallaud@univ-orleans.fr / Fax: (33) 02 38 63 64 88 / Phone: (33) 02 38 49 43 20)

As far as orogeny appears to influence the continental climate evolution, which controls the weathering of continent, in return, the continental weathering directly acts on the relief through erosion and spreading of the sedimentary masses into the adjacent basins.

The present study aims to reconstruct the past evolution of environments and erosions under both geodynamic and climatic forcing, in a well time-constrained framework, to attempt a better understanding of the mechanisms interacting between orogeny, erosion and climate. It focuses on the Tianshan Range located in the Xinjiang (Northwest of China). That range spreads over an E-W distance of 2500km, between Mongolia and Kazakhstan, with summits over 7000m and intracontinental basins at $\sim$1000m, separating the Junggar basin on the North side and the Tarim one on the South side. Its geological history revealed a Paleozoic subduction whereas its recent topography appeared to be mainly due to a Cenozoic reactivation phase induced by the India-Asia collision. The consecutive Cenozoic uplift of the range has widely affected the Central Asia climate and environment.

Different types of Neogene fluviatile sandstones, conglomerates and lacustrine sed-

iments from the northern piedmont of the Tianshan range were studied. 500 meters of sediments cored in Ebi Nor Lake (southwest Junggar basin) were dated from ∼5Myr to Present day. The Kuitun He and Jingou He rivers incise respectively the Huo'erguosi and Dushanzi fault bend-fold anticlines and expose continuous outcrop south-dipping series. These series were previously dated using magnetostratigraphy, given an age span from ∼10.5 to ∼3.1Myr and ∼23 to ∼8.1Myr respectively. The three study sites provide a continuous sedimentological record from ∼23Myr to Present day.

2 main types of investigations were conducted : a) a sedimentological study, with rock-facies analysis and environmental deposition reconstitution, b) a sedimentary organic matter study by the means of a bulk geochemical analysis (Rock-Eval pyrolysis) and an optical analysis of resistant particles (palynofacies) delivering information on the amount, composition and maturity of organic components, witnesses of the past biomasses.

The confrontation of these different markers brought a new insight on sedimentary systems, hydrological regimes, landscapes, soils and vegetal covers, which permitted to propose the following environmental and climatic evolution. From ∼23 to ∼17Myr, the climate was generally arid although associated with a fluvial system and flood plain. At ∼17Myr a lake developed in relation with the setting of vegetation and soils on the watershed, indicating true humid conditions. At 15Myr, attested by both the sedimentation rates and the organic composition, a strong increase of the erosion linked to an uplift phase of the Tianshan, occurs. From ∼15Myr to ∼10Myr, the vegetation cover expanded, linked to humid climate conditions associated with a complete fluvial system including flood plain. Then arid conditions prevailed according to braided alluvial fan system, with an intensification at ∼7Myr. The last 7Myr were globally dry excepted two 500 kyr–long humid periods recorded in Ebi Nor lake sediments. One period at ∼5Myr is attested by the occurrence of algal OM and another period at ∼1Myr, by the presence of well preserved vegetal debris derived from the watershed.