Unraveling Central Tibet's Sedimentary History: New Insights from the TIBETOP Project

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Résumé

Reconstructing the formation and evolution of the Himalaya and the Tibetan Plateau, the world's highest mountain range and plateau, is essential for understanding the interplay between geodynamic and surface processes during orogeny, refining Cenozoic paleogeographic and paleoclimatic reconstructions, and investigating biodiversity evolution. In the Tibetan syn-collisional sedimentary basins, fossil records and isotope composition from ancient meteoric water have been widely used to estimate past elevations. However, interpreting these paleoaltimetric data remains contentious, mainly due to poorly constrained chronostratigraphic framework. This results in contrasting topographic growth scenarios, such as in central Tibet, where some authors defend the existence of a high Proto-Tibetan Plateau prior to the India-Asia collision, while others argue for low-elevation valleys persisting into the Neogene, and undergoing major uplift during the Miocene. The Lunpola Basin, located along the Bangong–Nujiang Suture, offers a key setting to resolve this debate. While recent

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data suggest Middle to Late Eocene elevations of 1000–2000 m, increasing to 3000–4000 m in the Early Miocene, the mechanisms driving basin formation and uplift remain unclear. Because the mechanisms of subsidence that have governed their development are unknown, proposed models in the literature range from rift-related origins to flexural or sag basins. The timing of sedimentation and associated deformation is also poorly constrained, complicating efforts to determine whether uplift of the Tibetan plateau occurred gradually or episodically, and through which geodynamic processes. The ANR-funded TIBETOP project (WP1) addresses these questions by focusing on the Lunpola Basin. A one-month field campaign is scheduled for summer 2025 with three main objectives: (1) refine the chronological framework through magneto-cyclostratigraphy and radiochronology of tuffites and carbonates, (2) reconstruct basins evolution through sedimentological and structural analyses, and (3) expand existing paleoelevations database with new approaches (volcanic glass, triple oxygen analyses). This will provide crucial insights for elucidating the interaction mechanisms between lithospheric dynamics, tectonic uplift, climate change, and biotic evolution in the orogenic plateau. This poster presents the project's initial phase, outlining key observations and working hypotheses.

Mots-Clés: Tibet, sedimentary basin, stratigraphy, paleoelevation