



Pleistocene drainage reorganization driven by the isostatic response to deep incision into the northeastern Tibetan Plateau

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Pleistocene drainage basin integration led to progressive excavation of Tertiary-Quaternary sedimentary basins along the Yellow River in the northeastern Tibetan Plateau. Cosmogenic burial dating of ancestral river deposits and basin fill from two key watershed divides confirms a fluvial connection between basins at 0.5–1.2 Ma, prior to excavation by the Yellow River. Preservation of the relict depositional surface that represents the maximum height of basin fill allows reconstruction of the volume of eroded material across a broad region. We quantify the isostatic response to this erosional unloading using a two-dimensional (not one-dimensional) flexural model. Calculated maximum vertical displacements for different effective elastic thicknesses vary from ~160 m to ~260 m near the Pleistocene spillway from the Qinghai paleo-lake. We suggest that the isostatic response to fluvial excavation along the Yellow River defeated local tributaries, isolated Lake Qinghai, and led to the development of an internally drained basin in the past 0.5–1.2 Ma.