Cenozoic growth of West Kunlun Mountains and tectono-sedimentary evolution of adjacent SW Tarim Basin-New spatial model based on seismic data

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Kunlun Mountains, SW part of the Tarim Basin and S edge of the Bachu Uplift in central Asia collectively form the northernmost segment of the vast Cenozoic deformation zone and associated depositional areas formed in course of the India – Euroasia collision. Five seismic transects from the SW Tarim Basin (Yechang - Hotan area) calibrated by deep wells were used in order to assess lateral variations of a structural style and syn-tectonic sedimentation in this part of the basin. Pre-Cenozoic substratum of SW Tarim Basin is formed by crystalline basement covered by Paleozoic strata, with important mid-Cambrian evaporites (Awatage Formation) that served as first, deep detachment level. Cenozoic sedimentary infill consists of several kilometers of shallow water to terrestrial clastics with Paleogene evaporites of the Bashiblake Formation at their base. Paleogene evaporites acted as a second, shallow detachment. Mid – late Miocene to Quaternary wedging along the front of the Kunlun Mts., associated with formation of a large-scale duplex consisting of slivers built of Precambrian to Permian rocks, resulted in progressive, laterally variable uplift of the S margin of the Tarim Basin documented by well-preserved growth strata that have been also described in the field. Jade Anticline, large intra-basinal structure that is located in the central part of the Tarim Basin, previously interpreted as a regional wrenching zone, was reinterpreted as a thin-skinned syn-depositional “fish tail” structure, detached in the Paleogene evaporites and formed in Quaternary above local basement elevation. Northernmost late Miocene compressional deformations have been recognized along the S edge of the Bachu Uplift in its Western and central segment. They formed due to complex interplay of thick-skinned basement reverse faulting responsible for regional elevation of basement blocks, and two types of thin-skinned thrusting: southward directed thrusting detached within the mid-Cambrian evaporites and northward directed thrusting detached within the Paleogene evaporites. Compressional deformations along the S edge of the Bachu Uplift are diminishing and eventually disappearing towards the East. All these findings point to significant transfer of compressional stresses into the far foreland of the W Kunlun Mountains and laterally variable tectonic coupling between the Tibet Plateau and central part of the Tarim Basin.
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