



Basin evolution in a folding lithosphere. Examples from the Altay-Sayan and northern Tien Shan

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Central Asia is a classical example for intracontinental lithospheric folding. In particular, the Altay-Sayan belt in South-Siberia and the Kyrgyz Tien Shan display a special mode of lithospheric deformation, involving both lithospheric folding and crustal faulting. This area has a contrasting crust with a long history of accretion and collision and has been reactivated during the Indian-Eurasian collision. Thanks to the youthfulness of the tectonic deformation in this region (peak deformation in late Pliocene – early Pleistocene), the surface expression of lithospheric deformation is well documented by the surface topography and superficial structures. The first-order topographic wavelengths (from 150-175 km, up to 400 km) likely reflect first-order lithospheric deformation. Secondary wavelengths ranging between 35 and 70 km is evidenced for the Altai range by regularly spaced E-W trending mountain ranges, alternating with tectonic depressions containing Cenozoic sediments. The folding wavelengths and location appear strongly influenced by the crustal structure and in particular by the juxtaposition of terranes of markedly different thermotectonic age. A review of the tectono-stratigraphic evolution of the Kurai - Chuya basin in the Siberian Altai and the Issyk-Kul basin in the Kyrgyz Tien Shan suggests that they were initiated in an extensional context and inverted by a combination of fault-controlled deformation and flexural folding. In both basin systems, fault-controlled deformation alone appears largely insufficient to explain their architecture and lithospheric buckling inducing surface tilting, uplift and subsidence also played an important role. In the southern margin of these two basins, recent deformation occurs by reverse or transpressional faulting along basinward dipping faults, raising the basin sediments relative to the basement rocks of the adjacent mountain ranges. The characteristics of these basins are examined in reference to other basins in similar context.