Geophysical Research Abstracts
Vol. 16, EGU2014-9203, 2014
EGU General Assembly 2014

Folded Lithospheric Basins in Central Asia: Altai-Sayan and Tien Shan basins in a folding lithosphere

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Central Asia is a classic example for continental lithospheric folding. In particular, the Altay-Sayan belt in South-Siberia and the Kyrgyz Tien Shan display a special mode of lithospheric deformation, involving decoupled lithospheric mantle folding and upper crustal folding and faulting. A review of the paleostress data and tectono-stratigraphic evolution of the Kurai-Chuya basin in Siberian Altai, Zaisan basin in Kazakh South Altai and Issyk-Kul basin in Kyrgyz Tien Shan suggests that these basins were initiated in an extensional context and later inverted by a combination of fault-controlled deformation and flexural folding. They deformed by a combination of lithospheric buckling inducing surface tilting, uplift and subsidence, together with upper crustal fault-controlled deformation. They are good examples of Folded Lithospheric Basins (FLB) which typically form in a buckling lithosphere. Their characteristic basin fill and symmetry, inner structure, folding wavelength and amplitude, thermal regime and time frame are examined in relation to basement structure, stress field, strain rate, timing of deformation, and compared to existing modelling results.

Both regions of active lithospheric folding have a heterogeneous crust with a long history of accretion-collision, subsequently reactivated as a far-field effect of 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 tectonic structures.