



The immature thrust belt of the northern front of the Tianshan

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The modern Tianshan (central Asia), which extends east-west on about 2500 km long with an average of more than 2000 m in altitude, is considered as a direct consequence of the reactivation of a Paleozoic belt due to the India – Asia collision. At first order, the finite structure of this range obviously displays a significant uprising of Paleozoic “basement” rocks – as a crustal-scale ‘pop-up’ – surrounded by two Cenozoic foreland basins. In order to characterize the coupling history of this Cenozoic orogeny with its northern foreland basin (Junggar basin), a detailed structural field work has been carried out on the northern piedmont of Tianshan. From Wusu to Urumqi, on about 250 km long, the thrusting of the Paleozoic basement on the Mesozoic or Cenozoic sedimentary series of the basin is remarkably exposed along several river valleys. In contrast, in other sections, the Triassic to Jurassic sedimentary series can be followed from the basin to the range where they unconformably overlie on the Carboniferous basement. These series are only gently folded along the “range front”. These features imply that, at regional-scale, the Cenozoic reactivation of the Tianshan has not produced important deformation along its contact with the juxtaposed Junggar basin. The shortening ascribed to the Cenozoic intra-continental collision would either be localized in the range, mostly accommodated by reactivated Paleozoic structures or faults in the basement units, or in the distal parts of the Junggar basin, by folds and faults within the Cenozoic sedimentary series. Alternative hypothesis would be that the Tianshan uplift and the movements associated with along its northern front structures, which are traditionally assigned to its Cenozoic reactivation, might be reduced. Such characteristic significantly differs from other well-known orogenic ranges, such as the Canadian Rocky Mountains, the Appalachians, the Pyrenees which display highly folded foreland basins and thrust belts with rather well developed range front structures. This suggests that the Tianshan intra-continental range is rather “young” and still at a primary stage of its orogenic evolution. In other words, its front may be considered as an immature thrust belt. If considering the available tomographic data across the Tianshan, its actual uplift may probably be produced by an asymmetric intracontinental deformation mechanism, i.e. a deeper subduction of the Tarim plate below the Tianshan (to the south), with respect to the one of Junggar plate to the north of the range. Consequently, the Tianshan range offers an excellent natural laboratory to study the processes of the on-going orogeny-foreland basin coupling, ancient structures reactivation as well as initiation and development of range front structures.