

The long active southern Tianshan thrust belt, Kuche, Xinjiang China

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The presently active 70 km wide southern Tianshan thrust belt near Kuche on the northern edge of the Tarim basin is seismically well imaged and exquisitely exposed at the surface. There are many exposures of actively folding erosional and depositional geomorphic surfaces, especially in the frontal anticlines, which show growth by both kink-band migration and limb rotation. There are numerous examples of young fold scarps recording motion on active axial surfaces, but no fault scarps are presently known on these largely blind-thrust structures. This thrust belt has been active since about 30 m.y., but not necessarily continuously, as shown by seismic imaging of progressively deformed older growth strata and surface exposures of older growth unconformities. The thrust belt deforms the entirely non-marine 8 km thick Triassic to Quaternary sequence which contains two main levels of detachment, the Jurassic coals and the mid-Tertiary evaporates of the Jidike Formation, but elsewhere other detachments are important, especially the basal Tertiary evaporites. Slip is fed into this cover sequence largely by a stack of major deep basement thrust ramps, stepping up to the Jurassic coal detachment. Much of the slip is fed into a complex set of imbricate wedges in the immediately overlying cover in a 10 km wide zone of steep to overturned dips, whereas to the north of these ramps the cover is simply uplifted as the hanging wall of the basement ramp, bringing only gently folded Triassic and Jurassic strata to the surface. To the south of the basement ramps only mid-late Tertiary and Quaternary strata are exposed. Since about 5.3 m.y. ago slip has been fed south from the basement ramps along the Jurassic coal detachment and then up a ramp to the mid-Tertiary evaporite detachment. The 225 km long active Qilitak anticline lies above this ramp and is a complex stack of imbricate wedges. Slip is also fed south along the mid-Tertiary evaporitic detachment into the frontal surface anticline, the 100 km long Yakeng detachment fold which consumes about 1200 m of slip and is deforming surface gravels and preexisting drainage networks, creating numerous wind gaps. The southernmost structure is the low-amplitude Yanan anticline, south of Yakeng, which is a deep basement-involved inversion structure with late Cenozoic activity, but no surface expression.