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The role of continental-sized strike-slip faults in the orogenic processes of Central Asia.

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Central Asia results of a giant orogenic collage that welded Baltica, Siberia, Tarim and North China cratons. Although continental crust growth of Eurasia was intimately related to the Paleozoic accretion processes, late orogenic transcurrent motions controlled the present geometry of the collage. Evidences for this tectonic style can be observed at various scales. At large scale, linear strike-slip faults of several hundreds to thousands kilometers crop out of in Altai, Tian Shan and Kazakhstan. They are often associated with magmatism and subsequent fluid-related mineralization. Radiometric dating of synkinematic plutons or metamorphic mineral coeval with the ductile shearing reveals that transcurrent faulting lasted from Late Carboniferous to Early Triassic. Paleomagnetic data document large displacements from several hundreds to more than one thousand kilometers along these faults. At a smaller scale, in western Junggar, widespread folds with vertical or steeply plunging axes attest for a transpressive episode that affected the Carboniferous accretionary complex, before the end of the Carboniferous. The Permian Dalabute sinistral strike-slip fault superimposes on the previous tectonic features and, displacements along this fault are evaluated to ca. 100 km. In Central Asia, strike-slip faults played a significant role in the reorganization pattern, at two orders (which are closely interlinked).
At the first order, continental-sized strike-slip faults accommodated the development of large-scale structures. The Kazakh orocline developed since Early Devonian, in response to opposite motions of Tarim and Siberia. Oroclinal bending affected an active margin ribbon, which progressively grew and buckled as the inner oceanic domain was reduced by subduction. Half of the current curvature of the orocline was acquired in the Late Carboniferous. At this time, a critical threshold might have been reached for the curvature, and the arcuate structure was dismembered. This led to relative rotations between the linear fragments of the former orocline and, displacements were accommodated by the large-scale strike-slip faults observed in Altai, Tian Shan or Kazakhstan. The transcurrent event pervaded in Permian and enhanced the horseshoe shape of the Kazakh orocline.
At the second order, the relative rotations of the parts of the orocline induced variations in the general geometry of the subduction zone. Therefore, oblique convergence developed. Such a feature is suggested by our observations in West Junggar. Until Late Carboniferous, the buckling of the orocline can be compared to the closure of a jaw accommodated by oceanic subduction in the concave side of the orocline. Such a pattern might have impeded strike-slip faults initiation, and continuous transpression represent the tectonic response of the upper plate to oblique convergence. In the Late Carboniferous, the dismembering of the margin is accommodated by opposite block rotations along large strike-slip faults. This deformation modified the convergence zone into a convex shape. Such an arrangement, as well as the rheological softening induced by previous deformations, might favor the decoupling of the oblique convergence into a transcurrent component.