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Structural evolution of the Ural–Tian Shan junction: Paleozoics of the Southern Ural, Tien Shan and the margins of Central Kazakhstan

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Present-day Central Asia is perhaps the best location to investigate compression tectonics resulting from multiphase continental collision. This zone is geologically complex, and is also the location of important mineral deposits. Subduction-related accretion in the Paleo–Asian Ocean in the late Paleozoic to Mesozoic, gave rise to the present 2400 km-long Tien Shan orogenic collage that extends from the Urals eastwards through Uzbekistan, Tajikistan, Kyrgyzstan to Xinjiang in China. Significant metallogenic potential of the Tien Shan made this region a focus of intensive exploration in the 20th century. Here, we provide re-evaluation of the tectonic setting of the junction zone of the Paleozoic of the Southern Ural, Tien Shan and the margins of Central Kazakhstan. Correlation of geological and geophysical data based on deep seismic sounding, gravity and magnetic data shows that they are fragments of a single Paleozoic accretion-collisional complex, greatly complicated by the Late Carboniferous-Early Permian subduction-collision and later processes. This is evidenced also by the close age and composition of occurrences of ophiolitic melanges, the main ore deposits and periods of these deposits formations. According to geological data, the beginning of collision was in the age interval of 310 – 300 Ma. Strike-slip tectonics, related to oblique plate interactions is considered to play an important role in the palaeotectonic history of the Central Asian Orogenic Belt.

Mantle-rooted structures represent pathways favorable for the transfer of heat, magma and ore-forming fluids towards the Earth's surface. Such mantle-rooted structures usually observed in intersections of subduction zones with transverse faults where there are formed zones of increased permeability, serving as channels for mantle degassing and fluids relieve. Suture of Turkestan ocean is the boundary structure of the Southern Tien Shan with Kazakh microcontinent and suture of Gissar oceanic basin is the boundary structure of the Southern Tien Shan with Karakum - Tajik unit. Suture zone of Turkestan ocean is a zone of significant mineralisation, and is well known for its worldclass ore deposits including giant porphyry copper and orogenic gold deposits, such as Kalmakyr and Muruntau. Suture zone of Gissar oceanic basin covered by Mesozoic rocks is associated with location of large deposits of hydrocarbons in Bukhara - Khiva - South-Western Gissar area.