



Oblique wedge extrusion of UHP/HP complexes in the Late Triassic: structural analysis and zircon ages of the Atbashi Complex, South Tianshan, Kyrgyzstan

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The exhumation and tectonic emplacement of eclogites and blueschists takes place in forearc accretionary complexes by either forearc- or backarc-directed extrusion, but few examples have been well analysed in detail. Here we present an example of oblique wedge extrusion of UHP/HP rocks in the Atbashi accretionary complex of the Kyrgyz South Tianshan. The Atbashi Eclogite–Blueschist Complex (AEBC) is a conventional, formal name for the Atbashi Formation that contains pelitic to siliceous schists alternating with HP/UHP eclogites and blueschists. The main belt of the AEBC strikes SW–NE mostly parallel to the Atbashi–Inylchek Fault. Our field mapping and structural analysis demonstrate that the Atbashi Eclogite–Blueschist Complex is situated in a complicated duplex formed by a northerly dextral transpression system and a southerly sinistral transtension system, both of which contain a series of strike-slip duplexes at several scales. The two shear systems suggest that the Atbashi Complex underwent a unique oblique south- westward extrusion with a general plunge to the NE, the horizontal projection of which is sub-parallel to the strike of the major structures. This indicates that the Atbashi Complex was extruded obliquely southwestwards during eastward penetration of the southern tip of the Yili– Central Tianshan Arc of the Kazakhstan Orocline during the Late Triassic. Also, to constrain the extrusion of the AEBC and to place it in its temporal framework during docking of the Tarim Craton to the southern margin of the Ili–Tianshan Arc, we report new zircon U-Pb isotopic data for four eclogites and one garnet-bearing quartz-schist, in order to document the timing event during extrusion. The youngest ages of the eclogites and the garnet-bearing quartz-schist may be Late Triassic of 217–221 Ma and 223.9 Ma, respectively, suggesting that the main extrusion was later than previously proposed and that the final orogenesis was not completed until the Late Triassic. The HP/UHP rocks have an oblique plunge to the NE and extrusion took place south-westwards during escape tectonics along the South Tianshan accretionary wedge in the Late Triassic. Our work shows that the movement of HP/UHP rocks had a 3D style with an arc-parallel structure, and sheds light on earlier 2D models with either forearc- or backarc-directed extrusions, which indicates that more systematic structural and geochronological work is needed to characterize the accretionary tectonics of many orogens around the world. Our data on the timing of extrusion and emplacement of the Atbashi Eclogite–Blueschist Complex also help to resolve the long-standing controversy about the time of terminal orogeny of the Central Asian Orogenic Belt.