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Oblique convergence along plate boundaries led to formation of a paired metamorphic belt in the Chinese SW Tianshan

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A paired metamorphic belt, which records Paleozoic oceanic subduction, occurs in the Chinese southwestern (SW) Tianshan orogen in the southern Central Asian Orogenic Belt (CAOB). The paired metamorphic belt comprises two juxtaposed metamorphic belts, a HP/UHP–LT belt to the south and a LP–HT belt to the north, between the Tarim craton in the south and the Yili block in the north. Lithologies in the HP belt consist of predominantly metafelsic–metapelitic rocks mixed with eclogite, blueschist, serpentinite and marble occurring as blocks, lenses and/or interlayers and forming a *mélange*. This is interpreted to represent an accretionary *mélange* formed near the trench during subduction. The typical mineral assemblage of eclogite is Grt+Omp+Gln+Ph/Pg+Qz±Law±Cld. Rocks in the *mélange* record peak P–T conditions of about 430–610 °C, 28–33 kbar (UHP) or 450–550 °C, 18–25 kbar (HP) within different terranes, corresponding to an apparent thermal gradient of 160–250 °C/GPa. By contrast, the LP belt comprises mainly granite gneiss that has undergone partial melting with subordinate metapelites. The metapelites have a mineral assemblage of Grt+Sil+Bt+Qz+Pl±Crd±Kfs, indicating a low-pressure metamorphic facies series with peak PT conditions of 645–763 °C, 4.7–8.0 kbar, corresponding to an apparent thermal gradient >900 °C/GPa. Voluminous granitoids and volcanic rocks with continental arc chemical signatures have been developed throughout this belt.

Although these two metamorphic belts are adjacent to each other, there is a discrepancy between the ages of the (U)HP metamorphism (ca. 321–315 Ma) and the LP metamorphism (ca. 410–400 Ma). The age discrepancy reflects a later allochthonous (U)HP terrane sutured with an ancient LP arc terrane in southern Yili block. The paired metamorphic belt in SW Tianshan could be unrelated penecontemporaneous terranes juxtaposed by oblique convergence and lateral translation along the plate margin of the paleo–Kazakhstan continent.

In addition, we present new data to understand the tectonic regimes related to the formation of the Chinese SW Tianshan orogen.

