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RIDGE SUBDUCTION IN THE HISTORY OF THE CENTRAL ASIAN OROGENIC BELT: EVIDENCE AND TECTONIC IMPLICATIONS FOR THE EVOLUTION OF AN ACCRETIONARY OROGEN

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Cenozoic ridge subduction and the resultant slab windows have been well documented worldwide [*Sisson et al., 2003*], especially along the western margins of North and South America [*Thorkelson, Taylor, 1989*]. The principal characteristics of ridge subduction, which can be used to recognise the process in ancient orogens, include: intrusion of ridge-generated magmas into a forearc in a near-trench position [*Marshak, Karig, 1977*]; this can be regarded as the hallmark of ridge subduction. The key magmatic products are: adakites that include plutonic and volcanic rocks, have intermediate- to high-SiO_2, high Sr/Y and La/Yb ratios, elevated MgO, Na_2O, K_2O, Ni and Cr contents, and high LILE and LREE elements. They range from hornblende/biotite-bearing high-Mg diorites (often as dykes), Nb-enriched basalts, gabbros and granodiorites to hornblende/pyroxene andesites; they are often described as sanukitoids. They are typically associated with a wide variety of coeval and compositionally diverse volcanic and plutonic rocks such as high-Ca boninites, tholeiitic, high-T basalts, alkaline basalts, charnockites, peraluminous TTGs, I-type granites, and certain types of ophiolites. The trace element chemistry of these rocks demonstrates that they were generated by partial melting of dehydrated subducted oceanic crust and of lower continental crust, contaminated and metasomatized by juvenile melts that originated by upwelling of asthenospheric mantle. It is this combination of mixed sources that gives rise to the diagnostic and distinctive features of coeval and associated ridge subduction rocks in a near-trench environment. Other important features are: high-temperature metamorphism closely associated with near-trench plutons created by heat released through a slab window [*DeLong et al., 1979; Iwamori, 2000*]; and porphyry gold and copper mineralization often associated with adakitic rocks [*Sun et al., 2010*]. When a ridge subducts under a continental margin, the diverging plates continue to separate creating a slab window that forms between the separating plates [*Santosh, Kusky, 2010*]. Adakitic melts tend to be generated close to the hot plate margins, whereas A-type granites and porphyry Cu-Au deposits form in the centre of the opening slab window [*Thorkelson, Breitsprecher, 2005*].

All the above features have been discovered, analysed and described in many parts of the Central Asian Orogenic Belt (CAOB), particularly in West Junggar [*Shen et al., 2014; Tang et al., 2010*], the Chinese Altai [*Sun et al., 2009*], East Junggar [*Liu et al., 2017*], Beishan [*Zheng et al., 2016*], the Chinese Tianshan, Inner Mongolia, and the Alxa area near the southern margin of the CAOB. For high-temperature metamorphism and ridge subduction see *Jiang et al.* [*2010*]. There is a close association between porphyry AuCu deposits and ridge subduction [*Shen et al., 2013*]. Prominent in one of two slab windows defined in West Junggar are two swarms of late Carboniferous high-Mg hornblende-biotite diorite dykes with sanukitoid chemistry that intruded through the slab window. One generation was orthogonal to an ophiolite-strewn paleotrench represented by the Darbut Fault suture, and the second was parallel to a transform fault that was parallel to the paleo-trench [*Ma et al., 2012*]. The dikes provide the best evidence so far for the orientation and opening of a slab window in the CAOB, and for the relative movement directions of the downgoing and overriding plates during the subduction and closure of the Paleo-Asian Ocean. However, these are early days, as most parts of the CAOB have yet to be investigated for evidence of ridge subduction and slab windows, but the prospects are high.

In this talk we will document the considerable evidence for this distinctive form of plate tectonics and for its role in the evolution of the CAOB.

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