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Barrovian Metamorphism and Crustal Anatexis in the Danba Structural Culmination, E Tibet: Was It Polymetamorphic?

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The Danba Structural Culmination (DSC) is a tectonic window into the Songpan-Garze fold belt in E Tibet. It comprises a series of doubly-plunging antiforms, cored by Mesoproterozoic orthogneisses and overlain by a cover sequence of Neoproterozoic-Triassic metasedimentary rocks. These sedimentary rocks have undergone kyanite-grade Barrovian-type metamorphism at c. 204-190 Ma, culminating locally in sillimanite-grade crustal anatexis in the northern part of the DSC.

The region is of particular interest due to conflicting ages and interpretations pertaining to whether the partial melting was a progressive part of the Barrovian metamorphism or a separate thermal event (Huang *et al.*, 2003; Wallis *et al.*, 2003). More broadly, the locality provides a rare window into the tectono-thermal history of E Tibet. Finally, it is an excellent opportunity to quantify the structural and petrological evolution of Barrovian metamorphism using modern techniques, namely integrated P-T phase diagram modelling and *in-situ* SHRIMP U-Pb monazite geochronology.

To explore these aims, the region was extensively sampled, with metapelites acquired from each exposed mineral zone. XRF data was obtained, revealing a subset of almost isochemical samples from staurolite- to sillimanite-grade. Their P-T evolution has subsequently been modelled using THERMOCALC in the MnO-Na_2O–CaO–K_2O–FeO–MgO–Al_2O_3–SiO_2–H_2O–TiO_2–Fe_2O_3 (MnNCKFMASHTO) system, incorporating constraints from well-zoned garnets. The initial results suggest a common metamorphic field gradient (England & Richardson, 1977), implying that crustal anatexis was progressive and followed the kyanite-grade metamorphism. This is supported by petrographic observations that show a consistent deformation history for all of the samples. Abundant monazite has been imaged from each modelled mineral zone in a variety of settings (garnet core, rim and matrix) in preparation for *in-situ* SHRIMP dating in May 2012. These results will be presented at the EMC, and it is anticipated that they will ultimately resolve the age of peak metamorphism in Danba, and more broadly provide information on the temporal evolution (rates) of Barrovian metamorphism in a collisional setting.