Contextualising the Permian Sumdo eclogite belt, Lhasa block, Tibet

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From north to south, the Tibetan plateau is composed of the Kun Lun, Qiangtang and Lhasa terranes. Traditionally, it was suggested that these terranes were progressively accreted onto the southern margin of the stable North Asian craton since the early Mesozoic [1]. However, the recent discovery of a late Permian eclogite belt, known as the Sumdo eclogites, in the middle of the Lhasa terrane has complicated this model [2]. Coupled with the subsequent identification of Permian island-arc volcanics, dismembered ophiolite units and several late Triassic to early Jurassic amphibolite-facies metamorphic belts associated with coeval magmatism to the north of Sumdo, the eclogites have been interpreted to mark the location of a previously unrecognised suture zone within the Lhasa terrane [3,4]. While links have been drawn between all of these localities, no study has worked systematically across the suture zone, so that tectonostratigraphic assemblages, structural elements and the thermal evolution of the medial Lhasa suture remain poorly resolved.

This contribution summarises two field campaigns in the Sumdo region, during which a 300 km geotraverse was completed across the medial suture. Combining meso- and micro-scale structural observations with pseudosection modelling using THERMOCALC and Sensitive High Resolution Ion Microprobe U-Pb petrochronology of key samples, three sub-parallel metamorphic belts are identified, each with a distinct pressure-temperature-time-deformation (*P-T-t-d*) record. Trends are observed in age and grade, with the belts progressively younging northwards from the late Permian to the early Jurassic, and characterised by eclogite-facies, kyanite-grade amphibolite-facies and sillimanite-grade amphibolite-facies assemblages. These belts are variously overprinted by pre-Himalayan Gangdese-related volcanism, but Himalayan signatures and ages are absent.

The results support the model of north-directed subduction followed by collisional orogeny in the mid-Lhasa block during the late Permian to early Jurassic, and provide new information on the spatial distribution and unique *P-T-t-d* character of the juxtaposed metamorphic domains. The results thus contribute directly to further constraining the architecture of the Tibetan plateau and to the growing recognition of the importance of pre-Himalayan accretionary events [5]. The fact that the medial Lhasa suture zone remained unidentified until recently highlights the general paucity of structural-metamorphic information available for large tracts of the plateau and the importance of integrated field-based analytical results for constraining geodynamic models of the formation of the Tibetan plateau.

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