



## **Two radically different exhumation models for the Qiangtang Terrane, Central Tibet**

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A century after the discovery of blueschist rocks in the central Qiangtang Terrane, the debate on their origin is still ongoing. Although all authors agree that the blueschists derive from subduction of oceanic crust, two radically different models are proposed. The "underthrust model" envisages early Mesozoic subduction mélange to have been thrust southwards (from the Jinsa Suture Zone, 200 km to the North) under Paleozoic crust of the Qiangtang Terrane. The subduction mélange, with high-pressure rocks, are thought to have exhumed by normal faulting in a large metamorphic core complex. The alternative "in-situ subduction model" puts the suture with northward subduction closer by at the Longmu Co-Shuanhu Suture Zone that separates the North and South Qiangtang terranes. In this model, allochthonous mélange is thrust over autochthonous Paleozoic basement in a south-vergent imbricate thrusts system. The models have far-reaching consequences for the crustal structure of central Tibet, as the first predicts the middle and lower crust to consist of subduction mélange overlain by Qiangtang basement and onshore Carboniferous-Triassic sediments, whereas the second predicts these rocks to overlie the Qiangtang basement of North-Gondwana provenance.

To resolve this issue we combined detailed mapping in the central Qiangtang Terrane with 3D structural modelling using ASTER satellite images and the software package Move(TM). The high topography makes it possible to constrain the location and orientation of large-scale (>kms) structures, such as major faults. We found that Ordovician to Carboniferous sediments unconformably overly low-metamorphic grade pre-Ordovician basement rocks, together forming the autochthonous Paleozoic basement. This is overlain by a stack of shallowly dipping thrust sheets of subduction mélange, high-pressure rocks, as well as Permo-Triassic sediments. With the subduction mélange overlying the autochthonous basement, we prefer the in-situ subduction model with northward subduction between the South and North Qiangtang terranes in the Late Triassic.