Structural, metamorphic and magmatic evolution of the SE Tibetan crust

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The Tibetan plateau is the largest area of high average elevation (~5 km) and thick crust (~70-90 km) on the planet. It is composed of a series of terranes progressively accreted from the north since the early Mesozoic, and is bounded to the south by the collision of India with Asia ~50 Ma. Understanding the formation of the plateau is fundamental to understanding how collisional orogenies develop, how the lithosphere deforms and even how climate changes. However the timing of crustal thickening and surface uplift of the plateau has been the subject of much speculation and debate. Models proposed range from pre-collisional uplift, through gradual uplift following collision to sudden uplift ~7-8 Ma (England & Searle, 1986; Molnar *et al.*, 1993).

A major problem has been the lack of exhumed Tertiary high-grade metamorphic rocks in the plateau region. This is because Tibet is arid with low relief and little erosion so rocks are not readily exhumed. Therefore inferences are made about the Tibetan crust using alternative methods, such as analogue studies of the Karakoram, mantle xenoliths, volcanic distributions and receiver function studies (Searle *et al.*, 2010; Chan *et al.*, 2009; Chung *et al.*, 2005; Tilmann & Ni, 2003). However not all of Tibet is flat. The SE corner has high relief and is relatively unexplored. Recently high-grade metamorphic rocks have been discovered in the Eastern Nyenchen Tanglha Range, including cordierite and sillimanite grade gneisses and migmatites, providing a unique window into the lower crust of Tibet.

The age of metamorphism is currently unknown but in-situ and grain mount U-Pb SHRIMP dating of monazites and zircons from a suite of samples collected from this region in September 2010 is being conducted in May 2011, the results of which will be announced at the conference. Combined with pseudosection analysis, it is hoped that firm constraints can be placed on the various models of the evolution of Tibet. The ultimate aim of the project is (1) to determine the structural evolution of the crust along the southern margin of the Asian plate in the Lhasa block, (2) determine the pressure-temperature conditions of metamorphism and (3) determine the age of peak metamorphism, crustal thickening and exhumation of the Asian margin prior to, during and following the collision of India ~50 Ma.

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