2004 Fall Meeting
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Cite abstracts as **Author(s) (2004), Title, *Eos Trans. AGU*, *85*(47), Fall Meet. Suppl., Abstract xxxxx-xx**

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HR: 14:30h
AN: **T53D-04**
TI Co-Anatectic Crustal Failure in the Absence of Geophysically Detectable Partial Melt
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AB The India-Asia collision's syntaxial terminations are loci of active deformation and vigorous exhumation. Quantitative constraints on tectonic processes operating in the syntaxes are now available from a large suite of studies conducted at the Nanga Parbat and Namche Barwa massifs by several research groups. In the western syntaxis in particular, deployment of seismic and magnetotelluric arrays at Nanga Parbat has provided an image of crustal rheologies and the distribution of fluid phases. Surface constraints from structural surveying reveal major deformation localization via two conjugate shear zones whose crustal-scale characteristics are imaged by the geophysics. Extensive geochronological constraints from multiple syn-deformation shear zone granitoids indicate a prolonged history (steady-state?) of weakening and failure. In contrast to the southern-Tibet portions of the collision (where INDEPTH geophysical imaging has been interpreted to suggest crustal weakening coupled with extensive partial-melt accumulation), at Nanga Parbat no extensive partial-melt candidate is discernible in the geophysical data. Instead, these data suggest the presence of anomalously hot but dry crust beneath a region that thermochronologic

and petrologic data show has experienced rapid and extensive exhumation during the Neogene. Observed shear zone-hosted granitoids result from anatexis that at any instant is volumetrically trivial for the massif as a whole. It is unclear what role geophysically "invisible" subsurface melt might play in weakening. Three-dimensional numerical experiments indicate that positive mechanical-thermal feedback associated with localized exhumation is sufficient to produce melt lozenges and that further melt-enhanced weakening is not required for "aneurysm" behavior. That the Namche Barwa massif shares a remarkably similar geologic history with Nanga Parbat despite significant differences in tectonic setting underscores the importance of vigorous exhumation in active tectonic systems.

DE: 8102 Continental contractional orogenic belts
DE: 8110 Continental tectonics--general (0905)
DE: 8120 Dynamics of lithosphere and mantle--general
DE: 8159 Rheology--crust and lithosphere
SC: Tectonophysics [T]
MN: 2004 AGU Fall Meeting

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