
HR: 1340h

AN: **T23B-0482**

TI: **Active uplift and erosion of the Namche Barwa-Gyala Peri massif**

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AB: The eastern syntaxis of the Himalaya entrains a steep reach of the largest Himalayan river, the Tsangpo- Brahmaputra, as it slices a gorge through the rapidly cooled and deeply incised Namche Barwa-Gyala Peri massif. This spatial association has led to suggestions of a coupling between erosion and crustal deformation in this region. However, until now neither the geomorphology nor the thermal history of the eastern syntaxis has been characterized with enough detail to confirm such coupling, and hence to address the unique geodynamics of this region. Using measured channel width, TRMM satellite-derived river discharges, and channel slopes determined from 90 meter-resolution digital elevation data, we compute spatial patterns in river power as an index of the rate of fluvial incision across the eastern syntaxis. Comparisons between patterns in river power, zircon (U-Th)/He ages, and biotite Ar-Ar ages reveal a tight spatial correspondence between river power and cooling ages, which suggests a sustained balance between rates of vertical rock ascent and erosion at the surface over the last ~ 1 - 2 My. Aerial mapping of alluvial fans, glacial deposits, landslide deposits, active braided plains, and incised fill terraces indicates that long term valley-bottom sediment storage within the syntaxis is primarily restricted to regions with wide channels, low river power and slow rates of mineral cooling. This provides evidence that sediment supply relative to transport capacity and the frequency of channel alluviation are likely to strongly influence rates of river incision over geologic timescales. However, we identify two locations on the margins of the Namche Barwa-Gyala Peri uplift where reaches of low unit stream power are associated with rapid cooling. On the upper Yarlung Tsangpo, a downstream step in the location of active thrusting or an acceleration of domal uplift along the western margin of the Namche Barwa-Gyala Peri massif may have led to damming, ponding, and alluviation

of a reach of the river with young zircon and biotite ages. On the lower Parlung Tsangpo, Quaternary glaciation and recent landslide activity have inundated the river with coarse sediment. Because channels where bedrock is shielded by alluvial sediment are wider than those cut in bedrock, calculated fluvial power along the lower Parlung is approximately 50% of what it would be for a bedrock channel of equivalent slope. This helps explain the mismatch between current fluvial power and longer-term exhumation rates in these locations, and underscores the importance of channel width in the bedrock incision problem. Finally, we show that clearly defined topographic lineaments correspond with steep gradients in fluvial power, providing independent evidence for the location of surface-breaking faults.

DE: 1815 Erosion

DE: 1825 Geomorphology: fluvial (1625)

DE: 8107 Continental neotectonics (8002)

DE: 8175 Tectonics and landscape evolution

SC: Tectonophysics [T]

MN: 2006 Fall Meeting



Session Information

Tectonophysics

2006 Fall Meeting

Tuesday Afternoon 1			
Time	Session	Location	Title
1340	T23B	MCW Level 1	Geodynamics of Indentor Corners I Posters (joint with S) <i>Presiding: P Zeitler, Lehigh University</i> Print-friendly session details
1340	T23B-0477	MCW Level 1	The lithospheric architecture of the eastern Himalayan syntaxis from 3-D teleseismic receiver function imaging *B Zurek, A Meltzer, S Sol, P Zeitler, X Zhang, J Zhang POSTER Abstract
1340	T23B-0478	MCW Level 1	GPS Monitoring of Crustal Deformation Around the Eastern Himalayan Syntaxis *Y Liu, W Tang, Q Zhang, J Zhao, Z Chen, P O Koons POSTER Abstract
1340	T23B-0479	MCW Level 1	Seismicity and Active Deformation in Southeastern Tibet *S Sol, A Meltzer, B Zurek, P Zeitler, X Zhang, J Zhang POSTER Abstract
1340	T23B-0480	MCW Level 1	Structural and Tectonic Geology of the Namche Barwa-Gyala Peri Antiform, Southeastern Tibet *W S Kidd, C Lim, P K Zeitler, E Enkelmann, A L Booth, C P Chamberlain, W Tang, Y Liu, D Craw POSTER Abstract
1340	T23B-0481	MCW Level 1	Rivers Draining Eastern Tibet: Geomorphologic Description and Inferences *A L Ault, A S Meltzer POSTER Abstract
1340	T23B-0482	MCW Level 1	Active uplift and erosion of the Namche Barwa-Gyala Peri massif *N J Finnegan, P K Zeitler, B Hallet, D R Montgomery, W S Kidd, L Yuping POSTER Abstract
1340	T23B-0483	MCW Level 1	Fission-track Evidence for the Source of Brahmaputra River Sands Within the Eastern Himalayan Syntaxis: a Large Flux from a Tiny Source R J Stewart, *B Hallet, P K Zeitler POSTER Abstract
1340	T23B-0484	MCW Level 1	A misleading(?) similarity of indentor corners; Aegean-Anatolia versus the Himalaya syntaxes *m edwards, D Schneider, b GRASEMANN, T ACCEL POSTER Abstract
1340	T23B-0485	MCW Level 1	Tectonics of the Northern Tien Shan in Kazakhstan: New Fission-Track Ages and Open Questions R Freitag, *J Kley, N Seib, T Voigt POSTER Abstract
1340	T23B-0486	MCW Level 1	Regional Gradients in Shortening and Rates in a Foreland Basin due to Oblique Collision: Late Cenozoic Evolution of the Northwest Tarim Basin, Western China *R V Heermance, J Chen, D W Burbank, K Scharer

			POSTER Abstract
1340	T23B-0487	MCW Level 1	Late Cenozoic Extension in the Eastern Anatolian Corner: New Constraints on the Tectonic Escape Model *D Dhont, J Chorowicz, P Luxey POSTER Abstract
1340	T23B-0488	MCW Level 1	Causes of Extensional Deformation in Front of the Corner of the South Alpine Indentor: an Experimental Study *C L Rosenberg, J Brun, F Cagnard, D Gapais POSTER Abstract
1340	T23B-0489	MCW Level 1	Thermal Softening of the Hinterlands During Variscan Collision in Western Iberia A Marcos, *S Llana-Funez POSTER Abstract
1340	T23B-0490	MCW Level 1	A Model for the Termination of the Ryukyu Subduction Zone against Taiwan – A Triple Junction of Collision, Subduction/Separation and Subduction Boundaries *F T Wu, W Liang, J C Lee POSTER Abstract
1340	T23B-0491	MCW Level 1	Influence of Slab Geometry on Diffuse Plate Boundary Deformation: 3D Numerical Models of the Plate Boundary Corner in Southern Alaska *M A Jadamec, M I Billen POSTER Abstract
1340	T23B-0492	MCW Level 1	Localized deformation zones in the offshore leading edge of the Yakutat microplate, Gulf of Alaska *L A Lowe, S P Gulick, T Pavlis, R L Bruhn, P Mann POSTER Abstract
1340	T23B-0493	MCW Level 1	3D Modeling of the transition from oblique lateral to normal convergence at the plate corner of Southeast Alaska *A D Barker, P O Koons, T L Pavlis, J B Chapman, P Upton, S E Johnson POSTER Abstract
1340	T23B-0494	MCW Level 1	Cocos Ridge Collision: Tectonic Escape and Mountain Building in Central America *P C LaFemina, T H Dixon, R Govers POSTER Abstract
1340	T23B-0495	MCW Level 1	Heterogeneous Flow of an Extruded granitic dome in the Bronson Hill Terrane, Massachusetts, USA: Evidence for Oblique Convergence and Indentation, and the Alleghanian Orogeny *M A Massey, D P Moecher POSTER Abstract
1340	T23B-0496	MCW Level 1	Impact of indentor geometry on lithosphere deformation - insights from analogue vice models *K Schemmann, D Boutelier, A R Cruden, O Oncken POSTER Abstract
1340	T23B-0497	MCW Level 1	What's the effect of a subduction/collision indentor on the upper plate partitioning? *N Bergeot, M Bouin, M Regnier, M Diament POSTER Abstract

2006 AGU Fall Meeting
11–15 December 2006, Monday–Friday
Moscone Center West, 800 Howard Street
San Francisco, CA, USA

▶ [View videos of featured lectures](#)

▶ **Important:** [Hawaii Earthquake Late Breaking Session Schedule](#).

WELCOME!

Pickup your preregistration materials or register on-site at Moscone West, located at 800 Howard Street starting at 3:00 p.m. on Sunday, December 10. AGU members that must register at the meeting, please bring your AGU membership number to on-site registration.

Make Plans to Attend the Following Union Activities

- ▶ **The Earth's Radiation Belt presented by Dan N. Baker, UC, Boulder**
Sunday, 1600h, Marriott, Salon 7
- ▶ **Atlantic Ocean Circulation and Climate: The Current View From the Geological Record presented by William Curry, WHOI**
Wednesday, 1815h, Marriott, Salon 7
- ▶ **Climate Change: The Role of Science and the Media in Policy Making, Presented by the Honorable Al Gore**
Thursday, 1230h, Marriott, Salon 8, 1230h - 1330h
- ▶ **AGU Honors Ceremony and Banquet**
Wednesday, 1915h, Marriott
The Ceremony is free. A ticket is required for the banquet.

Visas

Visa applicants from many countries must now apply at least 3 months in advance of their travel date. [See Visa Information for details.](#)

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