T51B-1142 0830h POSTER

Differentiating Between Models of MCT Evolution in the Annapurna Range, Central Nepal Himalaya

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Recent thermochronologic data from the Annapurna region of central Nepal show very young ages in the footwall of the Main Central Thrust (MCT), with late Miocene-Pliocene Th/Pb monazite ages especially common 5-15 kilometers south of the MCT (Catlos et al., 2001). These data can be explained with several different models, including: 1) Reactivation of the MCT and its splays in Miocene-Pliocene time with motion on some faults continuing to the present (e.g. Catlos et al., 2001); 2) Growth of a duplex beneath the MCT that passively lifted both the footwall and the hangingwall of the MCT in Miocene-Pliocene time (e.g. DeCelles et al., 2001); 3) A combination of MCT reactivation and duplex growth. When combined with structural mapping, our pilot dataset of in situ monazite Th/Pb ages from hangingwall and footwall rocks in the Madi Khola allows us to begin to validate aspects of some models and eliminate others. Our structural and thermochronologic interpretations are enhanced by Nd isotopic analyses that accurately constrain the location of the MCT (defined as the crustal boundary between Lesser Himalayan and Greater Himalayan rocks). We use Nd isotopes to map the MCT across the 60 kilometers between the Modi and Marsyandi Rivers based on previous studies that showed that Lesser Himalayan rocks contain more radiogenic Nd than Greater Himalayan rocks. In addition to identifying potential structural modifications of the MCT, our map will be useful for future studies in the Annapurna region because the critical task of locating the MCT is not always straightforward in the field.

T51B-1143 0830h POSTER

Geologic Evolution of the Gyala Peri Massif, Southeastern Tibet

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At both the eastern and western terminations of the Himalaya, strong coupling between surface and tectonic processes is manifested in the development of active antiforms in close proximity to large river gorges. In southeastern Tibet the peaks Gyala Peri and Namche Barwa occupy a metamorphic massif that shows remarkable similarities to the Nanga Parbat massif in NW Pakistan, including exposure of high-grade gneisses intruded by Plio-Pleistocene granites. Nanga Parbat has been proposed to constitute a 'tectonic aneurysm' involving erosionally focused strain and related metamorphic reworking. As the Namche Barwa/Gyala Peri massif appears to be quite similar to Nanga Parbat in its geology and geologic setting, we suggest it has a similar origin. Most information to date has been reported from Namche Barwa, with Gyala Peri remaining largely unexplored. Here we report observations from a well-exposed section along the western margin of Gyala Peri. In the west near the Lulang River, a brittle fault zone up to 1 km wide juxtaposes a metasedimentary/mylonite section on the east against Lhasa/Gandese gneisses and granitoid rocks to the west. The steeply dipping fault zone shows a dominantly east-up (reverse) sense of brittle motion. The lower portion of the Lhasa/Gangdese metamorphic section is cut by dikes of at least two granite phases, a medium-grained Gangdese-like granite, and a leucocratic pegmatite. East of the brittle fault zone, and the metasediments and planar foliated mylonites, there is an 500 m thick section of S/C mylonites having a dominant reverse and subordinate dextral sense of shear. East of, or possibly in the eastern part of this ductile fault, grey gneisses [presumed basement] are intruded by a syntectonic(?) muscovite granite. Ar-Ar K-feldspar data from Gangdese rocks just west of the brittle fault zone drop to ages of 4 Ma, substantially younger than the pattern seen further to the west at Bayi. Overall, the geology of this section is quite similar to the western margin of the Nanga Parbat massif and, like it, represents progressive displacement and exhumation on a significant thrust sense shear and fault zone bordering the Gyala Peri massif. U-Pb analyses of the granites and the mylonite will be reported along with data from a pilot seismic study that had stations located in proximity to Gyala Peri.

T51B-1144 0830h POSTER

Structural Constraints on the Evolution of the Nyainqentanglha Massif, Southeastern Tibet

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The Nyainqentanglha massif, in the footwall of the Nyainqentanglha shear zone (NSZ), is part of the most prominent rift system in southern Tibet and uniquely exposes mid to upper-crustal rocks. These rocks include Paleozoic metasediments, Cretaceous-Tertiary(?) redbeds, and a collage of undeformed, calc-alkaline Triassic to late Miocene granitoids. Many of the granitoids are part of the Gangdese arc, which formed during closure of the Tethys ocean, and are 140 to 50 Ma, while leucogranites range in age from 30 to 8 Ma. Previous studies documented a SE-dipping low-angle ($\sim 30^\circ$) shear zone, which initiated at $\sim$8 Ma, bounding the southeastern margin of the central portion of the massif. However, the nature of the shear zone along strike to the northeast, and structural relationships between footwall lithologies, were not well studied.

It was previously inferred that crystalline rocks within the core of the massif were in fault contact with Paleozoic metasediments. However, recent geologic mapping indicate that contacts between granitoids and metasediments are everywhere intrusive. In addition, U-Pb ion-microprobe studies of zircon from a rounded granite clast within a micaceous schist yield an age of 121 Ma, suggesting that metasediments previously mapped as Paleozoic on the NW side of the massif may be Cretaceous or younger in age.

Previous workers have established that the central portion of the NSZ is characterized by a >1-km-thick zone of mylonitic orthogneiss. It exhibits a prominent S-C fabric and down-dip lineations, indicating top-to-the-southeast motion. To the northeast in the Lagen La valley, the main route to Nam Co, a subvertical, strike-slip, E-W-striking shear zone has been documented within phyllite and schist. However, the structural and timing relations between this subvertical shear zone and the low-angle shear zone to the south were not established. Our mapping shows that the low-angle shear zone lies structurally above and cuts the strike-slip shear zone near the range front, several hundred meters above the valley floor. This indicates that the strike-slip shear zone could have significantly predated rift formation.

About 15 km northeast of Damxung, the orientation of the massif changes from NE-SW to $\sim$E-W. Here, the range front is characterized by an $\sim$1-km-thick, E-W striking shear zone comprised of quartz-mica schist and lineated marble. The shear zone dips at a low angle to the south and exhibits sub-horizontal lineations. It grades structurally below into broadly folded, but non-lineated, limestones and sandstones. The shear zone northeast of Damxung exhibits less structural throw than the SE dipping shear zone to the south. This observation, together with the consistent low-angle nature of the shear zone despite an abrupt change in its orientation and lineation direction, makes it difficult to interpret the evolution of this low angle shear zone in the context of popular models of low angle normal fault systems.

T51B-1145 0830h POSTER

Ophiolitic Melanges in the Yarlung-Tsangpo Big Bend Canyon, SE Tibet

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The geology of the Tsangpo's "Big Bend" canyon in southeasternmost Tibet is quite significant to collisional tectonics, but this rugged region has been little studied. New 1:250 000 scale mapping since 1999 has improved our knowledge of the area and revealed four major units: (a) Namche Barwa group. Plagioclase gneisses with amphibole-containing high-P granulite lenses, exposed in the central area of the canyon, and representing the lower Indian plate. (b) Gangdese group. Plagioclase-gneiss, amphibolite, marble, quartzite intruded by granites, exposed surrounding the Namche Barwa group, representing the lower Eurasian plate. (3) Ophiolitic melange of the Indus-Yarlung Tsangpo (IYT) suture. The former occurs roughly along the Tsangpo "Big Bend" canyon with good exposures at Pangxin, Jiaresa and between Pailong and Zhaqu; it separates the Namche Barwa and Gangdese groups. (4) Ophiolitic melange of the Jiali–Pailong Tsangpo (JPT) suture.

The mafic rock assemblage of IYT includes radiolarian chert, basaltic pillow lava, diabase sills, cumulate complex and serpentinized peridotite. The ophiolitic zone has been metamorphosed and highly deformed to form a melange containing various blocks and matrix, including blocks of metamorphosed mafic and ultramafics, quartzite and mica quartz schist; marble, and both Namche Barwa and Gangdese gneiss. The petrochemistry and trace elements of IYT rocks show similar characteristics to other ophiolite suites in Tibet and western Sichuan. HREE and Cr, Co, Ni are strongly depleted in upper-mantle peridotite, which is slightly enriched in LREE and Rb, Sr, Ba, Nb, Ta. Meta-basalt and diabase are enriched in LREE with (La/Yb) ratios of 7.29 to 1.28, very different from MORB. Compared with MORB, IYT meta-basalts and diabases are enriched in lithophile elements and are depleted in transition elements, suggesting that the IYT ophiolite suite originated from a small oceanic basin. The initial magma formed in this environment could be LREE and lithophile element-enriched and might have been contaminated by more of these elements during the intrusion.

Along the Jiali-Pailong fault zone near high mountain ridges, ultramafic and mafic blocks occur enclosed or intruded by Jurassic to Triassic granite batholiths. Blocks of silicate, marble, and hornstone also occur. Field and lab studies suggest that these blocks may be a remnant of an old ophiolite zone. Rb-Sr dating on mafic rocks suggests a rough age of 215+/-63Ma. Stratigraphic, petrologic, and tectonic studies suggest that the JPT zone originated from an inner-arc basin. Oceanic crust formed in late Triassic and subducted from south to north from late Triassic to Jurassic. Closing of this ocean and orogenesis started in middle Jurassic accompanied by granite intrusions. The ophiolitic melange developed during arc-to-arc collision.

Our data support a new hypothesis that the Neo-Tethys ocean appeared between Paleozoic and early Cretaceous and closed along the Nujiang suture.

T51B-1146 0830h POSTER

The Crustal Structure of Central Tibet Based on Local Earthquake Records and a Reinterpretation of Seismic Data Along the INDEPTH III Profile

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Carpathians (Vrancea): **V Mocanu**, A van der Hoeven, W Spakman, G Schmitt, B C Ambrosius

0830 h **T51A-1129** *POSTER* Proterozoic Blueschist-Bearing Melange in the Anti-Atlas Mountains, Morocco: Implications for Pan-African Subduction: **K P Hefferan**, J A Karson, H Admou, R Hilal, A Saquaque, T Juteau, M Bohn

0830 h **T51A-1130** *POSTER* Key Role of the Anaximander Mountains in the Neotectonic Evolution of the Eastern Mediterranean: J H ten Veen, **T A Zitter**, J M Woodside

0830 h **T51A-1131** *POSTER* Thermal Regime and Rheological Properties of the Ossa-Morena Zone and South Portuguese Zone, Iberian Massif, Southern Portugal: **C L Ellsworth**

0830 h **T51A-1132** *POSTER* An Integrated Study of the Holy Cross Mountains region of the Eastern European TESZ in Poland: **M G Averill**, T Bond, P Sroda, G R Keller, K Miller

0830 h **T51A-1133** *POSTER* Wilson Cycles and Strong Orogenic Belts: The Influence of the Paleozoic Ouachita Orogen on Mesozoic Opening of the Gulf of Mexico: **D L Harry**, A D Huerta

0830 h **T51A-1134** *POSTER* Developing a Geothermal Indicator Index From Crustal Geophysical Data for the Western Great Basin: **W A Thelen**, S B Smith, J N Louie, A Concha-Dimas

0830 h **T51A-1135** *POSTER* Numerical modeling of creep in high-contrast Maxwell solids: **R C Bailey**

0830 h **T51A-1136** *POSTER* Active Late Cenozoic Flexures in the Precordillera in Northern Chile: Correlations With the Shallow Seismic Activity, and Implications for the Uplift of the Altiplano: M Farias, R Charrier, **D Comte**, J Martinod, L Pinto, G Herail

0830 h **T51A-1137** *POSTER* Pressure-Temperature-Time Relationships of Allochthons to Basement, Western Gneiss Region, Norway: **E O Walsh**, B R Hacker

0830 h **T51A-1138** *POSTER* The Ultrahigh-Pressure Rocks of Western Norway are Allochthonous: **D Young**, B Hacker, T Andersen

0830 h **T51A-1139** *POSTER* Sensitivity Analysis of a Gravity Inversion Model in Frenchman Flat Basin, Nevada: **G Phelps**

0830 h **T51A-1140** *POSTER* Rates and Causes of Lateral Migration of Basin-floor Submarine Fans and Role of Mass Transport Complexes, Mid Eocene, Spanish Pyrenees: **K T Pickering**, J Corregidor

T51B MCC: Hall C Friday 0830h
Tectonics and Structure of Tibet and China Posters

Presiding: **A J Martin**, University of Arizona; **B K Horton**, University of California, Los Angeles

0830 h **T51B-1141** *POSTER* Upholding or fatally altering the boundary conditions for channel flow of the Southern Tibet middle crust: **M EDWARDS**, W Kidd

0830 h **T51B-1142** *POSTER* Differentiating Between Models of MCT Evolution in the Annapurna Range, Central Nepal Himalaya: **A J Martin**, P G DeCelles, P Patchett, C Isachsen, G E Gehrels

0830 h **T51B-1143** *POSTER* Geologic Evolution of the Gyala Peri Massif, Southeastern Tibet: **W Kidd**, P Zeitler, A Meltzer, C Lim, C Chamberlain, L Zheng, Q Geng, Z Tang

0830 h **T51B-1144** *POSTER* Structural Constraints on the Evolution of the Nyainqentanglha Massif, Southeastern Tibet: **J Kapp**, M Harrison, M Grove, P Kapp, L Ding, O Lovera

0830 h **T51B-1145** *POSTER* Ophiolitic Melanges in the Yarlung-Tsangpo "Big Bend" Canyon, SE Tibet: Q Geng, **L Zheng**, G Pan, C Ou, Z Sun, H Dong, X Wang, Y Liu, S Li

0830 h **T51B-1146** *POSTER* The Crustal Structure of Central Tibet Based on Local Earthquake Records and a Reinterpretation of Seismic Data Along the INDEPTH III Profile: R Meissner, **F Tilmann**, S Haines, J Mechie

0830 h **T51B-1147** *POSTER* Timing and Rates of Quaternary normal2 Faulting in Central Tibet: **P M Blisniuk**, W D Sharp

0830 h **T51B-1148** *POSTER* Cretaceous to Tertiary Vertical-Axis Tectonic Rotations of Northeastern Tibet From Preliminary Paleomagnetic Results: **G Dupont-Nivet**, B K Horton, R F Butler, J Wang, J Zhou, H Zhang

0830 h **T51B-1149** *POSTER* Improved Age Constraints for Mesozoic and Cenozoic Basin Development in Northeastern Tibet Based on Magnetostratigraphy and Palynology: **B K Horton**, G Dupont-Nivet, J Zhou, G L Waanders, R F Butler, J Wang, H Zhang

0830 h **T51B-1150** *POSTER* Geology of the Northeastern Nyainqentanglha Range, Central Tibet: **Y Li**, W Kidd, K D Nelson, H Xia, M Edwards, L Ratschbacher, Z Jiang, W Jiang, Z Wu

0830 h **T51B-1151** *POSTER* Early Tertiary Sedimentation and Crustal Deformation Recorded in the Gonje Basin, Eastern Tibet: **C Studnicki-Gizbert**, B Burchfiel, Z Li

0830 h **T51B-1152** *POSTER* GPS Monitoring of Crustal Deformation in Eastern Tibetan Plateau: **Y Liu**, Z Chen, W Tang, J Zhao, Q Zhang, X Zhang, B C Burchfiel, R W King, L H Royden

0830 h **T51B-1153** *POSTER* Active Deformation in Central Tibet: Constraints from InSAR and Geologic Observations: **M Taylor**, G Peltzer, A Yin, F J Ryerson, R Finkel, D Lin

0830 h **T51B-1154** *POSTER* How Does the Kunlun Fault End?: **E Kirby**

0830 h **T51B-1155** *POSTER* Tectonics in East Asia : Contiunous or block-wise?: **M Iwakuni**, T Kato, S Miyazaki, W Sun

0830 h **T51B-1156** *POSTER* Kinematics and structures of the ultra-high-pressure Sulu terrane, eastern China: **L E Webb**, M L Leech, T Yang, Z Xu

0830 h **T51B-1157** *POSTER* Extensional collapse of a Mesozoic intraplate fold-and-thrust belt, Daqing Shan, Inner Mongolia, China: **B J Darby**, G A Davis, Y Zheng

0830 h **T51B-1158** *POSTER* Tertiary Shortening along the Eastern Portion of the North Qaidam Thrust System: **A C Robinson**, A Yin, C A Menold, X Chen, W X Feng

0830 h **T51B-1159** *POSTER* Tectonic Evolution of the North Qaidam UHP Complex, Western China: **C A Menold**, C E Manning, Y An, R C Alex, X Chen

0830 h **T51B-1160** *POSTER* The ICDP Information Network and the Chinese Continental Scientific Drilling CCSD: **R Conze**, D Su

0830 h **T51B-1161** *POSTER* Paleozoic and Cenozoic Tectonic Evolution of the Russian and Chinese Altai Mountains: A Preliminary Report: **S M Briggs**, A Yin, C E Manning, A G Vladimirov

0830 h **T51B-1162** *POSTER* The 1971 Artyk Earthquake: Is the Locus of Motion Changing in Northeast Russia?: **K Fujita**, M S McLean, K G Mackey, B M Kozmin

T51C MCC: Hall C Friday 0830h
Neotectonics Posters

Presiding: **D D Bowman**, California State University, Fullerton; **C P Huebscher**, Institute of Geophysics University of Hamburg

0830 h **T51C-1163** *POSTER* Evidence for Quaternary Faulting Along the Apricena Tectonic Lineament (Gargano Area, Italy): **F Cinti**, F Doumaz, J J Young, M Moro, S Salvi, L Colini, S Pierdominici

0830 h **T51C-1164** *POSTER* Raised Marine Terraces in the Sibari Plain (Calabria, Southern Italy): the Geological Record of Fast Regional Uplift and Local Fault Deformation: **L Cucci**

2002

Fall Meeting Program and Abstracts

AGU

FALL MEETING

SAN FRANCISCO
6-10 December

This CD-ROM contains the program and abstracts of the 2002 Fall Meeting. The information is stored in both HTML and PDF formats as browsable tables and a searchable database. The CD-ROM is designed to run on Windows and Macintosh platforms.

Software Requirements

A version 4.* or later WWW browser (Netscape Navigator or MS Internet Explorer) with Java support is required to browse and search the abstracts. It is recommended to use the latest available browser release. To view, print or search the PDF files, the Adobe Acrobat Reader is required. To download, go to:
http://www.adobe.com/products/acrobat/readstep2.html

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The default page index.htm will be loaded automatically in the browser when the CD is inserted into the CD-ROM drive. No special installation of files on to the hard disk is required.

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1. Select "Run" to run MacStart script when prompted after inserting CD.
2. Choose Stuffit Expander to open Go.hqx (this starts Java console which will say "Waiting for client's request !!!").
3. Click the CD icon on the desktop and open index.htm in the browser.

Note for Macintosh OS X users: Refer to the README.txt file on the CD-ROM.

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As an alternative, a searchable index of the collection of session PDF files is included. See README.txt on the CD-ROM for more details.

Abstracts should be cited as

Eos Trans. AGU, 83 (47), Fall Meet. Suppl., Abstract XXXXX-XX, 2002