



AGS NEWSLETTER

Arizona Geological Society, Inc. January 2006

CALENDAR OF EVENTS

- Tue. Feb 3 Meeting Speaker: Jon Patchett, Univ. Arizona Topic: TBD
Tue. Mar 7 Meeting Speaker: Patrick Leahy, USGS Topic: TBD
Tue. Apr 4 Meeting Speaker: Amanda Clarke, ASU Topic: Physical Volcanology

DINNER MEETING

DINNER MEETING SPEAKER:

Peter G. DeCelles

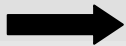
Dept. of Geosciences, University of Arizona



SUBJECT: Kinematic and Erosional Histories of the Nepalese Himalayan Fold-Thrust Belt: Implications for Mid-Crustal Channel Flow

Date: Tuesday, January 3, 2006

Location: Inn Suites Hotel, 475 N. Granada Ave. in Tucson



SCHEDULE: CASH BAR @ 6:00 PM DINNER @ 7:00 PM TALK @ 8:00 PM

WITH RESERVATION: MEMBER = \$20.00, GUEST = \$22.00, STUDENT = \$7.00

Without reservations you may not get dinner. If you do, an extra \$2.00 will be charged.

To make dinner reservations please call the **AGS answering machine** at (520) 663-5295 by 5:00 P.M. on the **Friday** before the meeting. Leave name, number of attendees, and whether a vegetarian or low-salt meal is required. This number can be used for field-trip reservations and leaving messages for Society officers. Please cancel your reservation via the answering machine if you find that you will be unable to attend.

Abstract

Regional structural mapping, thermochronology, provenance analysis of foreland basin deposits, and incremental restoration of balanced regional cross sections of the Nepalese Himalayan fold-thrust belt provide the basis for an assessment of recently proposed mid-crustal channel flow (MCCF) models for Himalayan geodynamics. As currently articulated, MCCF requires southward extrusion of mid-crustal rocks from beneath the Tibetan Plateau to “daylight” at an erosional window lying between the Main Central thrust (MCT) and South Tibetan detachment (STD). The model predicts that (1) the STD and MCT have comparable slip and do not join in the subsurface; (2) the rocks presently exposed in the Greater Himalayan zone would have been involved in ductile extrusion during Early Miocene time (although some versions of the model call for present-day channel flow); (3) incorporation of Indian rocks into the channel from below

the MCT is a turbulent process, resulting in mixing and structural overturning; (4) Tibetan mid-crustal rocks have been involved in the channel since its inception; and (5) the present outcrop of Greater Himalayan rocks has served as the erosional porthole throughout development of the channel. These features are testable with existing geological data from the Nepalese portion of the fold-thrust belt.

Detrital U-Pb zircon ages, Nd-isotopic data, and conventional petrographic data from foreland basin deposits in Nepal show no evidence of erosion of Tibetan mid-crustal rocks from Eocene to modern times. Conspicuously absent are Cretaceous zircons, juvenile Nd, and volcanic lithic grains, all of which would be expected derivatives from middle crust of the Lhasa terrane in southern Tibet. In view of the fact that Greater Himalayan rocks were transported >150 km southward during Early Miocene time, this indicates that MCCF, if it exists in the Nepalese Himalaya, must be confined to Indian material. Although Greater Himalayan-age zircons, Nd-isotopic signatures, and abundant plagioclase appear in the detrital record ca. 22-20 Ma, there is no evidence for erosion of Greater Himalayan medium- to high-grade metamorphic rocks until Late Miocene time (11 Ma). Structural data indicate that the Greater Himalayan rocks were emplaced by the MCT along an extensive regional flat upon essentially undeformed (but metamorphosed) lower Lesser Himalayan rocks, and the present position of the Greater Himalayan topographic front is not coincident with the southward extent of the original MCT sheet. The present, steeply northward-dipping surface outcrop pattern of Greater Himalayan rocks in central and western Nepal resulted from erosion into a regional scale antiformal duplex in Lesser Himalayan rocks that began to develop in Late Miocene time. Thus, the presently configured erosional porthole could not have begun to exist until the Late Miocene. The structural facing directions of Lesser Himalayan rocks below the MCT (the floor of the channel) are consistently upright and northward, precluding turbulent mixing along the base of the channel.

A variety of datasets support the following kinematic history of the Himalayan fold-thrust belt: Eocene-Oligocene thrusting in the Tibetan Himalaya, accompanied by amphibolite-grade metamorphism in the underlying Greater Himalayan rocks; Early Miocene emplacement of the MCT sheet and contemporaneous, but much lesser magnitude, northward slip on the STD; Middle-Late Miocene (post-12 Ma) emplacement of the Ramgarh thrust sheet; Late Miocene growth of the Lesser Himalayan duplex; Pliocene-Pleistocene slip on the Main Boundary thrust; and Pleistocene-Recent slip on thrusts within the frontal Sub-Himalayan imbricate belt. Considered alongside the detrital unroofing record, this kinematic history is incompatible with large-scale involvement of Tibetan middle crust in channel flow as currently articulated in the literature. Features often considered as diagnostic of MCCF in the Himalaya (such as ductile shear strain and out of sequence thrusting) are equally compatible with critical taper models of thrust belt behavior. On the other hand, a modified MCCF model involving only Indian material south of the Indus suture zone since Middle- to Late Miocene time may be compatible with geological data as well as conventional kinematic models for thrust belts. *Dr. DeCelles can be contacted at decelles@geo.arizona.edu or (520) 621-4910.*

Member News

Welcome to new members **Peter Laczay**, Lucky Irish Silver, Coeur d'Alene, **Richard Lundin**, Carothers Environmental, Clarkdale, **Erin Gleeson**, University of Arizona, **Dennis McMacken**, USGS, Tucson **Mary McMacken**, retired, Tucson, **Gregory Nickel**, AMEC Earth & Environmental, Tempe **William Webb** of Amarillo, Texas. We regret to inform you of the death of former AMAX geologist **Kenneth Lovestrom** on December 17. Ken was active in GSN and AGS. Congratulations go to **Mary Poulton**, University of Arizona who was

appointed to the Board of the Arizona Dept. of Mines and Mineral Resources by Governor Napolitano. Current membership is 375.

Dues for the 2006 calendar year are due in January if your mailing label says "05" on it. Please consider a donation to the Courtright Scholarship Fund while you're filling out the renewal.

Update on AGS Symposium Ores & Orogenesis for September 2007

On December 16, AGS finalized arrangements with the Scarritt Group in Tucson to assist AGS with conference planning for our Symposium in Fall 2007. Scarritt will help us prepare a realistic budget and assist us with coordinating the facilities, food/beverage and publicity.



The **Publicity Committee** is getting ready to send out 4,000 First Announcement fliers in early January but word of mouth is already spreading news of the Symposium. Thanks to all who helped with prepping the fliers for mailing.

The Web Site is getting inquiries from interested geologist as more information is posted. The address is www.agssymposium.org. We should have preliminary information soon about the field trips, the general sessions, and sponsors so keep checking back in.

The **Sponsorship Committee** is visiting the offices of corporate industry leaders and mailing out invitations to sponsor various events. **SRK Consulting** is the first to step forward and will be sponsoring the Mining Life Cycles technical session led by Dirk Van Zyl, Colorado School of Mines. Please contact Sponsorship Chairman Donald Hammer at hammer@theriver.com if you are interested in supporting the society as a sponsor or advertiser.

We continue to look for interested folks to jump into the mix of volunteers. We currently have about 35 who are taking on registration, exhibits, advertising and publicity, field trip organization and guidebooks, and digest editing and publication. Please contact Eric Seedorff, General Chairman, at Seedorff@geo.arizona.edu if you are interested in helping out.

Upcoming meetings of the AGS Symposium Committee in 2006 will be on Wednesdays **January 11th** and **February 15th** at 5:30 pm at 353 ENRB (USGS Building) on the U of A campus.

Director -Ariz. Geological Survey



Please join AGS in welcoming **Dr. Lee Allison**, the new **Arizona State Geologist and Director of the Arizona Geological Survey**. Lee was formerly the Science and Energy Policy Advisor to the Governor of Kansas and former Director of the Kansas and Utah Geological Surveys. He formerly served as the Science and Energy Policy Advisor to Kansas Governor Kathleen Sebelius, on loan from the University of Kansas.

He previously was State Geologist of Kansas and Director of the Kansas Geological Survey for five years. Prior to assuming that position in 1999, he served as State Geologist of Utah for nearly 10 years. Dr. Allison holds a B.A. from the University of California, Riverside; an M.S. from San Diego State University; and a Ph.D. from the University of Massachusetts, Amherst, all in geology. He worked in petroleum exploration and production throughout the U.S. as well as in geothermal exploration.

He has given more than 140 presentations to civic, scientific, and legislative groups around the country. He is the author of over 80 technical publications and dozens of editorial columns. He received the national Public Service Award from the American Association of Petroleum Geologists in 2002 for his leadership in a variety of controversial issues in the geosciences. The Association for Women Geoscientists presented him the Tanya Atwater "Encourage" Award in 2003 for promoting the role of women in the profession. The murder mystery "Fault Line" by Sarah Andrews is loosely based on his role in dealing with earthquake hazards affecting Olympics facilities in Salt Lake City.

AGS members will be looking forward to hearing what Lee's goals are and vision is for the Survey. The Survey's web site is <http://www.azgs.az.gov>.

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At an early date, about 1863, the Bradshaw Mountains were invaded by gold-seeking placer miners from California. They found some gold deposits of value along Hassayampa River and Lynx Creek and at other places, but compared to those of California the gravels were not rich and this early placer mining left no permanent imprint on the region. Conditions were unfavorable as to transportation, and mining was handicapped by hostile Indians. Lindgren, Waldemar, 1926, Ore deposits of the Jerome and Bradshaw Mountains quadrangles, Arizona, U. S. Geological Survey Bulletin 782, 192 p., 2 sheets, scale 1:125,000.

AGS home page at www.arizonageologicalsoc.org/index.htm contains links to the AGS membership application, talk abstracts, field trip news, and to the **Arizona Geological Survey (AZGS) home page**. The AZGS web site has ordering information for both AGS and AZGS publications and a complete list of available publications. Membership dues are renewable on a calendar year basis.

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2006 Membership Application or Renewal (applications made after October 1 apply to the following year)

Dues (check box): 1 year: \$15; 2 years: \$30; 3 years: \$40; full-time student (student membership is free)

Name: _____ Position: _____

Company: _____

Mailing Address: _____
Street City State Zip

Work Phone: _____ Home Phone: _____

Fax Number: _____ E-Mail: _____

If registered geologist, indicate registration number and State (optional, will appear in directory): _____

Also enclosed is a _____ tax-deductible contribution to the J. Harold Courtright Scholarship Fund.