4:30 PM | Youshe, Li

SHORTENING WITHIN THE NORTHERN UHAA BLOCK AT CA. 9000-ASSESSING STRAIN CONTRIBUTIONS TO THE INDIAN SUBDUCTION EDWARDS, M. A.1, RATSCHBACHER, L1, R.1, PUSKAREV, Y.Y.1, STAIGER, M.2,3, BLUMENWITZ, M.2,3, KIDD, W.S.P.4, YOUSHE, L.K.1, and WU, Z.1, (1) Asian Tectonics Research Unit, Institute of Geology, TU-Bergakademie Freiberg, D-09596 Freiberg, Germany, edwards@geo.tu-freiberg.de, (2) Russian Academy of Sciences, St. Petersburg, St. Petersburg, 196485 Russia, (3) Institute for Geology u. Palaeontology, University Tubingen, Stuttgart, D-72076 Tubingen, Germany, (4) Dept. Earth and Atmospheric Sci. SUNY-Albany, Albany, NY 12222, edwards@geo.tu-freiberg.de, (5) Chinese Academy of Geol Sciences, Beijingwanzid Rd, Beijing 100037, China.

GeDepth / INDEPHT III surface geology investigations were conducted upon the tibetan plateau in the northern half of the Uhaa Block (30'-31'15' N, and 89'45' to 90'15'E). Our work includes structural mapping, fault kinematic analyses, geochronology and palaeomagnetic studies, encompassing a section from immediately south of the ESE-trending en echelon dextral wrench faults of the Karakoram-Jailu system (the syntaxes') chord to immediately adjacent to the Zagya Tsangpo fault, which is adjacent to the Zagya Tsangpo fault sub-crustal transe. The prevalent stratigraphy comprises folded and thrusted, mainly Cretaceous-age limestones with red and dark sand-, art-, and mudstones interlayered with volcanics. In the northern portion of the tranverse, structurally imbricated are volcanics, associated volcaniclastic sediments, and clasts of likely ophiolitic/clyastic arc type affilia. In the southern portion, Permain and older Mesozoic rocks are thrust N-wards upon the Cretaceous. Locally scattered throughout the section are 100'-m thick, S-ward thrust slices of serpentinite/piedmont with other volcanic rocks; they are part of the Jurassic-emplaced Donghol gneiss "nappes" that extends for >15 km south from the Bangong Suture (Ginzburg et al. 1984). In the main Cretaceous section, folding is open to tight and, where thrust displacements are constraining via stratigraphy, shortening amounts are 30-60 %, unevenly distributed along a bulk NNE axis. A range of K/Ar ages from interbedded volcanic rocks from Aptian to Campanian requires the shortening to be largest close to the river and less close to the river as we go closer to the Bangong suture. In the northermost portion of the traverse, a ca. 15 km section at Zagya Tsangpo comprises tightly folded red-beds completely overturned from the anticlinal blocks of the high Cretaceous metamorphic rocks of the Bangong thrust at an anti-clockwise rotation (left lateral sense) to the trace of Bangong suture. We infer N-vertic reverse local fault reactivation of the suture. Based upon both the marine facies of the adjacent Ama - Campanian rocks and nearby deposits of late Cretaceous seaway sediments, this reactivation must be due to the India-Asia collision.

5:15 PM | Brueckner, Hannes K.

"DUNT" TECTONICS AS A MODEL FOR THE EVOLUTION OF THE SCANDINAVIAN CALEDONIDES BRUECKNER, Hannes K., School of Earth & Environmental Sciences, Queens College 4 & The Graduate Center City University of New York, 160th St., New York, NY 10036; 2) San Carlos College of Columbia at Van Roermund, Gerald L.M., Vening Memingen Research School of Earth Sciences, Faculteit van de Geologie, Universiteit Utrecht, Utrecht, Holland.

SCIENCE 474, 313-324 (1995) 0036-874X/95 $03.00 01995 American Association for the Advancement of Science;

Due to the substantial changes in the geology and the evolution of the Scandinavian Caledonides, the term "Dunt" tectonics has been introduced by the authors of the paper cited above. "Dunt" tectonics refers to a particular type of tectonics characterized by the development of a large number of small-scale, imbricated thrust faults that are oriented in a sub-horizontal direction. These faults are often associated with the development of high-pressure, high-temperature metamorphic conditions, which can result in the formation of mafic and ultramafic rocks. The "Dunt" tectonics model has been applied to explain the development of the Caledonides of Norway, where it is believed to have played a key role in the formation of the Sveco-Finnmark Supergroup. The model has also been applied to other regions, such as the Gneiss Complex of the Canadian Shield, where it has been proposed that the development of imbricated thrust faults played a role in the formation of the Kaapvaal Craton.

8:00 PM | Fisher, George W.

SCIENTIFIC AND MORAL REFLECTIONS ON WATER IN THE 21ST CENTURY (Critical Issues Subcommittee of Geology and Public Policy; GSA Quaternary Geology & Geomorphology Division; Institute for Earth Science and the Environment) Hynes Convention Center, Ballroom B

1:30 PM | Fisher, George W.

WATER AND LIVES WOLMAN, M. Gordon, Johns Hopkins Univ, 3400 N Charles Street, Baltimore, MD 21218, wolman@jhu.edu

The great human project of the next century will be learning how 10 or 12 billion people can be fed, clothed, and housed. Questions of what will be available will be among the many contentious dimensions of the sustainability discussion. During the last century, global water consumption grew more than twice as fast as population. Roughly one-third of the world population now lives in areas subject to moderate to high water stress, and the U.N. projects that the proportion of people affected could double during the next 25 years. Allocation of water among countries bordering rivers like those in Jordan, the Nile, and the Colorado is a source of international tension. Allocation of water between agriculture, manufacturing, household use, and ecosystem maintenance are politically sensitive issues that will impact food availability, human health, and culture. To make effective, policy decisions we must consider issues of availability, efficiency, human equity, needs of ecological systems, and the well-being of future generations. To be seen as fair, they must involve the principal stakeholders. Negotiating this complex of competing needs and interests requires both a scientific understanding of the resources and a moral understanding of how different participants value water and understand the notion of equity.

A full discussion of water use must incorporate both scientific and moral reflection on water availability and allocation. Finding ways of connecting a scientific understanding of how the world works with a moral understanding of how humans ought to live has proven difficult, but it is essential to the sustainability of our civilization. We must explore these aspects of water use will be useful in understanding how best to approach the larger issue of sustainability.
A Subsidence belt timing has been determined by magnetic reversal stratigraphy, tephra chronology, unconformities and growth strata geometries in foreland basin strata. An increase in the growth strata rate in the western part of the foreland basin at about 8.5-9 Ma marks the onset of Subsabed deformation when a crystalline basement thrust plate to the west ramped up to the current decoulement level. Using vertical separation diagrams, we pinpoint the peak age of the Pintacay thrust at 7.6 Ma and the Baja Ophiolite at 7.3 Ma. Both were active simultaneously until at least 4.7 Ma. To the east initial deformation is younger: in the San Antonio Range fault movement began at 4.4 Ma, and the Aaguapa uplift started at 4.3 Ma. Since 4 Ma, 4 km, new and abandoned thrust faulting characterizes almost the entire Subsabed Ranges, especially after 2 Ma. In concert with the balanced sections, these results suggest shortening rates varying from less than 5 to as great as about 10-12 mm/yr over the last 10 Ma.

2:00 PM Picornell, Carlos M.

THE PAMPLONA FOLD-BELT GULF OF ALASKA: CONTRACTION IN AN EVOLVING OROCALCINAL BELT AT THE SUBDUCTION-TRANSFORMATION TRANSITION OF THE EASTERN ALLEAN ARC
PICORNELL, Carlos M., PAULIS, Terry, CERPA, Laura, and OSLUND, Ronald L.* (1) Univ New Orleans, 2000 Classic Dr, New Orleans, LA 70122-3001, juandefera@hotmail.com, (2) Univ Utah, 135 S 1480 E Rm 719, Salt Lake City, UT 84112 (2001)

The Pampola zone is the deformation front of an active fold-thrust system developed at the leading edge of the Yakutat microplate during collision of the microplate with the eastern end of the Aleutian trench. Published geologic and Quaternary geology studies onland suggest that the Yakutat microplate is converging with North America at essentially full North America-Pacific velocity, and thus, if the Pampola zone were a typical fold-thrust belt it should be absorbing most, or all, of this convergence. This is clearly not the case. Using public domain and industry seismic data from the offshore area between the Seward Peninsula and the central part of the Pampola zone, we produced balanced cross-sections across the two leading antitlines of the fold-thrust belt. Age control is limited, but two offshore exploration wells provide sufficient information to place the approximate contruction on the timing of fold development through two different episodes of growth strata on the fold limbs. Analysis of growth strata suggest little, if any, hinge migration and folding via a detachment fold mechanism. Restoration of these folds indicates only 0-2 km of shortening across these structures. At full North America-Pacific convergence rates this amount of contraction could have occurred within the last 20 Ka, yet the growth strata demonstrate that the folds developed over at least 600,000 Ka. Thus, the Pampola zone is absorbing only a small fraction, if any, of the directed convergence, which if so, may act to halt most, or all, of the present contraction is either occurring onland or to the west in the Yakutat Island zone; a band of previously recognized deformation that extends north-eastward from the Aleutian trench into the core of the orogen. We interpret the Pampola zone as a secondary effect of 4orocinal bending? In this model the Pampola zone is produced in the contractional ?inside corner? where the Yakutat microplate is unroofed as it is driven into the subduction-transform transition, and forced to modify the shape and internal structure of the Pampola zone. This model is consistent with the dip-slip within the core of the orogen along the Bagwell-Seward glacier trough, and may resolve the origin of the peculiar geometry of the Pampola zone, which culls obtusely across the topographo-bathymetric grain of the orogen.

2:15 PM O'Sullivan, Paul B.

EVIDENCE AND IMPULATIONS FOR OUT-OF-SEQUENCE STRUCTURES IN THE SADRILCHET MOUNTAINS REGION OF THE ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA
O'SULLIVAN, Paul B., Department of Earth Sciences, Syracuse Univ, Syracuse, NY 13240, POSullivasyr.edu and WALLACE, Wesley K., Univ Alaska - Fairbanks, PO Box 755780, Fairbanks, AK 99777-5780

Field and seismic thermochronology, and structural analysis constrain the timing and structural development of the Sadrilchet Mountains, located along the southern edge of the coastal plain in the Arctic National Wildlife Refuge (ANWR) of northeastern Alaska. Rocks exposed south of the Sadrilchet Mountains into Wrangel Island from the coast were dated by fission-track and apatite fission-track ages from ele- vated palaeotemperatures at ~45 Ma and at some time since ~31 Ma, while similar-aged rocks exposed along the northern flank of the Sadrilchet Mountains cooled rapidly at ~45 Ma and ~40 Ma, respectively. The apparent ages suggest that the Sadrilchet Mountains, indicate that the sampled sequence experienced progressive heating during the Late Cretaceous to Early Cenozoic prior to cooling rapidly at ~45 Ma. Combined, the thermo-chronology results indicate that the Sadrilchet Mountains region experienced progressive heating up to Middle Eocene time, after which two major episodes of rapid cooling occurred in the Middle Eocene at ~45.3 Ma and in the Late Oligocene at ~27.2 Ma.

These episodes of rapid cooling are interpreted to have occurred in response to km-scale erosional denudation, which resulted from uplift due to structural thickening during the emplacement of horizons in a basement-involved duplex. Initially, at least one horse was probably active in the north of the belt. Subsequent denudation at ~27 Ma: 1) the Sadrilchet Mountains horse was probably emplaced behind the earlier emplaced horse(s), and thus was out of sequence, and 2) basement-involved deformation formed structures beneath the coastal plain to the north.

These results indicate that potential hydrocarbon source rocks in the vicinity were exposed to peak burial temperatures prior to Middle Eocene time, after which they experienced rapid cooling during the initial episode of structural deformation. Therefore, hydrocarbon generation from these source rocks probably occurred before formation of the Beluga fault, at approximately 40-45 Ma and 75-80 Ma independently of the northern Sadrilchet Mountains.

2:30 PM Bump, Alexander P.

THREE-DIMENSIONAL LARAMIDE DEFORMATION OF THE COLORADO PLATEAU: IMPACTING COMPETITORS OF THE SEVENIER THRUST AND THE FLAT PARALAB SLUMP
Bump, Alexander P., Department of Earth and Atmospheric Sciences, Univ of Arizona, 1040 E 4th St, Tucson, AZ 85721, abump@geo.arizona.edu

Kinematic analysis of six Laramide basement-cored uplifts on the northern Colorado Plateau indicates that four of the uplifts (the Kalab, Circle Cliffs, Miners Mountain, and Uncompaghre uplifts) were constructed by northeast-directed shortening while the remaining two (that San Rafael Swell and Monument Uplift) were constructed by southeast-directed shortening. Available strain data suggest that the uplifts were approximately the same age (~72-65 Ma; Lawton, 1983, Goldfarb, 1994), predating the possibility that they formed sequentially in response to a progressive rotation of regional stresses.

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On every odyssey there are milestones