

Addendum: Newsletter section on Accrete theme session

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Note: The following theme session summary was solicited for the March, 1998 Structure and Tectonics Newsletter but, due to a very unfortunate misunderstanding, it missed the publication deadline.

The significance of the Coast shear zone (CSZ) on the development of the western North American cordillera was the subject of a theme session at the annual G.S.A. meeting in Salt Lake City, chaired by John Diebold (Lamont Doherty Earth Observatory, Columbia University) and Lincoln Hollister (Princeton University). The CSZ can be traced for at least 800 km through southeast Alaska and northern British Columbia, and it may be over 2000 km long. There were eighteen contributed papers for the theme session*.

Highlights of the theme session included the presentation of:

- newly processed seismic data showing that the CSZ is truly crustal-scale and is nearly vertical from the surface to the Moho;
- new paleomagnetic results sparking much interest because of their high quality but different possible interpretations;
- recognition of patterns of deformation based on mapping and kinematic analysis indicating a transpressional regime dominated from late Cretaceous to early Tertiary, which was followed by a terminal regime of early Tertiary extension. U/Pb ages on melts which are affected by different rock fabrics have been particularly useful for defining the structural history of the CSZ

Because the CSZ is a relatively recently recognized major tectonic feature, its definition continues to be in flux. We attempt here a definition which is very likely to evolve as more work is done on it:

The Coast shear zone is a near-vertical, crustal-scale shear zone that formed at high temperatures (>600°C). The early Tertiary history of the CSZ includes east side up followed by west side up relative movement. This displacement history followed a period when the CSZ represented the western boundary of a transpressive shear zone, now mainly occupied by late Cretaceous to early Tertiary plutons. Plutons in this age range occur up to the CSZ along its eastern side, and they do not occur west of it.

Questions that were addressed in the papers presented included :

What is the width and length of the CSZ? Is it confined to the region from near Juneau to Prince Rupert, or does it extend for the full length (>2000 kms?) of the Coast Mountains, from Juneau to Washington state? Does it continue to the western Idaho shear? Does the Denali fault of Alaska continue into the CSZ? If so, how and where is the displacement on this fault system accommodated? Is its width limited to the approximate 5 km zone of high strain, or does it extend to the east where it would be largely obscured by melting and later plutons?

What was its history and kinematics? Did its pre early Tertiary history include a substantial (over 1000 km) component of strike slip motion? Is it part of a transform plate boundary? Is it a terrane boundary? Why is there a sharp western boundary of late Cretaceous to early Tertiary

plutonic rocks that appears to coincide with the location of the CSZ where it has been defined? Even where the CSZ has not been defined, there is a sharp western limit for late Cretaceous to early Tertiary plutons which extends for the full 2000 km of the Coast Mountains.

What is the relation of the CSZ to the proposed late Cretaceous Baja BC fault system? This fault system was defined by Cowan et al (1997) to account for possibly thousands of km of right lateral transport with respect to North America during the Late Cretaceous. Anomalous paleomagnetic poles have been reported from tectonostratigraphic terranes located outboard of the CSZ and have been used to support the interpretation of large scale northward translation of these terranes. Is there an eastern bounding line for these anomalous paleopoles and, if so, what is its relation to the CSZ? New paleomagnetic data obtained as part of the ACCRETE project imply that tilting is a likely explanation for the observed patterns of paleopoles, but the timing and mechanism of the tilting have yet to be resolved.

The CSZ is one target of a large multidisciplinary study that formally began with a 1993 controlled source seismic experiment along a 200 km fjord at the Alaska - British Columbia border. This study, which is called ACCRETE**, continues with collaborative geophysical, geochemical, and geological studies along the line of the seismic transect, which crosses the CSZ.

The new seismic data from ACCRETE indicate that mid-Cretaceous, west-vergent thrust fabrics located west of the CSZ can be traced down-dip to the east where they appear truncated under the surface exposure of the CSZ. These data also show that the Moho increases in depth to the east across the CSZ by about 5 km over a horizontal distance of 15 kms. East of the CSZ, horizontal (in section) deep crustal reflectors underlie late Cretaceous to early Tertiary plutons of the Coast Plutonic Complex. This crust has a higher than normal average crustal velocity and a keel of high velocity material not found to the west of the CSZ. Another result of the seismic study was the discovery of west (in section) dipping reflecting horizons that shallow into the lower crust above Moho arches and terminate in the upper crust under late Miocene grabens; these data indicate that the region was extended during the late Tertiary.

All in all, the papers presented collectively show that multidisciplinary collaboration on specific geological and geophysical problems yields results difficult to obtain using individual techniques.

*Presenters, in order, were David Brew, George Gehrels, Cathy Manduca, Carol Evenchick, Robert Butler, John Diebold, Scott Smithson, Keith Klepeis, Bill McClelland, Maria Luisa Crawford, Chris Andronicos, Lincoln Hollister, Jay Thomas, Krishna Sinha, Dominique Chardon, Susie Gareau, Harold Stowell, and Jim Metcalf.

**Scientists involved in ACCRETE, and who are funded from the Continental Dynamics program of NSF, are at Beloit College; Bryn Mawr College; Columbia University; Princeton University; Universities of Arizona, Wisconsin, and Wyoming; and Virginia Polytechnic Institute.

Lincoln S. Hollister Dept. of Geosciences Princeton University Princeton, NJ 08544	Keith Klepeis Dept. of Geology and Geophysics University of Sydney NSW 2006 AUSTRALIA
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Lincoln S. Hollister
Department of Geosciences
Princeton University
Princeton, New Jersey 08544
Phone: (609) 258-4106
Fax: (609) 258-1274
<http://geoweb.princeton.edu/research/ACCRETE/accrete.html>