Penrose Conference , August 17–22, 1999

Marine Eocene-Oligocene Transition

During the Eocene-Oligocene transition, a critical period in earth history, the "greenhouse" conditions of the middle Eocene were gradually replaced by the "icehouse" conditions of the early Oligocene. In the past 20 years, enormous strides have been made in our understanding of the global climatic changes of the Eocene and Oligocene, especially in the pelagic marine record of the world.

The focus of the GSA Penrose Conference, "The Marine Eocene-Oligocene Transition," August 17–22, 1999, will be to synthesize our current understanding of the deep marine and pelagic record of Eocene-Oligocene climatic and biotic events, and then to relate that synthesis to the shallow marine records of various continents, especially North America. The site of the conference, Evergreen State College, Olympia, Washington, in the beautiful forests of the Olympic Peninsula, will allow us to take a mid-meeting field trip to fossiliferous Eocene and Oligocene outcrops in the area, and to collect fossils from both sides of the Eocene-Oligocene boundary. Excellent fossil records of the bivalves, gastropods, echinoids, and foraminifera (as well as other marine groups) are known from the Gulf Coast, Atlantic Coast, and Pacific Coast, but for decades, their correlation to the global time scale was very imprecise. New correlations using magnetic and isotopic stratigraphy have greatly enhanced our cross-comparisons among the Atlantic, Gulf, and Pacific coasts. These data will allow us to consider changes in diversity and ecology in shallow-marine organisms throughout the entire late Paleogene, and correlate those events precisely to the global time scale and its record of climate. In addition, many of these shallow marine sediments will have also yielded a stable isotope record for the first time, allowing direct comparison with the global isotopic signal. Thus, we invite specialists in late Paleogene fossils, stratigraphers, isotope geologists, paleoclimatologists, and anyone else with important data on this time interval to apply.

The sessions will update the stratigraphic context for the Atlantic, Pacific, and Gulf Coasts, and then analyze the isotopic and paleontological records of each of these regions. Questions to be considered are: How did diversity and turnover change through the 12 m.y. (49–37 Ma) of the middle Eocene? Do climatic and/or biotic changes appear to have occurred gradually or in a stepwise fashion through this interval? Do participants' databases show a dramatic extinction at the end of the middle Eocene (37.0 Ma)? Are there any events correlated with the mid–late Eocene (35.5–36.0 Ma) impacts now documented from the Chesapeake Bay area and Siberia? Are there indications of a dramatic cooling in the earliest Oligocene (33.0 Ma)?

The conference is limited to 80 participants. We encourage interested graduate students to apply; some partial student subsidies will be available. The registration fee, which covers lodging, meals, field trips, and all other conference costs except personal incidentals, is not expected to exceed $700. Participants will be responsible for transportation to and from the conference site.

Co-conveners are ***Donald Prothero,*** Dept. of Geology, Occidental College, Los Angeles, CA 90041, (213) 259-2557, fax 213-259-2704, prothero@oxy.edu; ***Linda Ivany,*** Museum of Paleontology, University of Michigan, Ann Arbor, MI 48109, (313) 763-9253, ivany@umich.edu; ***Elizabeth Nesbitt,*** Burke Museum of Natural History and Culture, University of Washington, Box 343010, Seattle, WA 98195, (206) 543-5949, lnesbitt@u.washington.edu.

The application deadline is February 15, 1999. If you wish to participate send a letter of application to Donald Prothero (address above), including a brief statement of interests, the relevance of your recent work to the themes of the meeting, and a proposed title of your presentation (oral or poster; poster preferred). Invitations will be mailed to participants by March 15, 1999. ■

LETTERS

Big Tough Ediacarans

Narbonne (1998) has continued to promote the idea that Ediacaran fossils (Vendobionta) were soft-bodied animals by suggesting that their remarkable preservation in quartz sandstone was facilitated by microbial mats, which created a "death mask" of the fossils. His illustration of a specimen of *Spriggia* on a large rip-up carbonaceous film (Narbonne, 1998, Fig. 10) is an important new piece of evidence in the controversy concerning preservation of these problematic fossils. Like other recently discovered Vendobionta (Crimes et al., 1995; Crimes and Fedonkin, 1996), Narbonne's carbonaceoous film with an undistorted *Spriggia* reveals the extraordinary rigidity of these fossils. It also is evidence that sessile mats with Ediacaran fossils could be transported from shallow to deep water. The rigidity of Ediacaran fossils and associated matlike organisms is quite unlike jellyfish, pond scums, or unmineralized microbial mats of my experience.

Arguments such as those presented by Narbonne for microbial preservation of Ediacaran fossils still require a microbial consortium of unusual rigidity and toughness, comparable to those of lichens with their structural chitin (Retallack, 1994, 1997). Recent discovery of exquisitely preserved Devonian lichens is stimulating workers to reexamine a variety of permineralized Precambrian fossils as possible lichens (Taylor et al., 1997).

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Lichens They Are Not

Retallack continues to promote his idea that the Ediacara biota consisted entirely of lichens (Retallack, 1994), an interpretation that has already been criticized by Waggoner (1995). In addition to Waggoner's many objections, modern lichens are photosynthetic and nonmarine, whereas Ediacaran fossils were exclusively marine and occur in life position in probable deep-slope and fan deposits

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Sign Up Now!

Birdsall-Dreiss Distinguished Lecturer for 1999 Announced

Stuart Rojstaczer, Duke University, will be the 1999 Birdsall-Dreiss Distinguished Lecturer. He will speak on one of three topics by request from interested institutions. All talks are aimed at audiences broadly interested in the earth sciences.

Rojstaczer received a B.S. degree from the University of Wisconsin, an M.S. from the University of Illinois, and a Ph.D. from Stanford University. Formerly a research hydrologist with the U.S. Geological Survey, he has been at Duke University since 1990. At Duke, he serves as an associate professor of geology, environment and engineering, and as director of the Center for Hydrologic Science. He has published numerous research articles on a wide range of topics involving subsurface fluid flow and is the author of *Gone for Good: Tales of University Life After the Golden Age* (Oxford University Press, 1999).

To request a visit to your institution during this tour, go to http://www.aas.duke.edu/cgi-bin/geo/birdsall_dreiss.pl, where you will find an easy to use web-based request form, or contact Stuart Rojstaczer directly (Division of Earth & Ocean Sciences, Duke University, Box 90230, Durham, NC 27708, (919) 684-3159, fax 919-684-5833, stuart@duke.edu). We are particularly interested in including liberal arts colleges in the itinerary. The Hydrogeology Division pays transportation expenses; the host institution is expected to provide for the lecturer's local expenses.

TALK TOPICS

• Geysers: Why Are They So Rare and What Might They Indicate About Deformation in Areas of Active Tectonics?

Geysers are admired for both their beauty and rarity. Historical data, some of which are undoubtedly of questionable quality, indicate that variations in geyser and hydrothermal system behavior are partly controlled by tectonic deformation and may even provide clues to preseismic behavior near plate boundaries. We present a model of geyser mechanics that serves to explain why geysers are rare relative to other hydrothermal features, such as fumaroles and warm springs. We also present the first comprehensive effort to monitor geyser activity in the Old Faithful region of Yellowstone National Park over a lengthy (one year) time period. The data indicate that geyser behavior can be sensitive to small elastic deformation. Thus, historical accounts of unusual geyser activity associated with regional seismic events may reflect local elastic deformation induced by regional tectonism, and may not be as far-fetched as generally thought.

• Truly Useful Prediction of Subsurface Contaminant Transport: Can We Ever Have Enough Data?

The threat of contamination of well water is a world-wide problem, and the future costs associated with clean-up of contaminated aquifers or containment of contamination potentially will cost trillions of dollars. In order to assess the risk of contamination and devise effective clean-up strategies, it is imperative that we be able to predict rates and directions of contaminant movement. Understanding spatial variability and scaling of permeability is a key to predicting contaminant transport in the shallow subsurface. Conventional testing of permeability is generally done at too large a scale and at a resolution too coarse to allow for truly useful prediction of contaminant transport in the preponderance of cases. Our successes and failures in prediction of contaminant transport indicate that improvements in prediction will depend heavily on improving methods of imaging the permeability of the subsurface rather than improving our mathematical models of contaminant transport.

• Faults and Fluids: What Can We Learn About Brittle Failure in the Crust From Shallow Subsurface Hydrology?

Groundwater at depth has been hypothesized to play an important role in fault generation and fault motion. The temptation has been to assume that shallow subsurface hydrology is sometimes significantly coupled to deep-seated geologic and hydrologic processes in and around fault zones. Monitoring of shallow subsurface hydrology in areas of active tectonics can provide valuable information about crustal behavior. During aseismic periods, we can quantitatively use pore-fluid pressure to monitor elastic deformation near and within faults. The response of shallow groundwater and surface water to earthquakes also gives us information on the state of stress in the near surface and the susceptibility of the near surface to brittle failure. But evidence for significant coupling between shallow and deep hydrology is generally lacking. Evidence of the interaction between faults and fluids is currently heavily dependent on geophysical imaging and geological examination of exhumed fault zones. If we wish to significantly improve our understanding of the interaction between faults and fluids at depth, we will likely need to monitor hydrology at seismogenic depths directly. ■

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below the euphotic zone (see Narbonne, 1998, and references therein). Retallack's argument that these could not have been deep-marine because the deposits in Newfoundland include "red beds" (actually red shales) and those in the Mackenzie Mountains have a "calcareous composition" (Retallack, 1994, p. 537–538) ignores the fact that red mud and carbonates are the two most characteristic sediments on the deep sea floor of modern oceans (Kennett, 1982; Stow et al., 1996).

Retallack's view that no modern bacterial and algal mats are rigid or tough is perplexing in light of an extensive literature to the contrary (e.g., Gerdes et al., 1993; Krumbein et al., 1994).

Most important, the tremendous disparity in body plans, composition, and symmetry evident in the Ediacara biota suggests that attempts to shoehorn these organisms into any single taxonomic group is inappropriate, and may hinder our understanding of their paleobiology.

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