### CALL #: QE1 .G87
### LOCATION: KKS :: Main Library :: Hale Library Stacks
### TYPE: GSA today
### JOURNAL TITLE: GSA Today
### KKS CATALOG TITLE: Penrose Conference Report ??" Large Lake Systems and their Stratigraphic Record.
### ARTICLE TITLE: Cohen, A.S. and Johnson, T.C.
### ARTICLE AUTHOR: 1
### VOLUME: 1991
### ISSUE: don't know
### MONTH: 1052-5173
### YEAR: OCLC #:
### PAGES: 528451
### ISSN: CROSS REFERENCE ID:
### VERIFIED:

### BORROWER: AZU :: Main Library
### PATRON: COHEN,ANDREW S
### PATRON ID:
### PATRON ADDRESS:
### PATRON PHONE:
### PATRON FAX:
### PATRON E-MAIL: acohen@geo.arizona.edu
### PATRON DEPT: GEOSCIENCES
### PATRON STATUS: Faculty
### PATRON NOTES:

---

This material may be protected by copyright law (Title 17 U.S. Code)  
System Date/Time: 9/19/2008 3:14:15 PM MST

---

https://rapid2.library.colostate.edu/ILL/ViewQueue.aspx?ViewType=PendingByBranch&Id...  9/19/2008
Penrose Conference Report
Large Lake Systems and Their Stratigraphic Record

Conveners: Andrew S. Cohen
Department of Geosciences
University of Arizona, Tucson, AZ 85721

Thomas C. Johnson
Duke University Marine Laboratory
Beaufort, NC 28516

Large lakes of the world span all climatic zones and vary significantly in their origin (i.e., tectonic, glacial), chemistry (saline vs. fresh), and response to climatic forcing. Until recently, large lakes have been largely neglected in our analysis of modern environmental processes. Understanding Earth history or building sedimentological models that can be applied to study of modern sediments is slow. During the past few years, however, significant new information has been obtained on the structure and sedimentology of large lakes in Africa, North America, and Asia. Conclusions from these studies have resulted in a growing awareness and understanding of the sedimentary record in ancient lakes deposits in these diverse areas as geochemistry, basin modeling, Quaternary and pre-Quaternary paleoclimate, and climatic events. A Penrose Conference on Large Lakes and Their Stratigraphic Record was held at North Lake Tahoe, California, Sept. 9-13, 1990, to consider these diverse areas in light of current goals to allow geologists working on ancient lake deposits and geologists, geophysicists, and limnologists working on modern lakes to communicate their interests, problems, and recent results that provide a perspective for the formulation of future research directions. The 75 participants (including four students) from nine countries came with a vast array of backgrounds and research interests on lakes and lakes. Lake tahoe is the only of these lakes that has experienced significant changes in water level and water chemistry. The diversity of the lake has been evident in a provocative keynote address by David Livingstone, who pointed out that the lake's evolution does not involve a simple, well-structured, and well-defined history. The lake's evolution is characterized by a series of rapid and dramatic changes in water level and water chemistry. These changes have been influenced by a variety of factors, including changes in climate, changes in land use, and changes in the lake's biological community. The lake's evolution has been characterized by a series of rapid and dramatic changes in water level and water chemistry. These changes have been influenced by a variety of factors, including changes in climate, changes in land use, and changes in the lake's biological community. The lake's evolution has been characterized by a series of rapid and dramatic changes in water level and water chemistry. These changes have been influenced by a variety of factors, including changes in climate, changes in land use, and changes in the lake's biological community.

The Congressional Science Fellow Program was created to provide opportunities for the U.S. Congress to deal with the growing number of issues it faces with significant scientific and technological components. The program is a cooperative effort of approximately 20 national scientific and engineering organizations. Each organization selects and sponsors one or more professional associates who serve as special legislative assistants in congressional offices for one year. The program was begun in 1973, and it is administered by the American Association for the Advancement of Science (AAAS). The Geological Society of America has participated in the program since 1986.

The Congressional Science Fellows serve in the office of a Senator, a Congressman, a congressional committee, or a congressional support agency. The fellows gain firsthand experience about the legislative process, and they make practical contributions to public policy through the application of their scientific and technical knowledge. They communicate to policymakers the views of scientists, and they communicate to scientists the nature of the legislative process.

The fellowship begins with an intensive orientation program organized by the AAAS. The orientation program, which is highly regarded on Capitol Hill, provides an introduction to the substantive, procedural, and political aspects of public policy. It features meetings with members of Congress and their staffs, as well as briefings at the Congression al Research and Development Committee, the U.S. Office of Technology Assessment, and the Congressional Research Service.

The orientation program is limited to the legislative branch of the U.S. government. We meet with the Assistant to the President for Science and Technology, the chief of staff of the White House Office of Science and Technology Policy, and representatives from the National Science Foundation, NASA, the Department of Energy, and other executive agencies. We also met with representatives from nongovernmental organizations, including the World Bank and the National Academy of Sciences.

After fellows complete the orientation program, their next step is to secure placement in an appropriate congressional office. The demand for Science Fellows is much greater than the available supply. I interviewed with about a dozen personal and committee offices in both the House and the Senate. I considered several attractive opportunities before deciding to serve in the Senate, on the staff of the Subcommittee on Technology and Science. The chairman of this subcommittee is Senator Patrick Leahy of Vermont. The subcommittee was created in 1987, and it has had a strong scientific and engineering orientation.

A central goal of the Subcommittee on Technology and Science is to update our laws so that we keep pace with advances in technology.
Penrose continued from p. 51
of petrofacies boundaries. The discussion of these topics was continued on the second day of the field trip around the lake.

"Lake Basin Analysis," the theme for the second day of the field trip, generated lively evening discussion about the nature of tectonic and climatic controls on lacustrine basin graphic sequences and the degree to which deterministic models of basin development can be used to predict lake history patterns. Using the complex history of the Late Cretaceous Tertiary frontier inland lakes of the western United States as an example, Tom Pough argued that most ancient lake deposits are, by their very preservation, atypical systems. Lakes with an excellent stratigraphic record, which persist for long periods of Earth history, therefore may be telling us as much about profound disruptions in Earth's crust as they are about the climatic controls on lake development. Bill Bozworth synthesized much of the recent development of understanding the structural controls on rift basin development. He proposed that most present-day rift basins may be understood by a basal detachment fault, which in turn regulates the gross asymmetry in rift-basin tectonics and deposition. The precise position of a detachment fault as it intersects the earth's surface probably regulates the position of the sedimentation zones (which segment rift basins), and reversals in half-graben geometry. Bozworth and his colleagues argued that when viewed over the entire rift basin history, lake development and sedimentation may follow a predictable path controlled largely by structure and only secondarily by climate. The interplay of tectonic and climatic history in determining patterns of lacustrine deposition also figured in several of the poster presentations (Thomas Kreuser, Alan Carroll).

Much of our understanding of the relation between structure and stratigraphy in lake basins has come about by way of the vastly improved quality of seismic data (both high resolution and multichannel) recently available for both ancient lake deposits in the modern lakes. The 5000 km of multifold reflection data obtained by Project PROBE in therift lakes today demonstrate the utility of a sequence stratigraphic approach to understanding basin architecture, in a full rift development a basin characterized by terminal margins (Craig Scholl). Important differences between the two environments are evident however, in the rarity of progradational packages and downwarping terminations within the rift lakes in comparison with the oceans. New seismic and core data from Lake Baikal obtained by Steve Colman and Doug Williams was also the subject of much discussion. In the case of the glacial lakes of New York and Canada, Hank Mullins showed how an integration of seismic, piston and drill core, and down-hole geophysics can be used to infer both glacial development and lake history. Glacial lake development and climatic features associated with glaciation are readily imaged below post-glacial lake basins. Angela Teixera and Ted Moore presented a poster on seismic profiles and side-scan sonar records from Lake Linn, which showed large circular depressions that may result from the last deglaciation. Bob Goodell displayed high-resolution seismic profiles from lakes in Quebec that indicated considerable disruption of stratigraphy by dewatering of glacial sediment and the effects of earthquakes. Under the rubric of the third day's theme, "Deciphering the Lake Record," conference participants looked at recent geochronological, geochemical, and paleontological developments in the analysis of lake deposits. Mike Talbot, in his keynote address, discussed the interpretation of C and O stable isotopic data from lakes. Patterns of covariance between C14 and POC may be useful indicators for distinguishing closed-basin from open-basin conditions. Complementary data about ancient lake conditions may be derived from 210Pb analyses, which appear to be linked to patterns of nutrient cycling and nitrogen fixation. Thure Cerling reviewed the cycling of major ions in lake systems worldwide. He stated the data from Lake Turkana, Kenya, how mass-balance studies can be used to infer patterns of ecological and volcanic processes on a global scale. Thomas Kreuser presented evidence for 230Th and 231Pa sedimentary ice core in large closed-basin lakes during the late Quaternary. Advances in understanding the organic geochemistry of lake deposits were reviewed by Lisa Pratt. Unraveling the carbon cycle in lakes and its effect on organic carbon deposition has been difficult because of the myriad of processes affecting this cycle. Better understanding of the meaning of biomarker data as well as new developments in gas chromatography and mass spectrometry techniques hold great promise for resolving this problem. Case studies utilizing both organic and inorganic geochemical techniques in paleoclimatological studies of lake systems were presented as posters by Elaine Kennedy, Gary Isakson, George Smith, and Mary Rose Cassa. William Botsworth and P.J. Prinn demonstrated an approach using diagenetic and biogeochemical analyses of pollen, ostracodes and dinoflagellates, which has now been pushed back well into the pliocene (David Adam). As the poster sessions demonstrated, high-resolution records of environmental change from lake deposits using these and other techniques are available for many other time periods and parts of the world (Margaret Jenks, Russell Dubiel, Lisa Coshel, Mark Newton, Kathleen Campbell, Steve Colman, Rick Forester, Qian Wu).

The complexity of controls of the global climate system on lake levels and lake basin development provided the theme for the final two papers by Mary Perlmutter and Aline Wanninkhof. "Deciphering your paradigms," Perlmutter argued for a cyclostratigraphic approach to interpreting climatic changes. Changes in the latitudinal development of lakes in the past may be less a function of changing tectonic configurations than of orographically forced changes in the positions of the polar and Hadley cells. Thus, some lakes may be formed under cool conditions of precipitation, insolation, and evaporation which have no precise analog in the modern climate regime. Street-Perrott discussed the linkage between North Atlantic Ocean circulation patterns and abrupt lake-level fluctuations in Africa. Variations in the linkages among ocean salinity, deep-water thermostad circulation, and cross-Atlantic heat transport conspiring to radically alter precipitation patterns to the extent that abrupt changes in lake levels change extremely rapidly.

High-frequency lake-level excursions are commonly observed at the last day of the conference—this time in the field, at Mono Lake. The field trip, run by Susan achievement, centered on the evidence for lake-level fluctuations during the late Pleistocene and Holocene. The focus of the trip was on finding patterns with a final opportunity to thrash out the questions of climate vs. tectonic controls on lake basin development.

Acknowledgments
We thank Covson, Exxon, and Amoco Oil Companies for their generous donations toward this conference.

Penrose Conference Participants
David P. Adam
Roger Y. Anderson
Paul A. Baker
Larry Benson
Gerry Bruland
William Botsworth
James McHugh
Tom Campbell
Mary Rose Cassa
Glenn Cayley
Thure Cerling
Andrew S. Cohen
Steven Colman
Lee Coshel
Richard Craig
Jonathan O. Davis
Carl Drummond
Russell Dubiel
Jack Diamond
Bruce Ericksen
Kathryn Flanagan
Richard Forester
Thomas Fouach
Dora Gallegos
Gerry Genik
Elizabeth Glawowski
Korres
William Halsey
John Halfman
Nicholas Harris
Qiu Nan
Gary Isakson
Margaret Jenks
Thomas C. Johnson
Kathy Kennedy

Manuscripts
The Pleistocene lakes of western North America provide an opportunity to investigate the relation between climate change and lake-level fluctuations in a diversity of complex hydrological systems. Larry Benson, Fred Phillips, and Plant Bradbury showed how the lake systems west of the Rocky Mountains have responded in differing fashions to climate change, as a response to variations in the location of the "Pacific Link". A detailed record of paleoclimatic change in the Great Basin, as told in another poster and biogeochemical analyses of pollen, ostracodes and diatoms, has now been pushed back well into the pliocene (David Adam). As the poster sessions demonstrated, high-resolution records of environmental change from lake deposits using these and other techniques are available for many other time periods and parts of the world (Margaret Jenks, Russell Dubiel, Lisa Coshel, Mark Newton, Kathleen Campbell, Steve Colman, Rick Forester, Qian Wu).