

New Dynamic Classification of Lake Systems and Their Geologica...

https://gsa.confex.com/gsa/2008AM/finalprogram/abstract_149229.htm

2008 Joint Meeting of The Geological Society of America, Soil Science Society of America, American Society of Agronomy, Crop Science Society of America, Gulf Coast Association of Geological Societies with the Gulf Coast Section of SEPM

Paper No. 151-18

Presentation Time: 8:00 AM-4:45 PM

New Dynamic Classification of Lake Systems and Their Geological Records

OLSEN, Paul E., Department of Earth and Environmental Sciences, Lamont-Doherty Earth Observatory of Columbia University, 61 Route 9W, Palisades, NY 10964-1000, polsen@ldeo.columbia.edu

I propose a classification of lakes and their records based on three variables: **MLD**, maximum lake depth from floor to outlet; **PMD**, potential mean depth of the lake relative to MLD unconstrained by the outlet or lake floor; and **AWB**, amplitude of water balance variability deviating from PMD. If $AWB = 0$, we have Carroll & Bohacs (1) lake types: "overfilled", with $PMD > MLD$; "balanced fill", with $PMD = MLD$; and "underfilled", with $PMD < MLD$. However, $AWB \neq 0$ and fluctuates in time in frequency and amplitude, leading to a huge range of lake behavior and sediment sequence types. Consider an AWB in the form of the precession parameter. If $PMD > MLD$ and negative AWB excursions $< MLD$, the lake will be deep most of the time with deviations consisting of low stands at times of maximum precessional variability (mpv) [e.g., Lake Malawi cores (2)]. If PMD is close to but not below the lake floor, and positive AWB excursions $> MLD$, the lake will be mostly shallow punctuated by high-stands at mpv with flushing preventing extensive evaporites [e.g., Newark basin cores (3)]. But if PMD is close to or below the base of MLD , and AWB is less than MLD , the lake and its record may be dominated by short periods of high-stands at mpv, and long periods of evaporite production [e.g., Wilkins Peak Mb., Green River Formation cores (4)]. These variables express volumes in phase space into which lakes and their records occur, and have the advantage of being translatable into models that can explore behavior of lakes under varying tectonic, accumulation, and watershed regimes. References: 1 Carroll & Bohacs, 1999, *Geology* 27:99; 2 Cohen et al., 2007, *PNAS* 104:16422; 3 Olsen & Kent, 1996, *PPP* 122,1; 4 Machlus et al., 2008, *EPSL* 268:64.

2008 Joint Meeting of The Geological Society of America, Soil Science Society of America, American Society of Agronomy, Crop Science Society of America, Gulf Coast Association of Geological Societies with the Gulf Coast Section of SEPM
[General Information for this Meeting](#)

Session No. 151--Booth# 234

[Lake Cores: Climate Change and Tectonics \(Posters\)](#)

George R. Brown Convention Center: Exhibit Hall E

8:00 AM-4:45 PM, Sunday, 5 October 2008

Geological Society of America Abstracts with Programs, Vol. 40, No. 6, p. 166

© Copyright 2008 The Geological Society of America (GSA), all rights reserved. Permission is hereby granted to the author(s) of this abstract to reproduce and distribute it freely, for noncommercial purposes. Permission is hereby granted to any individual scientist to download a single copy of this electronic file and reproduce up to 20 paper copies for noncommercial purposes advancing science and education, including classroom use, providing all reproductions include the complete content shown here, including the author information. All other forms of reproduction and/or transmittal are prohibited without written permission from GSA Copyright Permissions.
