

ABSTRACT FORM FOR ALL GSA MEETINGS IN 1995

Complete all sections ① through ⑨ below.

① TYPE ABSTRACT COMPLETELY WITHIN THE BLUE LINES BELOW. (10 point type minimum)

② CHECK ONE DISCIPLINE (category) below in which reviewers will be best qualified to evaluate your abstract.

No 12908

STABLE CARBON ISOTOPES IN POST-GLACIAL LAKE SEDIMENTS: A TECHNIQUE FOR TIMING THE ONSET OF PRIMARY PRODUCTIVITY AND VERIFYING AMS ¹⁴C DATES

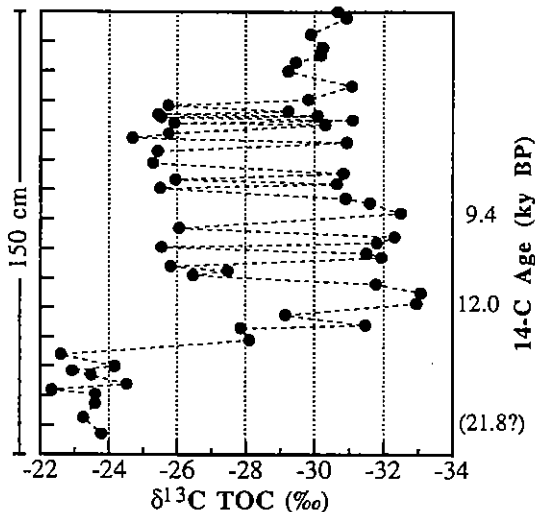
LINI, Andrea, BIERMAN, Paul R., LIN, Li, Department of Geology, University of Vermont, Burlington, VT 05405; DAVIS, Thompson P., Department of Natural Sciences, Bentley College, Waltham, MA 02154.

Stable carbon isotope geochemistry provides a tool for distinguishing the two primary sources of organic matter (OM) incorporated into lake sediments, namely allochthonous detrital OM originating from the surrounding watershed and autochthonous OM produced by aquatic organisms. This technique is being applied to samples from AMS ¹⁴C dated (LLNL) sediment cores collected from post-glacial lakes in northern Vermont. In addition to enabling us to assess past changes in the chemical and physical state of these lakes associated with post-glacial climate change, the carbon isotope signature recorded in the organic fraction of the lake sediments allows us to determine when lacustrine primary productivity began.

Results of stable carbon isotope analyses performed on the total organic carbon (TOC) fraction of core samples from the Ritterbush Pond, a lake located at an elevation of 317 m in metamorphic, virtually carbonate-free bedrock, show that the C_{org}-poor sands at the bottom of the core have TOC δ¹³C values fluctuating between -22 and -24‰. The ¹⁴C age of the bottom sediments is >12 ky. A remarkable positive shift (over 10‰) in the δ¹³C values correlates with the first appearance of organic carbon-rich layers.

The most negative δ¹³C values are found just before 12 ¹⁴Cky BP. In the rest of the core, the pattern of δ¹³C fluctuations reflects the alternating lithology, i.e. more negative δ¹³C values (-30 to -33‰) are found in the C_{org}-rich gyttias and less negative δ¹³C values (-25 to -27‰) in silty and sandy layers. Although terrestrial plants are known to have carbon isotope compositions as low as -32‰ (their average δ¹³C is -27‰), the striking correlation between lithology and δ¹³C suggests that the observed major variations in δ¹³C are related to the changing ratio of autochthonous (lacustrine) to allochthonous (terrestrial) OM in the sediment. Lake plankton δ¹³C generally ranges from -42 to -26‰.

The 10‰ shift towards very negative TOC δ¹³C in the lower part of the section implies that primary productivity was not a significant contributor of sedimentary OM in Ritterbush Pond until 12 ¹⁴Cky BP. The δ¹³C data also support discarding the ¹⁴C date obtained at the bottom of the core (21.8 ky BP), because the AMS analysis likely reflects the age of old, reworked terrestrial carbon.



- 1 archaeological geology
- 2 coal geology
- 3 computers
- 4 economic geology
- 5 engineering geology
- 6 environmental geology
- 7 geochemistry, aqueous/organic
- 8 geochemistry, other
- 9 geology education
- 10 geophysics/ tectonophysics
- 11 geoscience information
- 12 history of geology
- 13 hydrogeology
- 14 marine geology
- 15 micropaleontology
- 16 mineralogy/ crystallography
- 17 paleoceanography/ paleoclimatology
- 18 paleontology/ paleobotany
- 19 petroleum geology
- 20 petrology, experimental
- 21 petrology, igneous
- 22 petrology, metamorphic
- 23 planetary geology
- 24 Precambrian geology
- 25 Quaternary geology/ geomorphology
- 26 remote sensing
- 27 sediments, carbonates
- 28 sediments, clastic
- 29 stratigraphy
- 30 structural geology
- 31 tectonics
- 32 volcanology

③ SELECT ONE FORMAT

___ INVITED FOR SYMPOSIUM NUMBER: _____

(first five words of Symposium title)

VOLUNTEERED FOR DISCIPLINE SESSION

___ VOLUNTEERED FOR THEME SESSION NUMBER: _____

(first five words of Theme Session title)

④ SELECT ONE MODE

(Be aware that some theme sessions may have been designated specifically as either "poster" or "oral.")

___ ORAL—Verbal presentation before a seated audience.

POSTER—Graphic display on poster boards supplemented by speaker comments.

___ EITHER—Either mode is acceptable.

⑤ CHECK IF THIS APPLIES

___ WITHDRAW—If the abstract cannot be accepted in the mode I have indicated, please withdraw it.

___ STUDENT AUTHOR—(for Section meetings only)

Please check here if the presenter is a student author.

⑥ % OF THIS PAPER PREVIOUSLY PRESENTED 0

WHERE? _____

WHEN? _____

⑦ CHECK IF YOU ARE WILLING TO BE A SESSION CHAIR _____

Your Name _____

Office Phone _____ Home Phone _____

Fax _____ E-mail _____

⑧ SPEAKER'S IDENTITY AND MAILING ADDRESS—PLEASE TYPE!

Name DR. ANDREA LINI

Department GEOLOGY

Institution UNIVERSITY OF VERMONT

Address PERKINS HALL

City/SI/ZIP BURLINGTON, VT 05405-0122

Country USA

Office Phone 802-656-0245

Home Phone 802-434-6152

If the speaker will be unavailable at these numbers during the 45 days following the abstract deadline, list phone numbers to be used instead.

Office Phone _____

Home Phone _____

⑨ MAIL ORIGINAL + 8 COPIES TO:

INVITED-SYMPOSIUM ABSTRACTS: Send directly to your convener by deadline on invitation.

ALL OTHER ABSTRACTS (DISCIPLINE & THEME): Send to the appropriate address (see address box) to arrive before the deadline shown.

Abstracts may NOT be faxed.