

STABLE ISOTOPES
IN
SEDIMENTARY GEOLOGY

SEPM Short Course No. 10
DALLAS 1983

Society of Economic Paleontologists and Mineralogists



STABLE ISOTOPES
IN
SEDIMENTARY GEOLOGY

SEPM Short Course No. 10

Dallas 1983

by

MICHAEL A. ARTHUR, Organizer

THOMAS F. ANDERSON

ISAAC R. KAPLAN

JAN VEIZER

and

LYNTON S. LAND

Printed in U.S.A.

STABLE ISOTOPES

IN THE

LABORATORY

OF

Additional copies of this publication may be purchased from SEPM for \$16.00 each (Members) and \$20.00 each (Nonmembers).

Send your order to: SEPM
P. O. Box 4756
Tulsa, OK 74159

Copyright, SEPM, 1983. All rights reserved.

SEPM SHORT COURSE NO. 10

CONTRIBUTORS

MICHAEL A. ARTHUR
DEPARTMENT OF GEOLOGY
UNIVERSITY OF SOUTH CAROLINA
COLUMBIA, S.C. 29208

THOMAS F. ANDERSON
DEPARTMENT OF GEOLOGICAL SCIENCES
UNIVERSITY OF ILLINOIS
URBANA, IL. 61801

ISAAC R. KAPLAN
DEPARTMENT OF EARTH AND SPACE SCIENCES
UNIVERSITY OF CALIFORNIA
LOS ANGELES, CA. 90024

JÁN VEIZER
DÉPARTEMENT DE GÉOLOGIE
FACULTÉ DES SCIENCES ET GÉNIE
UNIVERSITÉ D'OTTOWA
OTTOWA, ONTARIO
CANADA

LYNTON S. LAND
DEPARTMENT OF GEOLOGICAL SCIENCES
UNIVERSITY OF TEXAS
AUSTIN, TX. 78712

ACKNOWLEDGEMENTS

We sincerely thank all of the people who have made this course and book possible. In particular we thank Peter A. Scholle for his encouragement to undertake this effort and Robin Dixon (SEPM) for her patience, guidance and enthusiasm.

The final preparation of this text would not have been possible without the efforts of John Harrison (illustrations and paste-up), Maria Burdett (illustrations), and Pris Ridgell, Leigh Harrison, Melòdy Alderman, and Melissa Watson for manuscript preparation.

CONTENTS

INTRODUCTION Michael A. Arthur	A-1--A-4
CHAPTER 1: STABLE ISOTOPES OF OXYGEN AND CARBON AND THEIR APPLICATION TO SEDIMENTOLOGIC AND PALEOENVIRONMENTAL PROBLEMS Thomas F. Anderson and Michael A. Arthur	1-1--1-151
CHAPTER 2: STABLE ISOTOPES OF SULFUR, NITROGEN AND DEUTERIUM IN RECENT MARINE ENVIRONMENTS Ian R. Kaplan	2-1--2-108
CHAPTER 3: CHEMICAL DIAGENESIS OF CARBONATES: THEORY AND APPLICATION OF TRACE ELEMENT TECHNIQUE Ján Veizer	3-1--3-100
CHAPTER 4: THE APPLICATION OF STABLE ISOTOPES TO STUDIES OF THE ORIGIN OF DOLOMITE AND TO PROBLEMS OF DIAGENESIS OF CLASTIC SEDIMENTS Lynton S. Land	4-1--4-22
BIBLIOGRAPHY	5-1--5-51