STABLE ISOTOPE STUDIES ON SEDIMENTARY DEPOSITS AND GROUND WATERS AND THEIR CLIMATIC IMPLICATIONS

BY

R.V. KRISHNAMURTHY
PHYSICAL RESEARCH LABORATORY
AHMEDABAD 380009
INDIA

THESIS
SUBMITTED FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

OF

THE GUJARAT UNIVERSITY

AHMEDABAD

MAY, 1984

043



CERTIFICATE

I hereby declare that the work presented in this thesis is original and has not formed the basis for the award of any degree or diploma by any University or Institution.

(R,V. Krishnamurthy)
Author

Certified by:

Professor K. Gopalan Thesis Supervisor

May, 1984

TO
THE THREE MOTHERS,
HIS, HIS MOTHER'S AND HIS DAUGHTER'S

CONTENTS

	전 환경 : 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1	Page N
Statement	diane de Notas	1
Acknowledgements		XΙ
PART A:	STABLE ISOTOPE STUDIES ON GROUND WATERS	
CHAPTER I:	INTRODUCTION	
I.1.	Ground water hydrology	2
I.2.	Stable isotope composition of ground water of meteoric origin	3
I.3.	Brief summary of earlier work	5
I.4.	Significance of the present study	7
I.5.	Sampling strategy	8
CHAPTER II:	EXPERIMENTAL TECHNIQUES	10
II.1.	Fractionationprocess and definitions	10
II.2.	The isotopic standard	12
II.3.	Experimental techniques for the determination of the oxygen isotope ratio of ground waters	15
II.4.	Experimental techniques for the determination of the hydrogen isotopic ratio of ground waters	21

		<u>Page No</u> .
CHAPTER III:	RESULTS AND DISCUSSIONS	25
III.1.	Results	25
III.2.	The South-west Monsoon	26
III.3.	General discussion of isotopic data	32
III.4.	Discussion of oxygen isotopic data on Indian ground waters	41
III.5.	Discussion of & D- & 180 relation- ship of Indian ground waters	44
III.6.	Isotopic investigation of other water samples	46
III.7.	An evapotranspiration model for the \$50 value of ground water on the Calcutta-Delhi sector	46
III.8.	Source of moisture to the SW monsoon	53
III.9.	Conclusion	5 ¹ 4
PART B:	STABLE ISOTOPE STUDIES ON SEDIMENT DEPOSITS	<u>ARY</u>
CHAPTER IV:	INTRODUCTION	55
IV.1.	Brief survey of isotope based palaeoclimatological studies on continental deposits	59
IV.2.	Brief survey of isotope based palaeoclimatological studies on lake sediments	62
IV.3.	The Karewa deposits of Kashmir Valley	68

		Page No
CHAPTER V:	EXPERIMENTAL TECHNIQES	72
V.1.	Experimental technique for the determination of carbon isotope ratios of sedimentary organic matter	73
CHAPTER VI:	RESULTS AND DISCUSSIONS	79
VI.1.	The isotopic composition of organic matter	79
VI.2.	The isotopic composition of sedimentary organic matter	, 83
VI.3.	The Romushi Section	85
VI.4.	Geochronology of the Romushi Section	87
VI.5.	€ ¹³ C values and C/N ratios of the organic fraction from Romushi and their climatic implications	88
VI.6.	Carbon isotope studies of palaeosols from Loess	96
	δ ¹³ C values of the organic fractions of palaeosols and modern soils from the Kashmir Valley	99
REFERENCES;		103