

TABLE OF CONTENTS

DECLARATION	I
ABSTRACT	II
ACKNOWLEDGEMENTS	III
TABLE OF CONTENTS	IV
LIST OF TABLES	VII
LIST OF FIGURES	VIII
CHAPTER 1	1
INTRODUCTION	1
1.1 GENERAL INTRODUCTION	1
1.2 AIM	1
1.3 DISSERTATION OUTLINE	2
CHAPTER 2	3
SOUTHERN CAPE ENVIRONMENTS	3
2.1 INTRODUCTION	3
2.2 GEOLOGY OF THE DE HOOP REGION	7
2.2.1 Brief introduction to formation of the southern Cape coast.....	7
2.3 THE SOUTHERN CAPE'S PRESENT-DAY CLIMATE.....	11
2.3.1 Local climate	11
2.3.2 Extant vegetation.....	15
2.4 SOUTHERN CAPE PALAEOENVIRONMENTS	18
2.4.1 Eustatic and local sea level changes.....	18
2.4.2 Sedimentary evidence	23
2.4.3 Vegetation proxy evidence	24
2.4 SUMMARY	29
CHAPTER 3	33
BLOMBOS CAVE	33
3.1 INTRODUCTION	33
3.2 LOCATION, LOCAL CLIMATE & GEOLOGY	34
3.3 EXCAVATION HISTORY, STRATIGRAPHY AND DATING.....	36
3.4 THE IMPORTANCE OF BLOMBOS CAVE IN THE MIDDLE STONE AGE CONTEXT OF SOUTHERN AFRICA	41
3.4.1 Blombos Cave and the Still Bay techno-tradition of the MSA	41
3.4.2 Dating the Still Bay	43
3.4.3 MSA material from Blombos Cave	44
3.6 SUMMARY	55
CHAPTER 4	60
METHODOLOGY	60
4.1 INTRODUCTION	60

4.2 SPELEOTHEM FORMATION	61
4.2.1 Dissolution of the De Hoop limestone	61
4.2.2 Cave air, temperature & speleothem deposition	63
4.3 THE DE HOOP CAVES.....	65
4.3.1 Sample selection and the De Hoop caves.....	65
4.3.2 Brief description of the De Hoop speleothem samples	73
4.4 URANIUM SERIES DATING	78
4.4.1 Principles of uranium series dating	78
4.4.2 Criteria for U-series dating.....	81
4.5 CHEMICAL PREPARATION OF THE DE HOOP SAMPLES FOR U-SERIES DATING.....	84
4.5.1 Sampling approach for U-series dating.....	84
4.5.2 ICP MS analyses	87
4.6 STABLE ISOTOPE MEASUREMENTS	93
4.6.1 ^{13}C isotopes	93
4.6.2 ^{18}O isotopes	98
4.6.3 Fractionation & the ^{18}O signal	99
4.6.4 Speleothem delta function (SDF) & Temperature	103
4.7 SAMPLING FOR THE STABLE CARBON AND OXYGEN ISOTOPE ANALYSES	105
4.7.1 Sampling for stable C and O isotope analyses	105
4.8 SUMMARY	111
CHAPTER 5	113
RESULTS OF THE DE HOOP SPELEOTHEM ANALYSES	113
5.1 INTRODUCTION	113
5.1 URANIUM SERIES (U-SERIES) AGE DETERMINATIONS.....	114
5.2 STABLE ISOTOPE SIGNALS	125
5.2.1 Evaluating kinetic fractionation & conditions of isotopic equilibrium	130
5.2.2 $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ profile of the individual samples	135
5.2.3 Isotope age calibration curve	138
5.3 DISCUSSION OF THE <i>BLOU1</i> AND <i>KG2.3</i> ISOTOPE RESULTS	141
5.4 SUMMARY	148
CHAPTER 6	150
DISCUSSION	150
6.1 INTRODUCTION	150
6.2 COMPARISON OF THE DE HOOP PALAEOENVIRONMENTAL EVIDENCE WITH OTHER TERRESTRIAL PROXY RECORDS	151
6.2.1 Mid-MIS 3	155
6.2.2 MIS 5c/d	156
6.3 FORCING MECHANISMS OF ENVIRONMENTAL CHANGE DOCUMENTED IN THE DE HOOP SPELEOTHEM RECORDS	157
6.4 ENVIRONMENTAL CONDITIONS DURING THE LEVELS OF MSA OCCUPATION AT BLOMBOS CAVE	162
6.4.1 Introduction	162
6.4.2 Environment and archaeology of the c. 100 ka M3 occupation at Bломbos Cave	163

CHAPTER 7	168
CONCLUSION & RECOMMENDATIONS.....	168
7.1 CONCLUSION & RECOMMENDATIONS	168
CHAPTER 8	170
REFERENCES	170