

Geological Studies in the Eastern Desert East and South of Qena

BY

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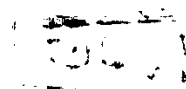
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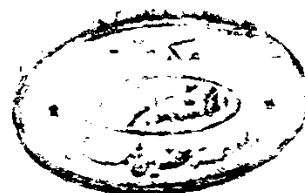
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N O T E

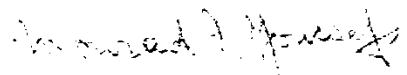
The present thesis is submitted to the Ain Shams University in partial fulfillment of the requirements for the degree of Master of Science in Geology.

Beside the research work materialized in this thesis the candidate has attended three graduate courses for one year in the following topics:

- 1- Advanced structural geology and geotectonics.
- 2- Field geology and surveying.
- 3- Advanced stratigraphy.

She has satisfactorily passed the final examinations of these courses. Also, and in fulfillment of the language requirements of the degree, she has passed the final examination of a course in the German language.

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A B S T R A C T

The domain of the present study includes the air-photo lineation, drainage lineation, and drainage basin analyses. A total area of approximately 50,000 sq km extending from the Nile Valley east and south of Qena bend across the Eastern Desert to the Red Sea coast is involved in one or more of such analyses.

The regional pattern of airphoto lineations was detected using aerial photographs (scale 1 : 40,000) and airphoto indexes (scale 1:100,000). A multi-stage analytical technique was adopted. A set of 11 indexes were employed; namely: Wadi Qena, Gebel El-Shayib, Safaga, Bir Umm Fawakhir, Quseir, El-Laquita, Gebel El-Sibai, Umm Gheig, Wadi El-Miyah, Barraniya, and Iqla. A total of 33,426 linear features were identified, recorded, and their lengths and directions (azimuth) annotated and plotted in 166 azimuth - frequency (rose) diagrams and 356 frequency curves. Length-wise macro-linears and micro-linears were screened from the total field of lineation and each type was separately illustrated.

Six topographic maps (scale 1 : 100,000) were involved in the drainage lineation analysis carried out. These are designated: Qena - Quseir Road Sheets (1), (2), and (3), Barraniya (West) and (East), and Umm Rus. A total of 16,805 drainage linears were recorded, annotated and plotted in different types of diagrams. Horton (1945) analysis was carried out for 3 drainage basins selected from different parts of the total area drainage lineation analyzed. The relationships between stream lengths and stream numbers to stream orders were determined.

The regional airphoto lineation pattern is

characterized by a strong degree of preferred orientation in northwesterly and northeasterly directions. Less significant trends are oriented northerly and westerly. The airphoto lineation density (intensity) is highest in the basement rocks particularly the Metavolcanics and the Leungar Granitoids. The density values decrease in the overlying sedimentary succession.

Drainage pattern in the area is well-integrated but of variable density, stream length, furcation, angle of juncture and/or uniformity. Parts are subdendritic, others are subarellis, and still others are subparallel. Lithology, structures particularly faults, and relief affect the pattern and are the cause of its local variability.

Drainage lineations show a higher degree of scattering than the airphoto lineations of corresponding areas. Drainage basin analysis gave the following results : weighted mean bifurcation ratio (W_{rb}) ranges from 2.9 to 4.2; drainage density (P_d) from 1.5 to 1.7 and stream frequency (F_s) from 0.9 to 1.3.

TABLE OF CONTENTS

	<u>Page</u>
ABSTRACT.....	i
TABLE OF CONTENTS.....	iii
LIST OF ILLUSTRATIONS.....	vi
LIST OF TABLES.....	ix
ACKNOWLEDGEMENTS.....	x
<u>CHAPTER I: INTRODUCTION</u>	1
Location.....	1
Geomorphology.....	8
Objectives of Study.....	14
Literature Review.....	14
General Geology and Structure.....	16
Lineation and Drainage Analyses.....	16
<u>CHAPTER II: REGIONAL GEOLOGY AND PHOTOGEOLOGY</u> ..	20
Regional Geology.....	20
Areal Distribution of Rock Units.....	20
Structures.....	28
Photogeology.....	31
<u>CHAPTER III: TECHNIQUE OF AIRPHOTO LINEATION ANALYSIS</u>	36
Terminology.....	36
Characteristics.....	38
Identification and Annotation Procedure.....	39
<u>CHAPTER IV: AIRPHOTO LINEATION PATTERNS OF COMPONENT AREAS STUDIED</u>	44
Introduction.....	44
Airphoto Lineations of Wadi Qena Area.....	48
Airphoto Lineations of El-Shayib Area.....	53
Airphoto Lineations of Safaga Area.....	60
Airphoto Lineations of Bir Umm Fawakhir Area.....	63
Airphoto Lineations of Quseir Area.....	66
Airphoto Lineations of El-Laquita Area.....	71
Airphoto Lineations of Gebel El-Sibai Area..	74
Airphoto Lineations of Umm Gheig Area.....	78
Airphoto Lineations of Wadi El-Miyah Area...	81
Airphoto Lineations of Barramiya Area.....	85
Airphoto Lineations of Igla Area.....	89
<u>CHAPTER V : AIR PHOTO LINEATION PATTERN OF THE TOTAL AREA STUDIED</u>	93
Introduction.....	93
Compiled Frequency Curves of Airphoto Lineations, Macro-Linears, and Micro-Linears..	95
Summation Azimuth-Frequency Diagrams and Frequency curves of Airphoto Lineations, Macro-Linears, and Micro-Linears.....	102
Density Distribution of Airphoto Lineations.....	113

	<u>Page</u>
<u>CHAPTER VI: DRAINAGE AND DRAINAGE LINEATION ANALYSIS</u>	119
Introduction.....	119
Procedure of Study.....	122
Drainage and Drainage Lineation Patterns.....	123
General Remarks.....	123
Drainage Pattern of Qena-Quseir Road Sheet(1).....	123
Drainage Lineation Pattern of Qena-Quseir Road Sheet(1).....	126
Drainage Pattern of Qena-Quseir Road Sheet(2).....	129
Drainage Lineation Pattern of Qena-Quseir Road Sheet(2).....	132
Drainage Pattern of Qena-Quseir Road Sheet(3).....	132
Drainage Lineation Pattern of Qena-Quseir Road Sheet(3).....	136
Drainage Pattern of Barramiya(West)Area..	136
Drainage Lineation Pattern of Barramiya (West) Area.....	140
Drainage Pattern of Barramiya (East)Area..	140
Drainage Lineation Pattern of Barramiya (East) Area.....	145
Drainage Pattern of Umm Rus Area.....	148
Drainage Lineation Pattern of Umm Rus Area.....	151
Frequency Curves of Drainage Lineations of the Total Area Studied.....	154
Comparison between Drainage Lineations and Corresponding Airphoto Lineations of Selected Areas.....	157
<u>CHAPTER VII: DRAINAGE BASIN ANALYSIS</u>	161
General Statement.....	161
Drainage Basins Studied.....	163
Procedure of Study.....	163
Results of Analyses.....	164
<u>CHAPTER VIII: APPLICATIONS OF THE TECHNIQUE OF AIRPHOTO LINEATION ANALYSIS</u>	173
Applications in Mineral Exploration.....	173
Applications in Oil Exploration.....	175
Applications in Geothermal Energy Exploration.....	176
Applications in Ground-Water Studies.....	177
Applications in Geological Engineering.....	179
Applications Related to Space and Planetary Studies.....	180

	<u>Page</u>
<u>CHAPTER IX : SUMMARY AND CONCLUSIONS</u>	181
<u>APPENDIX I: Data Sheet of Airphoto Lineations</u> Plotted in Azimuth - Frequency Diagrams.....	196
<u>APPENDIX II: Data Sheet of Airphoto Lineations</u> Plotted in Summation Azimuth-Frequency Diagrams.....	203
<u>APPENDIX III: Data Sheet of Airphoto Micro-Linears</u> Plotted in Azimuth - Frequency Diagrams....	205
<u>APPENDIX IV: Data Sheet of Airphoto Macro-Linears</u> Plotted in Azimuth - Frequency Diagrams.....	206
<u>APPENDIX V : Data Sheet of Drainage Lineations</u> Plotted in Frequency Curves.....	208
<u>APPENDIX VI: Data Sheet of Drainage Lineations</u> Plotted in Summation Frequency Curves.....	212
<u>APPENDIX VII: Data Sheet of Longer Drainage Linea- tions Plotted in Summation Frequency Curves.</u>	212
<u>LIST OF REFERENCES</u>	213
Regional Geology.....	213
Lineation Analysis, Photogeology & Geomorphology	218
<u>VITA</u>	227
<u>ARABIC SUMMARY</u>	

LIST OF ILLUSTRATIONS

<u>Figure</u>		<u>Page</u>
1	Location Map.....	2
2	Gemini XII - photograph Showing the Regional Setting.....	3
3	Orographic - Geomorphic Units.....	5
4	Location Map of Areas Airphoto Lincation Analyzed in the Eastern Desert.....	9
5	Compiled Geological map.....	21,22
6	Compiled Map of the Structural Elements Present.....	29
7	Map showing Names of Airphoto Indexes Used..	46
8	Airphoto Lineations of Wadi Qena Area.....	49
9	Azimuth - Frequency Diagrams of Airphoto Lineations of Wadi Qena Area.....	52
10	Airphoto Lineations of El-Shayib Area.....	55
11	Geological Map of the Northern parts of El-Shayib and Safaga Sheets.....	57
12	Azimuth - Frequency Diagrams of Airphoto Lineations of El-Shayib Area.....	58
13	Airphoto Lineations of Safaga Area.....	61
14	Azimuth - Frequency Diagrams of Airphoto Lineations of Safaga Area.....	62
15	Airphoto Lineations of Bir Umm Fawakhir Area	64
16	Azimuth - Frequency Diagrams of Airphoto Lineations of Bir Umm Fawakhir Area.....	65
17	Airphoto Lineations of Quseir Area.....	68
18	Azimuth - Frequency Diagrams of Airphoto Lineations of Quseir Area.....	69
19	Airphoto Lineations of El-Laquita Area.....	72
20	Azimuth - Frequency Diagrams of Airphoto Lineations of El-Laquita Area.....	73
21	Airphoto Lineations of Gebel El-Sibai Area..	75
22	Azimuth - Frequency Diagrams of Airphoto Lineations of Gebel El-Sibai Area.....	77

23	Airphoto Lineations of Umm Gheig Area.....	79
24	Azimuth - Frequency Diagrams of Airphoto Lineations of Umm Gheig Area.....	80
25	Airphoto Lineations of Wadi El-Miyah Area....	82
26	Azimuth - Frequency Diagrams of Airphoto Lineations of Wadi El-Miyah Area.....	83
27	Airphoto Lineations of Barramiya Area.....	86
28	Azimuth - Frequency Diagrams of Airphoto Lineations of Barramiya Area.....	87
29	Airphoto Lineations of Igla Area.....	90
30	Azimuth - Frequency Diagrams of Airphoto Lineations of Igla Area.....	92
31	Compiled Frequency Curves of Airphoto Linea- tions.....	96
32	Compiled Frequency Curves of Airphoto Macro- Linears.....	99
33	Compiled Frequency Curves of Airphoto Micro- Linears.....	101
34	Summation Azimuth - Frequency Diagrams of _____ Airphoto Lineations.....	103
35	Summation Frequency Curves of Airphoto Lineations.....	104
36	Summation Azimuth - Frequency Diagrams of Airphoto Macro - Linears.....	106
37	Summation Frequency Curves of Airphoto Macro- Linears.....	107
38	Summation Azimuth-Frequency Diagrams of Air- photo Micro-Linears.....	111
39	Summation Frequency Curves of Airphoto Micro- Linears.....	112
40	Density Distribution Map of the Airphoto Li- neations Based on Values of the Total Nu- mbers.....	114
41	Density Distribution Map of the Airphoto Li- neations Based on Values of the Total Lengths.....	116
42	Density Distribution Map of the Airphoto Li- neations Based on Values of the Average Lengths.....	118

43	Location map of the Area Covered by Drainage Analysis.....	124
44	Drainage System of Qena-Guseir Road Sheet(1)	125
45	Drainage Lineations of Qena-Guseir Road Sheet (1).....	127
46	Azimuth-Frequency Diagrams of Drainage Lineations of Qena-Guseir Sheet (1).....	128
47	Drainage System of Qena-Guseir Road Sheet(2).	130
48	Drainage Lineations of Qena-Guseir Road Sheet(2).....	133
49	Azimuth-Frequency Diagrams of Drainage Lineations of Qena-Guseir Road Sheet(2).....	134
50	Drainage System of Qena-Guseir Road Sheet(3).	135
51	Drainage Lineations of Qena-Guseir Road Sheet(3).....	137
52	Azimuth-Frequency Diagrams of Drainage Lineations of Qena-Guseir Sheet (3).....	138
53	Drainage System of Barramiya (West)-Area.....	139
54	Drainage Lineations of Barramiya(West)Area...	141
55	Azimuth-Frequency Diagrams of Drainage Lineations of Barramiya (West)Area.....	142
56	Drainage System of Barramiya(East)Area.....	143
57	Drainage Lineations of Barramiya(East)Area...	146
58	Azimuth-Frequency Diagrams of Drainage Lineations of Barramiya (East)Area.....	147
59	Azimuth-Frequency Diagrams of Drainage Lineations between Barramiya (West)and Barramiya (East) Area.....	149
60	Drainage System of Umm Rus Area.....	150
61	Drainage Lineations of Umm Rus Area.....	152
62	Azimuth-Frequency Diagrams of Drainage Lineations of Umm Rus Area.....	153
63	Frequency Curves of Drainage Lineations of the Total Area studied.....	155
64	Summation Frequency Curves of Drainage Lineations and Corresponding Longer Drainage Lineations.....	156

65	Comparison between the Summation Frequency Curves of Drainage Lineations and Corresponding Airphoto Lineations.....
66	Comparison between the Summation Frequency Curves of the Longer Drainage Lineations and Corresponding Airphoto Macro-linears.
67	Stream Ordering of the Western Part of Wadi Abbad Drainage Basin.....
68	Stream Ordering of Wadi Al-Sayah Drainage Basin.....
69	Stream Ordering of Wadi Mubarak Drainage Basin.....
70	Relationship of Stream Order + Streams and Relations to Stream Length Studied
71	Summary

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CHAPTER I

INTRODUCTION

CHAPTER I

I N T R O D U C T I O N

Chapter I includes an outline of the geography and geomorphology of the region under investigation, the objectives of the study, and a literature survey.

Location

The area studied extends from the Nile Valley east and south of Qena bend across the Eastern Desert to the Red Sea coast. It has maximum limits of parallels $24^{\circ} 45'$ and $27^{\circ} 00'$ north latitudes and meridians $32^{\circ} 20'$ and $35^{\circ} 00'$ east longitudes (Fig.1). The region has an approximate total surface area of 50,000 sq km.

Geomorphology

The satellite photograph shown in Figure 2 gives a bird's eye view of the regional setting and geomorphology of the study area. It shows also the northern part of the Red Sea, the Gulfs of Suez and Aqaba, southern part of Sinai, the Nile Valley and Qena bend, and the western part of Saudi Arabia. In this photograph waters and cultivated lands (along the Nile Valley) appear black, basement rocks dark gray, sedimentary rocks various shades of medium gray, and Quaternary to Recent unconsolidated sediments light gray.

Morphologically, the region may be broadly divided into five distinct units similar to those adopted by Hunting (1967) in the area directly south of that under investigation; namely: a) a coastal belt in the east flanking the Red Sea, b) a zone of mountainous basement