

DEDICATION

I dedicated this thesis to:
The soul of my mother
My father
My husband
My sisters and brothers, all relatives.

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ABSTRACT

This study was conducted to assess the natural radioactivity level and doses calculation in some areas in South Kordofan State. Samples were collected contain soil, rock and some crops from northern and eastern regions of South Kordofan State. Activity concentration of ^{238}U , ^{232}Th , ^{40}K and ^{137}Cs has been measured by γ -ray spectroscopy equipped with high efficiency NaI (TI). The average concentrations were 108.82, 98.03 and 1059.13 Bq/kg for soil samples, 282.76, 142.79 and 1081.50 Bq/kg for rock samples and 12.70, 14.54 and 866.32 Bq/kg for crops samples for ^{238}U , ^{232}Th and ^{40}K respectively, the concentration of ^{137}Cs was found to be 7.32 Bq/kg this means very little contribution to the total exposure for crops samples. The obtained results were found to be relatively higher than those mentioned in UNSCEAR data publications for normal background areas.

Absorbed dose rate in air at a height of 1m from the ground was measured and calculated using four sets of dose rate conversion factors and the corresponding annual effective dose was estimated. On the average, the values obtained were: 153.76, 132.14, 139.14 and 153.65 nGy h^{-1} for soil samples, 262.27, 222.39, 233.94 and 261.98 nGy/h for rock samples, 50.79, 45.10, 47.60 and 50.63 nGy/h for crops samples, and annual effective dose are: 188.70, 162.17, 170.75 and 188.56 μSvy^{-1} for the soil samples, 321.87, 272.92, 287.10 and 321.52 μSvy^{-1} for rock samples and 62.33, 55.35, 58.41 and 62.32 $\mu\text{Sv/y}$ for crops samples, respectively for DRCFs (SAITO, MCNP, GEANT and UNSEAR). These values lie within the areas of high background radiation.

المستخلص

أجريت هذه الدراسة لتقييم مستوى النشاط الإشعاعي الطبيعي وحساب الجرعات في بعض المناطق في ولاية جنوب كردفان. اشتملت العينات التي تم جمعها على: تربة، وصخور وبعض المحاصيل، أخذت من المناطق الشمالية والشرقية للولاية. تم قياس متوسط التركيز الإشعاعي لكل من: ^{40}K ، ^{232}Th ، ^{238}U و ^{137}Cs باستخدام مطيافية جاما المزودة بكاشف (يوديد الصوديوم المنشط بالتاليوم) عالي الكفاءة. وجد أن متوسط التراكيز هو: 108.82، 98.03، 1059.13 بيكريل/كجم لعينات التربة و 282.76، 142.79، 1081.50 بيكريل/كجم لعينات الصخور و 12.70، 14.54، 866.32 بيكريل/كجم لعينات المحاصيل وذلك لكل من ^{40}K ، ^{232}Th ، ^{238}U على التوالي. بينما وجد أن تركيز ^{137}Cs هو 7.32 بيكريل/كجم، مما يعني أن مساهمته ضئيلة في الجرعة الكلية لعينات المحاصيل. أشارت النتائج المتحصل عليها إلى أن التركيز الإشعاعي لتلك النظائر هو أعلى من المتوسط العالمي حسب ما ورد في منشورات لجنة الأمم المتحدة العلمية للوقاية من آثار الإشعاعات الذرية.

تم قياس و حساب الجرعة الإشعاعية الممتصة في الهواء علي ارتفاع 1 متر من سطح الأرض، و ذلك باستخدام أربع مجموعات من ثوابت تحويل معدل الجرعة (DRCFs) كما تم حساب الجرعة الفعالة السنوية حيث وجد أن متوسط نتائج الجرعة الممتصة هو: 153.76، 132.14، 139.14 و 153.65 نانو جراي/الساعة لعينات التربة، 262.27، 222.39، 233.94 و 261.98 نانو جراي/الساعة لعينات الصخور و 50.79، 45.10، 47.60 و 50.78 نانو جراي/الساعة لعينات المحاصيل. والجرعة الفعالة السنوية هي: 188.70، 162.17، 170.75 و 188.56 ميكرو سيفرت/السنة لعينات التربة، 321.87، 272.92، 287.10 و 321.52 ميكرو سيفرت/السنة لعينات الصخور و 62.33، 55.35، 58.41 و 62.32 ميكرو سيفرت/السنة لعينات المحاصيل على التوالي للثوابت: (SAITO، MCNP، GEANT، UNSCEAR). وبينت هذه النتائج ان متوسطات المتحصل عليها تقع في نطاق المناطق ذات الخلفية الإشعاعية العالية.

CONTENTS

Dedication.....	I
Acknowledgment.....	II
Abstract.....	III
Arabic abstract.....	IV
Contents.....	V
List of tables.....	VI
List of figures.....	VII
CHAPTER ONE	
1. INTRODUCTION	
1.1 Background radiation	1
1.2 Problem statement.....	3
1.3 Research aims.....	4
CHAPTER TWO	
2. LITERATURE REVIEW	
2.1 Theory of radiation.	5
2.1.1 Gamma decay.	6
2.2 Natural gamma radiation.	7
2.2.1 Cosmic radiation.	7
2.2.2 Terrestrial radiation.	7
2.2.2.1 Potassium (K).	8
2.2.2.2 Uranium (U).	9
2.2.2.3 Thorium (Th).	10
2.3 The radioactivity of the earth's crust.	11
2.3.1 Radioactivity of rocks.	11
2.3.2 The radioactivity of soil.	13
2.3.3 Radioactivity of water.	16
2.3.4 Radioactivity of plant.	17

2.4. Environmental radioactivity.	19
2.4.1 Guidance on radiation protection.	21
2.5 Exposure radiation.	22
2.5.1 Absorbed dose rate in air (D).	23
2.5.2 External and internal hazard indices.....	23
2.5.3 Annual effective dose equivalent (E)	24
2.6 Radiation dose limits.....	24
2.7 Previous studies.....	25

CHAPTER THREE

3. MATERIAL AND METHODS

3.1 The study area.....	33
3.2 Geological information of Nuba Mountains.....	33
3.3 Sample collection and preparation.....	34
3.3.1 Soil samples.....	34
3.3.2 Rock samples.....	34
3.3.3 Crops samples.....	35
3.4 Gamma-ray spectroscopy	42
3.4.1 System calibration of gamma.....	44
3.4.1.1 Energy calibration.....	44
3.4.1.2 Efficiency calibration.....	46
3.5 Evaluation of the gamma dose rates in air outdoors.....	47
3.6 Dose rate conversion factors (DRCFs).....	47
3.6.1 UNSCEAR.....	48
3.6.2 K. Saito and P. Jacob (1995)	48
3.6.3 Monte Carlo codes.....	49
3.6.3.1 The MCNP code.....	49
3.6.3.2 The GEANT code	50
3.7 Calculation of absorbed dose rate in air.....	52

3.8 Annual effective dose.....	52
3.9 X-Ray fluorescence.....	53
3.9.1 Standard material of XRF.....	56
3.9.2 System calibration of XRF.....	56

CHAPTER FOUR

4. RESULTS AND DISCUSSION

4.1 The results of gamma spectroscopy measurements.....	58
4.2 Annual effective dose results.....	74
4.3 The results of X-ray fluorescence.....	89
4.4 DISCUSSION	94
CONCLUSION.....	100
References.....	101
Appendix.....	108

LIST OF TABLES

Table (2.1) Characteristics of the ^{40}K decay scheme.....	9
Table (2.2) Principal characteristics of the ^{238}U decay series.....	9
Table (2.3). Principal characteristics of the ^{232}Th decay series.....	10
Table (2.4). Concentration of some radioisotopes in water (Kogan et al, 1971)	16
Table (2.5). ICRP recommendation on protection against environmental radioactivity.	22
Table (2.6). The recommended dose limits (ICRP. 1991).....	25
Table (3.1). Location names with their coordinates in soil samples.....	35
Table (3.2). Location names with their coordinates in rock samples.....	38
Table (3.3). Absorbed dose rates in air at 1 m height (nGy/h) were measured by Radose and annual effective dose ($\mu\text{Sv/y}$) as derived using UNSCEAR DRCFs in soil samples	39
Table (3.4). Absorbed dose rates in air at 1 m height (nGy/h) were measured by Radose and annual effective dose ($\mu\text{Sv/y}$) derived using UNSCEAR DRCFs in rock samples	42
Table (3.5). Types of mixed radionuclides used for system calibration and their corresponding gamma energies	45
Table (3.6). Types of radionuclides used for efficiency calibration and their corresponding gamma energies	46
Table (3.7): Conversion factors for different radionuclides as deduced by Kocher and Sjoreen, Beck et al., Saito and Jacob, recent results from various Monte Carlo technique obtained by (Clouvas et.al.,2000) and UNSCEAR values in units of $\text{nGy h}^{-1}/\text{Bq kg}^{-1}$ (Kohshi et.al.,2001)	52
Table (3.8): Energy calibration (Kev) of the system illustrating K-line of Fe and Zn.	57
Table (4.1): Activity concentrations (Bq/kg) of gamma emitters from ^{238}U , ^{232}Th and ^{40}K in soil samples	58
Table (4.2): Activity concentrations (Bq/kg) of gamma emitters from ^{238}U , ^{232}Th series and ^{40}K in soil samples	61
Table (4.3): Activity concentrations (Bq/kg) of gamma emitters from ^{238}U ,	64

^{232}Th and ^{40}K in rock samples	
Table (4.4): Activity concentrations (Bq/kg) of gamma emitters from ^{238}U , ^{232}Th series and ^{40}K in rock samples	65
Table (4.5): Activity concentrations (Bq/kg) of gamma emitters from ^{238}U , ^{232}Th , ^{137}Cs and ^{40}K in crops samples	66
Table (4.6): Activity concentrations (Bq/kg) of gamma emitters from ^{238}U , ^{232}Th series, ^{137}Cs and ^{40}K in crops samples	67
Table (4.7): Statistical summary of absorbed dose rate in air at 1 m height (nGy/h) (mean and range) due to γ -emitters from ^{238}U , ^{232}Th and ^{40}K with their relative contribution to the total absorbed dose rate and the annual effective dose ($\mu\text{Sv/y}$) in South Kordofan State using different DRCFs in soil samples	75
Table (4.8): Statistical summary of absorbed dose rate in air at 1 m height (nGy/h) (mean and range) due to γ -emitters from ^{238}U , ^{232}Th series and ^{40}K with their relative contribution to the total absorbed dose rate and the annual effective dose ($\mu\text{Sv/y}$) in South Kordofan State using different DRCFs in soil samples	76
Table (4.9): Statistical summary of absorbed dose rate in air at 1 m height (nGy/h) (mean and range) due to γ -emitters from ^{238}U , ^{232}Th and ^{40}K with their relative contribution to the total absorbed dose rate and the annual effective dose ($\mu\text{Sv/y}$) in South Kordofan State using different DRCFs in rock samples	77
Table (4.10): Statistical summary of absorbed dose rate in air at 1 m height (nGy/h) (mean and range) due to γ -emitters from ^{238}U , ^{232}Th series and ^{40}K with their relative contribution to the total absorbed dose rate and the annual effective dose ($\mu\text{Sv/y}$) in South Kordofan State using different DRCFs in rock samples.	78
Table (4.11): Statistical summary of absorbed dose rate in air at 1 m height (nGy/h) (mean and range) due to γ -emitters from ^{238}U , ^{232}Th and ^{40}K with their relative contribution to the total absorbed dose rate and the annual effective dose ($\mu\text{Sv/y}$) in South Kordofan State using different DRCFs in crops samples.	79
Table (4.12): Statistical summary of absorbed dose rate in air at 1 m height (nGy/h) (mean and range) due to γ -emitters from ^{238}U , ^{232}Th series and ^{40}K with their relative contribution to the total absorbed dose rate and the annual effective dose ($\mu\text{Sv/y}$) in South Kordofan State using different DRCFs in crops samples	80
Table (4.13): Statistical summary of absorbed dose rate in air at 1 m height (nGy/h) (mean and range) due to γ -emitters from ^{238}U , ^{232}Th and ^{40}K with their relative contribution to the total absorbed dose rate and the	81

annual effective dose (mSv/y) in South Kordofan State using UNSCEAR DRCFs in study sample groups; soil samples, rock samples and crops samples	
Table (4.14): Statistical summary of absorbed dose rate in air at 1 m height (nGy/h) (mean and range) due to γ -emitters from ^{238}U , ^{232}Th series and ^{40}K with their relative contribution to the total absorbed dose rate and the annual effective dose (mSv/y) in South Kordofan State using UNSCEAR DRCFs in study sample groups; soil samples, rock samples and crops samples.	82
Table (4.15): Heavy metal content in the evaluation in soil samples concentrations in p.p.m.	89
Table (4.16): Heavy metal content in the evaluation in soil samples concentrations in p.p.m.	90
Table (4.17): Heavy metal content in the evaluation in soil samples concentrations in p.p.m.	91
Table (4.18): Heavy metal content in the evaluation in rock samples concentrations in p.p.m.	92
Table (4.19): Heavy metal content in the evaluation in crops samples concentrations in p.p.m.	93
Table (4.20): Comparison of absorbed dose rate in air at 1 m height (derived using UNSCEAR DRCFs) with similar data from Sudan and different Countries	97
Table (4.21): Areas of high natural radiation background (UNSCEAR 2000)	98

Appendix

Table (1): Absorbed dose rates in air at 1 m height (nGy/h) due to gamma emitting nuclides from ^{238}U , ^{232}Th and ^{40}K as derived using SAITO DRCFs and annual effective dose ($\mu\text{Sv/y}$) in soil samples.	109
Table (2): Absorbed dose rates in air at 1 m height (nGy/h) due to gamma emitting nuclides from ^{238}U , ^{232}Th and ^{40}K as derived using MCNP DRCFs and annual effective dose ($\mu\text{Sv/y}$) in soil samples.	112
Table (3): Absorbed dose rates in air at 1 m height (nGy/h) due to gamma emitting nuclides from ^{238}U , ^{232}Th and ^{40}K as derived using GEANT DRCFs and annual effective dose ($\mu\text{Sv/y}$) in soil samples	115
Table (4): Absorbed dose rates in air at 1 m height (nGy/h) due to gamma emitting nuclides from ^{238}U , ^{232}Th and ^{40}K as derived using UNSCEAR DRCFs and annual effective dose ($\mu\text{Sv/y}$) in soil samples	118
Table (5): Absorbed dose rates in air at 1 m height (nGy/h) due to gamma emitting nuclides from ^{238}U , ^{232}Th series and ^{40}K as derived using SAITO DRCFs and annual effective dose ($\mu\text{Sv/y}$) in soil samples	121
Table (6): Absorbed dose rates in air at 1 m height (nGy/h) due to gamma emitting nuclides from ^{238}U , ^{232}Th series and ^{40}K as derived using MCNP DRCFs and annual effective dose ($\mu\text{Sv/y}$) in soil samples	124
Table (7): Absorbed dose rates in air at 1 m height (nGy/h) due to gamma emitting nuclides from ^{238}U , ^{232}Th series and ^{40}K as derived using GEANT DRCFs and annual effective dose ($\mu\text{Sv/y}$) in soil samples	127
Table (8): Absorbed dose rates in air at 1 m height (nGy/h) due to gamma emitting nuclides from ^{238}U , ^{232}Th series and ^{40}K as derived using UNSCEAR DRCFs and annual effective dose ($\mu\text{Sv/y}$) in soil samples	130
Table(9): Absorbed dose rates in air at 1 m height (nGy/h) due to gamma emitting nuclides from ^{238}U , ^{232}Th and ^{40}K as derived using SAITO DRCFs and annual effective dose ($\mu\text{Sv/y}$) in rock samples	133
Table (10): Absorbed dose rates in air at 1 m height (nGy/h) due to gamma emitting nuclides from ^{238}U , ^{232}Th and ^{40}K as derived using MCNP DRCFs and annual effective dose ($\mu\text{Sv/y}$) in rock samples	134
Table (11): Absorbed dose rates in air at 1 m height (nGy/h) due to gamma emitting nuclides from ^{238}U , ^{232}Th and ^{40}K as derived using GEANT DRCFs and annual effective dose ($\mu\text{Sv/y}$) in rock samples	135
Table (12): Absorbed dose rates in air at 1 m height (nGy/h) due to gamma emitting nuclides from ^{238}U , ^{232}Th and ^{40}K as derived using UNSCEAR DRCFs and annual effective dose ($\mu\text{Sv/y}$) in rock samples	136

Table (13): Absorbed dose rates in air at 1 m height (nGy/h) due to gamma emitting nuclides from ^{238}U , ^{232}Th series and ^{40}K as derived using SAITO DRCFs and annual effective dose ($\mu\text{Sv/y}$) in rock samples	137
Table (14): Absorbed dose rates in air at 1 m height (nGy/h) due to gamma emitting nuclides from ^{238}U , ^{232}Th series and ^{40}K as derived using MCNP DRCFs and annual effective dose ($\mu\text{Sv/y}$) in rock samples	138
Table (15): Absorbed dose rates in air at 1 m height (nGy/h) due to gamma emitting nuclides from ^{238}U , ^{232}Th series and ^{40}K as derived using GEANT DRCFs and annual effective dose ($\mu\text{Sv/y}$) in rock samples	139
Table (16): Absorbed dose rates in air at 1 m height (nGy/h) due to gamma emitting nuclides from ^{238}U , ^{232}Th series and ^{40}K as derived using UNSCEAR DRCFs and annual effective dose ($\mu\text{Sv/y}$) in rock samples	140
Table (17): Absorbed dose rates in air at 1 m height (nGy/h) due to gamma emitting nuclides from ^{238}U , ^{232}Th and ^{40}K as derived using SAITO DRCFs and annual effective dose ($\mu\text{Sv/y}$) in crops samples	141
Table (18): Absorbed dose rates in air at 1 m height (nGy/h) due to gamma emitting nuclides from ^{238}U , ^{232}Th and ^{40}K as derived using MCNP DRCFs and annual effective dose ($\mu\text{Sv/y}$) in crops samples	142
Table (19): Absorbed dose rates in air at 1 m height (nGy/h) due to gamma emitting nuclides from ^{238}U , ^{232}Th and ^{40}K as derived using GEANT DRCFs and annual effective dose ($\mu\text{Sv/y}$) in crops samples	143
Table (20): Absorbed dose rates in air at 1 m height (nGy/h) due to gamma emitting nuclides from ^{238}U , ^{232}Th and ^{40}K as derived using UNSCEAR DRCFs and annual effective dose ($\mu\text{Sv/y}$) in crops samples	144
Table (21): Absorbed dose rates in air at 1 m height (nGy/h) due to gamma emitting nuclides from ^{238}U , ^{232}Th series and ^{40}K as derived using SAITO DRCFs and annual effective dose ($\mu\text{Sv/y}$) in crops samples	145
Table (22): Absorbed dose rates in air at 1 m height (nGy/h) due to gamma emitting nuclides from ^{238}U , ^{232}Th series and ^{40}K as derived using MCNP DRCFs and annual effective dose ($\mu\text{Sv/y}$) in crops samples	146
Table (23): Absorbed dose rates in air at 1 m height (nGy/h) due to gamma emitting nuclides from ^{238}U , ^{232}Th series and ^{40}K as derived using GEANT DRCFs and annual effective dose ($\mu\text{Sv/y}$) in crops samples	147
Table (24): Absorbed dose rates in air at 1 m height (nGy/h) due to gamma emitting nuclides from ^{238}U , ^{232}Th series and ^{40}K as derived using UNSCEAR DRCFs and annual effective dose ($\mu\text{Sv/y}$) in crops samples	148

LIST OF FIGURES

Fig. (3.1) Geological map of Nuba Mountains.....	33
Fig. (3.2): Sampling location (South Kordofan State).....	39
Fig.(3.3): Block diagram of gamma-ray spectrometer.....	44
Fig. (3.4): Energy calibration curve.....	45
Fig. (3.5): Efficiency calibration curve.....	47
Fig. (3.6): A schematic view of the (XRF) principle and measuring setup	55
Fig. (3.7): A general view of the (XRF) measuring arrangement.....	55
Fig. (3.8): Plot of energy calibration of the system illustrating peak of the Fe and Zn.	57
Fig. (4.1): Average activity concentrations of ^{238}U , ^{232}Th and ^{40}K in soil samples from South Kordofan State	68
Fig. (4.2): Average activity concentrations of ^{238}U , ^{232}Th series and ^{40}K in soil samples from South Kordofan State	69
Fig. (4.3): Average activity concentrations of ^{238}U , ^{232}Th and ^{40}K in rock samples from South Kordofan State	70
Fig. (4.4): Average activity concentrations of ^{238}U , ^{232}Th series and ^{40}K in rock samples from South Kordofan State	71
Fig. (4.5): Average activity concentrations of ^{238}U , ^{232}Th , ^{137}Cs and ^{40}K in crops samples from South Kordofan State	72
Fig. (4.6): Average activity concentrations of ^{238}U , ^{232}Th Series, ^{137}Cs and ^{40}K in crops samples from South Kordofan State	73
Fig. (4.7): Relative contribution of ^{238}U , ^{232}Th and ^{40}K to the total absorbed dose rate in air as calculated using different DRCFs in soil samples	83
Fig. (4.8): Relative contribution of ^{238}U , ^{232}Th series and ^{40}K to the total absorbed dose rate in air as calculated using different DRCFs in soil samples	84
Fig. (4.9): Relative contribution of ^{238}U , ^{232}Th and ^{40}K to the total absorbed dose rate in air as calculated using different DRCFs in rock samples	85
Fig. (4.10): Relative contribution of ^{238}U , ^{232}Th series and ^{40}K to the total absorbed dose rate in air as calculated using different DRCFs in	86

rock samples.

Fig. (4.11): Relative contribution of ^{238}U , ^{232}Th and ^{40}K to the total absorbed dose rate in air as calculated using different DRCFs in crops samples. 87

Fig. (4.12): Relative contribution of ^{238}U , ^{232}Th series and ^{40}K to the total absorbed dose rate in air as calculated using different DRCFs in crops samples. 88

