I dedicated this thesis to:
The soul of my mother
My father
My husband
My sisters and brothers, all relatives.
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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 $\gamma$-ray spectroscopy equipped with high efficiency NaI (Tl). 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 nGyh$^{-1}$ 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 $\mu$Sv$^{-1}$ for the soil samples, 321.87, 272.92, 287.10 and 321.52 $\mu$Sv$^{-1}$ for rock samples and 62.33, 55.35, 58.41 and 62.32 $\mu$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 ومع بعض المحاصيل، أخذت من المناطق الشمالية والشرقية للولاية. تم قياس متوسط التركيز الإشعاعي لكل من: $^{137}\text{Cs}$، $^{232}\text{Th}$، $^{238}\text{U}$، $^{40}\text{K}$ باستخدام مطيافية جاما المزودة بكاشف (بوديد الصوديوم المنظم بالثاليوم) عالي الكفاءة. وجد أن متوسط التراكيز هو: 108.82، 98.03، 1059.13 بيكيل/كم لعينات النترة، و 142.79، 50 بيكيل/كم لعينات الصخور و 14.54، 866.32 بيكيل/كم لعينات المحاصيل $^{137}\text{Cs}$، $^{238}\text{U}$، $^{232}\text{Th}$، $^{40}\text{K}$ وذلك لكل من بيكيل/كم، مما يعني أن مساهمته ضئيلة في الجرعة الكلية لعينات المحاصيل. أشارت النتائج المتحصل عليها إلى أن التركيز الإشعاعي للكنوز هو أعلى من المتوسط العالمي حسب ما ورد في منشورات لجنة الأمم المتحدة للوقاية من أثار الإشعاعات الذرية.

تم قياس و حساب الجرعة الإشعاعية الممتتة في الهواء على ارتفاع 1 متر من سطح الأرض، وذلك باستخدام أربع مجموعات من ثوابت تحويل معدل الجرعة (DRCFs) كما تم حساب الجرعة الفعلية السنوية حيث وجد أن متوسط نتائج الجرعة الممتتة هو: 153.76، 132.14، 139.14 نانو جراي/ساعة/عينات النترة، و 262.39، 222.10، 60، 47.60 نانو جراي/ساعة/عينات الصخور و 0.79، 50.78 نانو جراي/ساعة/عينات المحاصيل. والجرعة الفعلية السنوية هي: 188.70، 172.97، 162.17، 88.56 ميكرودسيفرت/سنة/عينات النترة، 321.87، 321.52، 287.10، 238.52 نانو جراي/ساعة/عينات الصخور و 0.86، 62.33، 55.35، 41.00، 58.41 و 32 منشآت المحاصيل على التوالي للثوابت: (UNSCEAR، GEANT، MCNP، SAITO). وبيبت هذه النتائج أن متوسطات المتحصل عليها تقع في نطاق المناطق ذات الخلفية الإشعاعية العالية.
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