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Depositional fluxes of radionuclides in Kuwaiti dust fallout

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Nine stations of the dust collector (PVC bucket of 0.2 m diameter and 0.4 m depth) were deployed to collect dust fallout for the period of 23 mo (Oct 2009 to Aug 2011) on monthly bases. Adequate dust samples were collected using four collectors in each station. The weight of the collected dust were varied from 0.5 g to about 3 g. Ultra Low Background gamma spectrometry equipped with a Broad Energy Germanium detector was used to determine the concentration of (^7Be , ^{210}Pb , ^{40}K and ^{137}Cs). However, the corrected factor for the sampling time was applied for the short-lived isotope (^7Be). The radionuclide deposition rates were calculated using the massic activities (Bq.g^{-1}) and the deposition fluxes ($\text{g m}^{-2} \text{mo}^{-1}$). The average monthly deposition rates were 35.4, 11.2, 13.2, and 0.3 ($\text{Bq m}^{-2} \text{mo}^{-1}$) for ^7Be , ^{210}Pb , ^{40}K and ^{137}Cs , respectively. The temporal variation of the radionuclides depositions rates showed maxima during spring months (February, March, and April) and lowest in October and November. Similar trend was found for the dust deposition rates where the average was $50 \text{ mg m}^{-2} \text{h}^{-1}$ with an extreme value of $664 \text{ mg m}^{-2} \text{h}^{-1}$ was reported during March 2011 when an exotic dust storm hit Kuwait. The correlation between the radionuclide depositional fluxes and the dust deposition rates showed that ^{40}K has the strongest correlation (0.92) while the ^7Be was the weakest (0.67). The maximum of the annual effective dose of ^{137}Cs inhalation was found negligible ($2.43 \cdot 10^{-3} \text{ mSv}$).

Biography

Anfal Taleb Jraq Ismaeel graduated in 2011 from the Kuwait University, College of Graduated Studies (Program of Environmental Science). She is a Senior Research Associate in KISR and working in the Radiation Measurement Laboratory. She participated in long-term fellowship programs on the environmental applications of gamma spectrometry at the IAEA laboratories in Seibersdorf, Austria, and Bundesamt für Strahlenschutz, Germany. She worked in radioactivity measurements related to several KISR's projects and contributed to several published papers in refereed journals.

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