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Caesium-137 activities in surface materials in Southeast Asia

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Application of a fallout radionuclide ^{137}Cs for studies on soil erosion and sediment movement in Southeast Asia has a prospective potential, but the fallout level of the radionuclide in low latitude regions might have been critically low. The total inventories of ^{137}Cs (corrected for activities in 2009) in soil profiles in Taunggyi, Myanmar (Burma) (20N) and Sarawak, Malaysia (2N) are $656\pm 38\text{ Bq/m}^2$ and $203\pm 28\text{ Bq/m}^2$, respectively. Activities in surface soils and river sediments were well detected in the samples in Taunggyi by gamma spectrometry with measurement time of 12-24 hours, but river sediment samples in Sarawak provided insufficient activities for detection by the same measurement; Continuous ~168 hour measurement allowed detection of the radionuclide in the Sarawak river sediment samples. Existing data in Southeast Asia and its vicinity, namely Cherrapunji, India (26N), Yunnan, China (25N), and Chiang Rai, Thailand (19N) show sufficient deposition of the radionuclide in those areas, whereas a preliminary study in east Jawa, Indonesia (8S) found activities in cropland soils were not detected. Estimated values of latitudinal deposition of ^{137}Cs using the fallout data of ^{90}Sr are comparable to the new and existing data assembled above, which support reasonability of the sample-based data. It is concluded that remaining levels of ^{137}Cs deposition in mainland Southeast Asia (10-30N) provides a reasonable opportunity for the radionuclide to be a chronometer and tracer in studies on soil and sediment movement in the region; however, the opportunity may be limited in maritime Southeast Asia (10S-10N) due to insufficient deposition despite the large amount of rainfall common throughout the region. Low-level measurement methods mostly have to be applied to the samples from maritime Southeast Asia.

Keywords: Caesium-137, total inventory, soil erosion, sediment movement, Southeast Asia