



A study of Cs-137 spatial distribution in soil thin sections by digital autoradiography

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Recent studies have proved autoradiography to have high potential in detection of radiation in particles including geological objects [1-3]. We applied digital autoradiography based on usage of image plates to study Cs-137 microdistribution in thin sections of the podzolic sandy soil typical for the Chernobyl remote impact zone 25 years after the accident. The zone is noted for contamination of the so-called condensation type where the contribution of the “hot” fuel particles has been comparatively low. The initial ¹³⁷Cs contamination level of the study plot approximated 40 Ci/km². According to the soil core data twenty five years after the accident the main portion of cesium radioisotopes is still concentrated in the 10-20 cm thick surface layer.

Thin sections have been prepared from the top 0-10 cm soil layer of the soil profile located on the shoulder of the relatively steep northern slope of the forested hill formed on the Iput river terrace ca 20 km to the east of the town of Novozybkov, Bryansk region. Undisturbed soil sample was impregnated with epoxy resin, then dissected in vertical triplicates and polished to obtain open surface.

Autoradiography of the thin sections has clearly shown different patterns of Cs-137 distribution related to its concentration in organic material and on the surface of soil particles. High sensitivity and resolution of the applied technique enables to reveal concentration and dispersion zones on microscale level. Soil micro-morphology has shown to be helpful in deciphering soil components and properties responsible for Cs-137 retention in the soil top layer.

References

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