

Event Fallout Inhomogeneity on Small- and Medium-Scale in Meadows and Forests

Due to peculiarities of radionuclides dispersion in the atmosphere the fallout, especially if radionuclides are not emitted into the stratosphere through an obvious atmospheric nuclear test conducted, creates a significant inhomogeneous pattern while air mass travel-path models show definite backward trajectories pointed out to the possible emission source. In order to understand nuclear fallout inhomogeneity reasons up to one hundred soil samples were collected in certain places where the Chernobyl accident plume travelled over. For a reasonably comprehensive sample analysis different techniques were used: HPGe gamma, alpha spectrometry, inductively coupled plasma mass spectrometry combined with a high sensitivity APEX sample introduction system. Although the mixture of global nuclear tests fallout and the negligible Chernobyl plume emissions prevailed, the results showed a substantial concentration increase (up to one hundred times) of ^{137}Cs and Pu and considerable atomic and isotopic ratios differences of $^{137}\text{Cs}/^{239,240}\text{Pu}$, $^{238}\text{Pu}/^{239,240}\text{Pu}$, $^{240}\text{Pu}/^{239}\text{Pu}$ in sampling locations nearby and in medium-scale, sometimes revealing Chernobyl contribution up to 43% in certain places. Places to perform sampling under air mass trajectories of the possible radionuclide emission for the best its detection sensitivity are discussed. The numerical model to explain inhomogeneous fallout depending on various surface and near-ground troposphere parameters is contemplated, too.

Primary author: PUZAS, Andrius (Center for Physical Sciences and Technology (FTMC))

Presenter: PUZAS, Andrius (Center for Physical Sciences and Technology (FTMC))

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