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Spatial heterogeneity of radiocesium in the soil of a broadleaved deciduous forest: the marked role of stemflow

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This project amplifies our understanding of the transport of Cs-137 via stemflow in a konara oak forest by examining the spatial distribution of Cs-137 in the soil in both proximal (near-trunk) and distal (> 1 m form tree trunk) stem areas. We report the Cs-137 concentrations and stocks for twenty-four soil samples harvested from the proximal and distal stem areas around individual trees in a radioactively contaminated konara oak forest in east-central Honshu, Japan. Preferential flowpaths of stemflow on the tree trunk and its point of infiltration into the forest floor was observed by conducting a dye tracer experiment. Experimental results showed that Cs-137 concentrations and stocks were higher in the soils of the proximal stem area as compared to the distal stem area when they corresponded with the preferential flowpaths of stemflow. Moreover, there was a significant relationship between the canopy projection area of individual trees and average soil Cs-137 concentrations and stocks, despite some canopy overlap among even trees. Our findings demonstrate that the spatial patterning of Cs-137 concentrations and stocks in the soil of the proximal stem area are governed (at least partially) by the preferential flowpaths of stemflow along the tree trunk.

[Note: This presentation is currently under peer-review for journal publication.]