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Mathematical Modeling of Environmental Dynamics in Fukushima Prefecture

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Radioactive cesium, which strongly adheres to soils, is one of the major concerns regarding health physics in Fukushima today. It migrates mainly by soil erosion and subsequent sediment transport within surface water during times of widespread flooding. In order to predict the future distribution and resulting air dose rate at any location in Fukushima, we have prepared a number of mathematical models for radioactive cesium transport with different space and time scales. In this presentation we cover our prediction methodology, ranging from sediment and radioactive cesium movement to resulting long term air dose rate changes. Specifically, we present simulation results of sediment movement and radioactive cesium migration using semi-empirical and physics based watershed models, and that of sediment and radioactive cesium behavior in dam reservoirs using one and two dimensional water system simulation models. The results are compared with monitoring based estimates to demonstrate the validity of the models. We also present some simulation results on air dose rate at a particular location and compared with direct measurement value.