Development and application of forest ^{137}Cs cycling model "FoRothCs"

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Following the Fukushima Dai-ichi nuclear power plant (FNDPP) accident in March 2011, 14.5 PBq of ^{137}Cs were released into the atmosphere and deposited onto surrounding terrestrial ecosystems and largely on forest ecosystems. The big difference in the contaminated forest between FNDPP and Chernobyl is that the most contaminated forest is in Fukushima consisted of plantation forests for timber production. Because of the physical decay constant of ^{137}Cs (30.1 year^{-1}), the fate of ^{137}Cs is important for long-term management of these forests. So, we have developed forest Roth-C and Cs cycling model "FoRothCs" to predict the redistribution of ^{137}Cs in forest ecosystem especially for plantation forest in decadal timescale. This model can simulate ^{137}Cs inventory and concentrations and activities of 7 compartments of a forest ecosystem (see Figure: diagonal components are the compartments and other components are transfer processes of FoRothCs) with biomass production (including stem volume of a tree). In this study, we will introduce "FoRothCs" and the application to 6-years monitoring data in 4 forest sites in Fukushima with different amount of ^{137}Cs deposition. To reconcile FoRothCs outputs to these observations and estimate parameters regarding ^{137}Cs transfer processes, we used an approximate Bayesian computation.

Keywords: 137Cs cycling, plantation forest

Atmo	Deposit			Deposit			
	Leaf	Pullback	Pullback	Litterfall Troughfall			
	Trans-location	Branch		Litterfall			
		Trans-location	Stem	Dead			
				Litter	Decom	Immob	Decom
	Uptake	Uptake	Uptake		Soil Org.	Immob	Decom
					Death	Micro-be	Decom
	Uptake	Uptake	Uptake	Uptake by Fungi			Soil Min.

