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Radioactive Sediment Transport on Ogaki Dam Reservoir in Fukushima Evacuated Zone: Numerical Simulation Studies by 2-D River Simulation Code

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Fukushima Daiichi Nuclear Power Plant (FDNPP) accident on March 2011 released significant quantities of radionuclides to atmosphere. The most significant nuclide is radioactive cesium isotopes. Therefore, the movement of the cesium is one of the critical issues for the environmental assessment. Since the cesium is strongly sorbed by soil particles, the cesium transport can be regarded as the sediment transport which is mainly brought about by the aquatic system such as a river and a lake. In this research, our target is the sediment transport on Ogaki dam reservoir which is located in about 16 km northwest from FDNPP. The reservoir is one of the principal irrigation dam reservoirs in Fukushima Prefecture and its upstream river basin was heavily contaminated by radioactivity. We simulate the sediment transport on the reservoir using 2-D river simulation code named Nays2D originally developed by Shimizu et al. (The latest version of Nays2D is available as a code included in iRIC (http://i-ric.org/en/), which is a river flow and riverbed variation analysis software package). In general, a 2-D simulation code requires a huge amount of calculation time. Therefore, we parallelize the code and execute it on a parallel computer. We examine the relationship between the behavior of the sediment transport and the height of the reservoir exit. The simulation result shows that almost all the sand that enter into the reservoir deposit close to the entrance of the reservoir for any height of the exit. The amounts of silt depositing within the reservoir slightly increase by raising the height of the exit. However, that of the clay dramatically increases. Especially, more than half of the clay deposits, if the exit is sufficiently high. These results demonstrate that the water level of the reservoir has a strong influence on the amount of the clay discharged from the reservoir. As a result, we conclude that the tuning of the water level has a possibility for controlling the recontamination to the downstream.