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Future projection of potential suspended sediment load in Japanese rivers under climate change

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Suspended sediment concentrations (SSCs) affect river water quality and can be a threat to aquatic life. Moreover, the annual rate of reservoir storage capacity loss to sedimentation in the world is 0.5%¹, and it varies dramatically for different river basins due to their forest cover and geological conditions. Therefore, estimation of SSCs is essential for characterizing water quality and water resources management. In this study, the total amount of suspended sediment load carried by Japanese streams is discussed. Firstly, the relationships between suspended sediment load and hydrogeography were examined by analyzing river water SSCs observation data at about 400 agricultural and forest watersheds in Japan. Suspended sediment transport was found to be importantly affected by changes in river discharge and watershed characteristics. Then, multiple regression models were built to test the national scale estimation for the indicator of SSCs. The resulted estimation of SSCs provided satisfactory simulations in terms of the selected performance criteria comparing well with the observed SSCs. Finally, the potential suspended sediment load in Japanese rivers under climate change was estimated by considering the future changes of river discharges simulated by a national scale distributed rainfall-runoff hydrological model. The temporal and spatial distribution of suspended sediment load in Japan was then evaluated under future climate change scenarios.

Keywords: Climate change, River, Sediment