

Sediment loading processes in a tectonic and forested catchment: field observations and modelling

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Exploring fluvial sedimentary processes on catchment scale is useful for studies on the forest management, material cycle and ecosystem of short time scale and topographic evolution of long scale. The fluvial transportation of sediment is also related to sedimentation, material cycle and ecosystem in coastal regions. A considerable portion of suspended sediment discharging into a costal lagoon, the Oikamani Lagoon, Tokachi, Hokkaido annually is contributed by the forested Oikamanai River catchment with many tectonic faults. It is important to find out the sediment source in such forested catchments. Here, we have tried to find how sediment load occurs by rainfall and snowmelt runoffs in the forested (ca. 90% area) catchment. Grain size and mineralogy of catchment soil and stream sediment, survey techniques, and turbidimeters provide the information that allows us to understand fluvial sedimentary processes and the sediment source and its availability. Here, a semi-distributed model, ArcSWAT2012, was applied to time series of discharge and sediment load, which were obtained in 2011 to 2013. In ArcSWAT2012, the total basin area (62.48 km²) was divided into 3 sub-basins, as subbasin into hydrological response unit (HRU) based on soil type, land use and slope classes that allow a high level of spatial detail simulation. In this study we have used the data of discharge, Q (m³/s), suspended sediment concentration (SSC; C , mg/L) and sediment load, L (kg/s) of April 2011 to October 2013, weather data of 2008 to 2013, and soil data. Discharge and sediment load simulations by SWAT2012 offer reasonable results. The simulations of sediment load time series and hysteresis analysis indicate that most of the sediment input is coming from sub-basin 2, especially, from its basin slope.

Keywords: tectonic, forested, sediment load, SWAT, hysteresis