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Temporal variations of rain splash at the forest floor of Japanese cypress plantations

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Temporal variations of rain splash during natural rainfall in the field were evaluated using piezoelectric saltation sensors, SENSIT (H11B, SENSIT.Co.USA), in unmanaged Japanese cypress forest. Before the observation, laboratory test was conducted to differentiate the response of SENSIT to water and soil particles. Test results showed that impacts by soil particles can distinguish from impacts by water using SENSIT. Field observation was conducted in 21 year-old stand (21yr stand) and 36 year-old stand (36yr stand) of Japanese cypress with mean stand's height of 9 m and 17 m, respectively. In these stands, SENSIT was installed and saltation counts were monitored. Splashed sediment (g m^{-2}) was collected with splash cup. Raindrop kinetic energy (J m^{-2} mm^{-1}) was measured using LD gauges. Overland flow was monitored using runoff plot (2.0 m x 0.5 m) and converted to flow depth (mm) based on Darcy-Weisbach's friction factor equation. The observation period was from July to September in 2006.

Total splashed sediment collected during observation was 5100 g m^{-2} for 21yr stand and 8192 g m^{-2} for 36yr stand. Unit kinetic energy of raindrop was 16.9 J m^{-2} mm^{-1} in 21yr stand and 21.0 J $m^{-2}mm^{-1}$ in 36yr stand. The significant correlation between cumulative saltation counts recorded by SENSIT and splashed sediment was found and we converted saltation counts to splash rate (g m^{-2} 10 $min.^{-1}$). The data of splash rate showed the different responses of rain splash to antecedent soil water contents and flow depth between two stands. With more than 2000 minute of rainless periods after

the previous rainfall, splash rates per unit throughfall was increased in both stands. During rainstorm event, splash rate in 36yr stand increased with the increase of contemporary flow depth whereas splash rate decreased with time in 21yr stand and little overland flow was observed. These results indicate that surface water flow accelerated rain splash in 36yr stand. From these results, it can be suggested that the increase of raindrop kinetic energy causes the changes of temporal variation of rain splash, and that SENSIT is one of useful tools to monitor temporal variations of rain splash.