A study on characteristics of movement of woody debris mass in debris flows by video footage analysis

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It is known that woody debris in a debris flow is concentrated near the flow front. However, the actual state of transportation of woody debris hasn't been revealed. Accordingly, the purpose of our study is to clear characteristics of transportation of woody debris in debris flows by video footage analysis.

We collected and analyzed video footage of woody debris carried on debris flows and sediment flows. As a result, qualitative characteristics that woody debris was concentrated near the flow front and a lot of woody debris was carried on debris flows were revealed. In our study, the part of woody debris entangled by each other near the flow front is called “woody debris mass”. Woody debris that forms woody debris mass moved with little change in the relative position. When a sediment flow reached the widening part of stream channel and the flow was spread laterally, woody debris mass was broken down and the height of woody debris mass was reduced. Moreover, we measured stream channel width, velocity, flow depth, average length of woody debris, height of woody debris mass, and so on by using video footage. Consequently, a positive correlation was found between “the ratio of the average length of woody debris to the stream channel width” and “the height of woody debris mass”.

Besides, we carried out hydraulic flume experiment on the transportation of woody debris by debris flows. As a result, woody debris mass was formed near the flow front of debris flows. Furthermore, a positive correlation was found between “the ratio of the length of woody debris model to the flume width” and “the height of woody debris mass”. This result was harmonious with that of video footage analysis results.