Summary of Dissertation

Title **Assessing Sediment Yield in a Steep Mountainous Catchment: Influences, Management, and High-Temporal Modeling under Various Land Use and Soil Types**

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Rainfall-induced floods and suspended sediments impact both water quality and human well-being. Besides the soil erosion impacts on the environment, the soil itself is a very fragile and valuable resource due to the difference between soil formation and deterioration rates. Japanese catchments are vulnerable to flood and sediment-related disasters as steep slope catchments are under torrential rainfall despite forests being the dominant land use types. This study utilized the Soil and Water Assessment Tool (SWAT) and assessed the high-sediment-yield areas, identified the main factors for high sediment yield, evaluated the effectiveness of filter strips in retaining the sediment from steep slope areas, and evaluated the pre-event and within-event conditions on the simulation of the sub-daily hydrological model. The model results showed that SWAT is a reliable model to simulate sediment transport successfully pointing out the high sediment yield hotspot areas. The slope is the most influencing factor for the high sediment and consequently, steep slopes along the river are the most critical areas for sediment production. The slope gradient effects are varied with different land use and soil types. Deciduous forests with a slope gradient greater than 45% rise are the areas with the highest soil erosion rate. Regosol soil types showed the highest soil erosion rate as the slope became steeper. The sediment filter strips revealed to be effective for trapping the sediments transported from the steep slope, with the 5-m width strip in the five highest sediment yield subbasins

retaining 14% of the total sediment transported at the catchment main outlet. Additionally, the SWAT model can simulate high-flow events satisfactorily despite the model performance being related to the event conditions and characteristics. Moist antecedent conditions with low total precipitation events' streamflow and suspended sediment are simulated satisfactorily by the sub-daily model. The sub-daily event-based model provides better simulation than the time-continuous daily model in high-flow events simulation. The transported sediment during the high-flow events is influenced not only by the total precipitation of the event but also by the spatial variation of precipitation in the catchment, where the concentrated precipitation in high sediment yield subbasin events transported a higher amount of sediment than the other events. Therefore, future studies focusing on the spatial precipitation input data on the sub-daily model simulation are preferable. As the steep slope is the highest influencing factor on sediment yield, the influence of the topography input data resolution on the catchment sediment simulation should be addressed in the future.