



Sediment transport and erosional processes of a mountain bedrock channel using high-resolution topographic surveys

Yu-Hsuan Yin and J. Bruce H. Shyu

Department of Geosciences, National Taiwan University, Taipei, Taiwan (r04224105@ntu.edu.tw)

In recent years, spatial information with high resolution and accuracy have become widely available, thanks to the rapid technological developments. Such data have been applied in a variety of topics, including the digitization and monitoring of outcrops and the construction of digital elevation models (DEMs) of landscapes. In fluvial geomorphology, it is critical to understand the sediment transport and erosional processes of bedrock channels, but previously this is generally done using computer numerical simulations or minimized experiments. Therefore, this study intends to observe in situ fluvial sediment transport and erosional processes using terrestrial laser scanning (also called “ground LiDAR”) and structure-from-motion (SfM) photogrammetry in a mountain bedrock channel in eastern Taiwan.

Along the Swallow Grotto (Yanzikou) section of the Liwu River, there are many large boulders with different sizes that are up to more than ten meters. Most of these boulders came from rock fall events of a nearby tributary, and are gneiss in composition, distinctively different from the bedrock of the river channel (marble). Thus in this study, we chose these boulders as our survey targets. We applied ground LiDAR survey to observe the movement of the boulders, and to understand the transportation threshold of sediments under different flow conditions. For those giant boulders that do not seem to be moveable under regular fluvial conditions, we suspect that bedrock erosional processes apply to them. We then used SfM photogrammetry to monitor the erosion of particular boulders. By constructing 3D models of the boulders before and after flooding events, we will be able to analyze the amount and location of erosion occurred on the boulders. Combining these different datasets and results, we hope to further understand the sediment transport and erosional processes of bedrock channels.