Using Image-processing with Unmanned Aerial Vehicle to Analyze Grain-Size Distributions of a River

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Generally, there were three conventional methods, i.e. pebble counts, grid sampling, and areal sampling methods to survey surface gravels of a river. Pebble counts used tapes or footsteps to establish the analyzing areas. Grid sampling used straight ropes to separate the analyzing areas before sampled gravels. Areal sampling sampled total gravels under the analyzing areas. These methods must survey many analyze areas, repeat surveys, and expand the analyze area to confirm to the distributions of gravels of a river. These surveying processes were time and cost consuming. This study attempts to use aerial photography with UAV to analyze the grain-size distributions. The aerial photographs were to calibrate the distortions of pixel coordinates and reduce the effect of inhomogeneous luminosity with image pre-processing. After that, Image-processing was used to detect the outline of gravels and removed noises. Then, the images of gravels were segmented from background. Finally, the grain-sizing was analyzed by different fitting-methods, and plotted its distribution curves. First, the experiment in laboratory was used in order to test the analyzed result. These gravels were arranged for different types. Next, image-processing was used to analyze the grain sizing of above types. The result shows the grain-size distribution curves surveyed by image-processing was close to the grain sizing measured by tape. It is showed that using image-processing with UAV to analyze grain-size distributions is a feasible and efficient measuring method.