



River remote sensing beneath the riparian canopy

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Photogrammetric analysis of the river environment has traditionally been achieved through the capture of small- and medium-scale imagery acquired from aircraft and satellite platforms. Although such techniques may yield sub-meter resolution imagery, the presence of a riparian tree canopy may obscure part or the entire channel if the bankfull width is relatively narrow (e.g., < 20 m) and limit the usefulness of photogrammetric data acquisition. However, recent advancements in digital photogrammetry enable acquisition and analysis of large data sets captured at close-range from non-metric cameras. This paper presents a technique for the capture and analysis of photogrammetric data acquired from a non-metric camera mounted on a self-leveling gimbal and suspended 10 m above the channel bed by a unipod. The technique has been applied to several narrow (2 to 5 m bankfull width), gravel bed channels in British Columbia and has produced detailed planimetric maps of channel morphology and high resolution digital elevation models (DEMs) of the channel bed. Horizontal and vertical errors fell within a range of ± 1 to 10 cm. Changes in volume of bed material storage were then calculated from differencing multitemporal DEMs. Measurement errors were on the order of 1%.