

Utilizing New Technology for Acquiring Three-dimensional Topographic Data in River Management (Study period: FY2016 to FY2017)

SUWA Yoshio, Head, FUKUSHIMA Masaki, Senior Researcher, NAKAMURA Kento, Researcher

River Division, River Department

MORIKAWA Hirokuni, Head, NAGAYAMA Shin-ichi, Researcher

Advanced Construction Technology Division, Social Infrastructure Management Research Center

Key words: river management, three-dimensional topographic data, aerial laser survey

1. Visible underwater topography

As existing technologies for obtaining three-dimensional topographic data on rivers, laser survey (aerial laser survey, stationary laser scanner, MMS, etc.) and aerial photogrammetry are mentioned for land topography and echo sounding survey (multi-beam, side scan sonar, etc.), for underwater topography (river bed). On the other hand, as the result of the recent technical innovation, photogrammetry using UAV has been developed for land topography, and aerial laser survey using the green laser with the wave length that can pass through water has also been developed for underwater topography, and both of them are attracting attention as a new technology for obtaining three-dimensional topographic data. This paper introduces aerial laser survey using green laser and a new possibility of using a new technology for obtaining three-dimensional topographic data for river management.

As an example of the aerial laser survey using a green laser, the elevation tints map of the Yoshino River is shown (Fig. 1). Elevations in river management have been measured by the method called "periodic cross-sectional survey," which sets traverse lines in the longitudinal direction of the river at intervals of about 200m and obtains the change points on the traverse lines using level and staff.

With this method, it is difficult to grasp horizontally the sedimentation and the scouring of river bed. However, use of three-dimensional topographic data enables the grasp of topographic changes horizontally and leads to more strict implementation of river bed control.

2. Roles of NILIM in new technology

In order to promote the acquisition of three-dimensional topographic data, as a near-term goal, we aim to prepare the manual of the periodic cross-sectional survey using aerial laser survey by the end of fiscal 2017.

3. Utilization method of three-dimensional topographic data

We are going to consider how to use three-dimensional topographic data in cooperation with the local sites of Regional Development Bureaus. For the present, we intend to apply three-dimensional topographic data to the management of hydraulic structures (mainly levees) and the environment (mainly tree height), as well as the grasp of sedimentation and scouring of river bed as mentioned above. As an example of such applications, grasp of the scouring of river bed is considered to achieve more easily prevention of damage to river levees caused by washing-away of foot protection works.

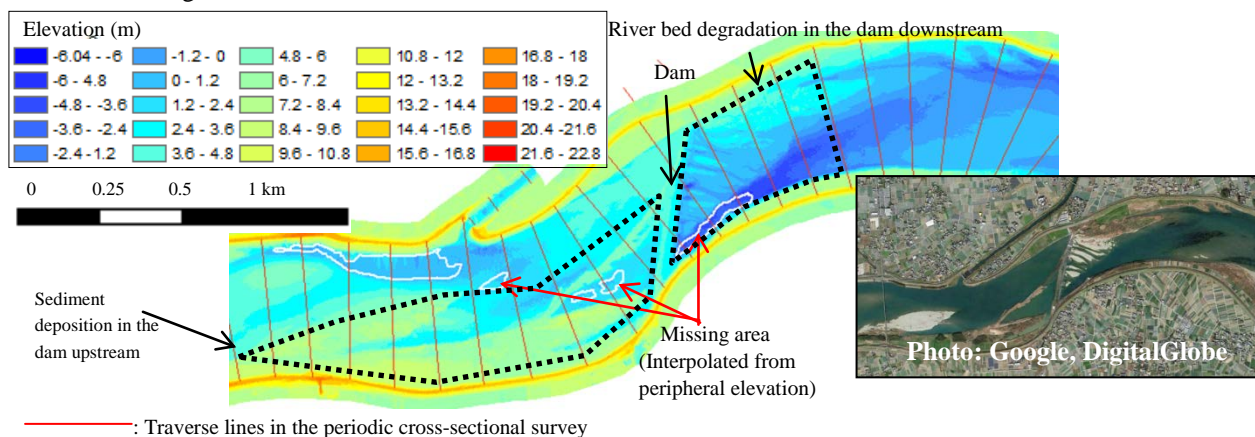


Figure 1: Elevation tints map by aerial laser survey (green laser)
 (Data provided by Tokushima Office of River and National Highway, Shikoku Regional Development Bureau)