[EE] Evening Poster | M (Multidisciplinary and Interdisciplinary) | M-TT Technology & Techniques

[M-TT35]HIGH-DEFINITION TOPOGRAPHY AND GEOPHYSICAL DATA ANALYSIS

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Sun. May 20, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

High-definition, or high-resolution data of earth surface topography and geophysical properties have become widely available for better understandings of the earth surface processes and dynamics. Here in this session, we accept discussions on high-definition topographic and geophysical data, including its theory, acquisition, archiving, processing, modeling and analysis. The approaches may include applications of, but not limited to, laser scanning, SfM-MVS photogrammetry, GNSS positioning, SAR interferometry, multi-beam sonar, geomagnetics and electromagnetics sensors based on terrestrial (fixed or mobile) and aerial (UAV or manned airborne) platforms.

[MTT35-P04]Making of a 3D model of a gravel river bed by combining a DSM with near surface resistivity profiles.

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Keywords:DSM, River bed, Kinu River, 3D model, Resistivity

We created a 3D model of a gravel river bed by combining a DSM with near surface resistivity sections. The field resistivity survey was conducted in 2011, 2 weeks before the 2011 East Japan Earthquake at the middle reaches of Kinu River, flowing through Mouka City, Tochigi Prefecture. Purpose of the survey was to clarify the relationship between small-scale fluvial geomorphology and near surface resistivity structure, or sedimentary environment. A total of 10 short survey lines were set on the gravel river bed, about 400 m wide and 1 km long (Inazaki, 2012). Aerial photogrammetry was also conducted using a UAV in March just before the 2011 East Japan Earthquake. The covered area was about 1.0 km wide and 1.5 km long, and a total of 235 pictures were taken at about 150 m above the ground.

The aerial photos were processed using Agisoft Photoscan Professional to create an orthophoto and a DSM with a resolution of 4.8 cm and 9.6 cm respectively. Regretfully, we could not locate them onto the local coordinate system for a half year due to postseismic displacements associated with the 2011 East Japan Earthquake. We re-positioned 6 GCPs which had been set in the site in June 2011 after reopening of GPS stations situated in Kanto Plain, and projected the photogrammetric results on the plane rectangular coordinate system Zone IX through JGD2011 revised in October 2011. Control points of resistivity survey lines were also referenced to the same system, and the geo-referenced resistivity sections were imported in commercial 2D/3D visualization systems (Surfer 15 and Voxler 4 provided by Golden Software). Finally we created a 3D near surface geoscientific model of the gravel river bed of Kinu River.
The constructed 3D geoscientific model clearly mapped a micro-geomorphology of the gravel river bed, especially a trace of distributary channels. Geo-referenced resistivity sections were concordant well with micro-geomorphology. For example, remnant channels traced in the high-water surface were imaged as low resistivity anomaly. In contract, a dune in the low-water surface was imaged as relatively high resistivity zone through parallel survey lines. The 3D model and field observations showed the river bed consisted of thick coarse-grained fluvial sediments and conductivity of pore water was relatively low or resistivity was high due to the infiltration of fresh water in the surficial layers.