

High-resolution measurement of surface deformation at low banks after 2003 Tokachi-oki earthquake

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On alluvium land in lower Tokachi River, some of banks flew and deformed following the Tokachi-oki earthquake in 2003. Small banks on infilled valley damaged in almost researched zone. The deformation is categorized as flow deformation, a part of road expanding to side, and open clacks on surface and shoulder of roads. For road damages, however, efforts were not made for noting detailed deformation, but repairing work was done, rapidly. We measured detailed 3D shapes of the deformation in road using 3D laser profiling instrument.

The measurement was done at low bank in marsh zone, near Chobushi lake, Toyokoro town in southeast of Hokkaido. The bank is height from 1.5 to 2.0 meters, and mount asphalt two-lane road. The features of deformation were shown as below. (1) Tearing was from open cracks at center line to shoulder of road. (2) A lane deformed as flowing expanded to side of road. (3) There were bending, settling, caving. A part of road shaped as wave form.

The bird-eye view of overall deformation was difficult to obtain in field, but we could obtain it from the integrated image between 3D image and 5cm interval contour map by 3D laser profiling method. From the integrated image, the mechanism of deformation is interpreted as whole of road didn't deform uniformly, but road shoulder at the most sinking part is pushed to outside.

As mentioned above, we can obtain and display the 3D image of ground deformation by high resolution 3D laser profiling method. We are planning to compare the fact and the simulated result of process of deformation at low bank zone.