Surface rupture characteristics of the 2016 Kumamoto earthquake from compare of LiDAR DEM

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In the earthquake of M 7.3 occurred in Kumamoto Prefecture at 1:25 on April 16, 2016 (hereinafter referred to as the Kumamoto earthquake), surface earthquake faults had appeared in the area including Aso-city to Mifune-cho. In order to grasp these ground deformation quantitatively and quantitatively, the authors used airborne LIDAR data captured at two time periods immediately before this earthquake (April 15,14: 59 - 19: 20) and immediately after (April 23,10: 14 - 11: 53).
Elevation difference using mesh data is common as a method of comparing terrain data at multiple times. However, when large horizontal displacement is involved such as fault displacement, accurate fluctuation situation cannot be grasped by this method.
Therefore, we investigated a method to calculate three dimensional displacement vector by using point cloud data acquired by aviation laser measurement. An ICP (Iterative Closest Point) method is a general technique for registration between two point clouds. By repeating the process of obtaining the nearest neighbor point between two point clouds as the corresponding point and estimating the geometric transformation of reducing the distance of the corresponding point, it is possible to perform automatic positioning without a marker. In this study, we also adopted a method (CCICP: Classification and Combined ICP) that also takes into consideration minimizing the distance between the plane and the plane that the point group comprises.
Model area was set up near Mt. Miyake in Mashiki Town and CCICP method was applied as shown in Fig.1. From this result, it was confirmed that two right lateral strike-slip faults in the east-west direction along the north and south edges of the Kiyamagawa Lowland and the northwest-southeastward fault going on to it.
In addition, the uplift was observed in the mountainous area on the south side and the subsidence in the plateau portion on the north side. It was revealed that in some places where there are almost no horizontal movement locally in the vicinity where the fault crosses.

Keywords: LiDAR, Active Fault, 2016 Kumamoto Earthquake, Iterative Closest Point algorithm