Terrain analysis of terrace spread in Shinano River basin, Niigata Prefecture using detailed DEM data

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The Shinano River basin in Niigata Prefecture has long been known as an active folding area. It is said that the river terrace along the watershed has an abnormal slope on the upstream and mountain sides. In the Chuetsu earthquake in 2004, an uplift of about 1 m was reported near the Higashiyama Anticline. In these backgrounds,geomorphological, geological and geodetic studies have been conducted in this area.

In this study, landform classification was performed on the terrace near the confluence of Shinano River and Uono River. While, topographic analysis was performed to visualize characteristic terrain surfaces and to consider landform evolution using 1m grid DEM by Lidar data which provided by Geospatial Information Authority of Japan (measurement period: May 2005) was used. In addition, DEM difference between two periods was calculated and the value was calculated as the amount of erosion in 6 years. (another measurement time: November 2011)

As the result of aerial photograph interpretation, field surveys, and reference of preceding studies, river terraces in this area was divided into 15 terraces consisting of M1 to M4 and L1 to L11 terrace in total. In the topographic analysis, a micro topographic map was created using Arc GIS with reference to Toda (2014), and a water network map and watershed map were created using hydrological analysis tools.

The calculated erosion amount clearly shows the erosion on the attack slope side and the accumulation on sand bars. As the result of overlay between erosion map and geological map by GIS. erosion sites were concentrated in the Uonuma Formation near the boundary between the Uonuma Formation and the Wanazu Formation.

For field survey, it is considered that there is room for further discussion on the relationship between geology and erosion at the geological boundary and the amount of uplift by crustal deformation. For topographical analysis, we plan to create maps using tools other than hydrological analysis, and to consider landform evolution.

Keywords: Terrain analysis, Lidar data, Shinano River, River terrace, Arc GIS

