

Landscape Ecological Mapping Using LIDAR Data for Biodiversity Evaluation

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[Abstract]

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This study develops the way to produce landscape ecological map for estimation of biodiversity using the airborne laser survey (LIDAR Survey) data. We produce the landscape ecological map which consists of three dimensional vegetation structure and micro topography under the forest using LIDAR. Two study areas were selected. One is the Shiretoko Peninsula (Mt. Rausu and Shiretoko Corp), Hokkaido Island as World Natural Heritage Area of Japan. Another is the Chugoku Mountains (north foots of Mt. Dogo) where many historic iron sand mining sites (Kanna-Nagashi sites) as Satoyama Region (secondary forest area) are existing.

Basic legend of landscape-ecological map consists of ecotopes which are the combination of vegetation classification and landform classification. Vegetation classification is three dimensional vegetation structure classification using high density random points data, detailed DSM (Digital Surface Model) and detailed DEM (Digital Elevation Model) by LIDAR data. Landform classification is micro landform classification using detailed DEM (Digital Elevation Model) by LIDAR data.

Using LIDAR Survey data in summer and autumn seasons, 0.5m grid DSM and DEM in summer and 1 or 2m grid DSM and DEM in autumn are obtained. Vegetation classification has been done using three dimensional vegetation structure detected by the difference between LIDAR data in two seasons. The legend of three dimensional vegetation structure vegetation maps consists of the combination of vegetation height, thickness of crown and difference in two

seasons (deciduous single layer tree, deciduous multi layer tree and evergreen tree). Landform classification has been done by automatic landform classification method combining three categories, such as slope degree, texture (roughness) and convexity of autumn DEM. The results of overlay analysis between vegetation classification and landform classification are as follows: On Shiretoko Peninsula, three dimensional vegetation structures are dominated by site elevation compared with micro landform classification. On Chugoku Mountains, some early deciduous high think crown trees (a kind of nut) are located in historical mining sites (Kanna-Nagashi) with following micro landform categories such as gentle slope, concave and rough texture.

Grid size of landscape ecological maps is 4m, because the grid size is corresponding to tree crown size. At first, we produced 1m grid vegetation maps and automated landform classification maps, and then we resampled 4m grid data from 1m grid data. These maps would be introduced as an example of LIDAR application for ecological field.