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Application potentiality of lidar derived DEM and DSM data in forestry

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Abstract: Remote sensing techniques and technologies are used extensively in forestry as well as in many other disciplines. There are certain reasons why remote sensing techniques are so widespread and widely used. The most important of these are the efficiency of the technology reducing the time, cost and labor. In addition, they are also useful in establishing the possibility of working in large areas and determining the invisible properties of objects. Light Detection and Ranging (LIDAR) is an important instrument that has been used in remote sensing studies since the early 1960's. As the name implies, LIDAR measures the distance to the targeted object(s) by calculating the time differences for the light pulses hitting the object(s) and returning from them. Besides, the change in the wavelength gives users other important information about the properties of the object(s). Basically, LIDAR data gives us 3D point cloud of the object/area, which includes elevation and other structural properties of them. Digital Elevation Models (DEMs) and Digital Surface Models (DSMs) are the most important outputs obtained through LIDAR data. While DEM gives us the elevation data of the world's bare surface, the DSM gives us elevation data of all elements (trees, buildings, etc.) on the earth's surface. In this study, the usage and capacity of high resolution DEM and DSM data obtained through LIDAR data in forestry activities were examined and discussed. Results were obtained by using many different studies in the literature. Accordingly, DEM and DSM data derived by LIDAR have been used for calculating and estimating the 3D stand parameters such as canopy height, above–ground biomass, mean steam diameter, vertical foliage profiles, canopy volume, tree density, open areas and stream/road paths within forests. In these studies, it was seen that the calculation of the elements of forest components obtained with LIDAR data validated and exceeded the expectations and saved both labor and time. It has also been demonstrated that LIDAR was far superior then the other remote sensing techniques. The success achieved in forestry activities with LIDAR data is important in the future development, production and use of such techniques.
Keywords: LIDAR, DEM, DSM, Remote sensing, Forestry