Detection and Classification of Forest Area and Forest Type using Multi-Temporal Satellite Imagery : Focusing on Gangwon-province in South and North Korea

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Abstract: Climate change broadly impacts on the ecosystem and Intergovernmental Panel on Climate Change (IPCC) announced that climate change in the 21st century will be much faster than in the 20th century. Developed countries have begun to pay attention to forests that serve as storage and absorption sources of carbon. South Korea has begun to manage forest based on 2030 Greenhouse Gas (GHG) Reduction Roadmap. Therefore, it is important to detect forest cover and classify forest type (deciduous forest, coniferous forest), and calculate accurate carbon stock based on forest type. The Korean Forest Service has established spatial forest information and updates regularly. Based on these statistics, the government indicates the need for forest management policy to prevent deforestation and climate change. However, in the case of North Korea, such roadmap is absent and because of the limitations of the political and geographical approach, the spatial information about land use and land use change has been extremely limited. One of the most efficient ways to detect forest cover area and forest type in restricted areas such as North Korea and Demilitarized Zone (DMZ) is using satellite imagery and spectral vegetation index, and geological spatial information such as Digital Elevation Model (DEM). In this study, we detected a forest area and classified forest type using spectral vegetation index and spatial geological information and multi-temporal Landsat imagery. The study area is Gangwon-province which is the only divided administrative district to South and North Korea and the most forested area in the Korean peninsula. We derived the two regression equations for forest detection and classification using Korean public spatial data, spectral vegetation index, and geographic information, and applied these regression coefficients to North Korea. This study is meaningful in that 1) using South Korea public spatial data for training data set (setting regression function) and 2) detecting the forest cover and type on the Korean Peninsula, especially on North Korea and DMZ, by using vegetation index and spatial

geological data. It will be a base spatial map for sustainable forest management and ultimately base information in the forest field to respond to climate change. Also, this method will be the best plan for researching forest area before North Korea is opened.

Keywords: Climate Change, Forest, Satellite Imagery, Regression, Classification