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Use of time series MODIS Leaf Area Index data to monitor temperate forest

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As one of the primary EOS sensors, MODIS has provided not only radiant-flux image data but also several biophysical variables, including leaf area index (LAI), fraction of photosynthetically radiation (FPAR), and net primary production (NPP), that can be a valuable source of information for ecological studies in range of time and spatial scales. Since 2000, MODIS LAI data (every eight-days composite) have been available for whole land areas of the earth. The objectives of this study are to analyze the potential of time series MODIS LAI product to monitor the regional scale forest cover changes over the temperate forests in the Korean peninsula.

Time series MODIS LAI data over the study region were obtained for the period of 2000 to 2003. As an initial approach to assess the quality of the data, we analyzed those reference data that are delivered with LAI data and include the LAI estimation algorithm used and cloud coverage for every pixel. Mean LAI value over the Korean peninsula showed very unusual pattern from June to August for every year, which was caused by the high cloud coverage during the summer season. Those LAI values estimated by the backup algorithm of using NDVI showed rather low quality. Therefore, it is strongly advised to use only those LAI values estimated by the main algorithm using the canopy radiative transfer model and not affected by cloud cover.

LAI of North Korea showed lower LAI than South Korea for spring, fall and winter, but similar mean LAI (4.5 LAI) during growing season of summer, which implies the short growing period due to the climate pattern between north and south Korea. Time-series MODIS LAI data have shown the possibility of detecting and monitoring of fire damaged forests. Comparison among three years MODIS LAI product, we were able to see high LAI value for a certain year when the precipitation and temperature were better than the other years. Time series MODIS LAI product can be useful to monitor several biotic and abiotic changes of temperate forest in regional scale.