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## Global-scale analysis of climate change impact on vegetation greenness for land cover type

Munkhnasan Lamchin P, Woo Kyun Lee and Seong Woo Jeon  
Korea University, Republic of South Korea

Vegetation and climate variable trends and correlation analysis are among the important issues of global land degradation. However, present climatic impacts on global vegetation trends are uncertain. Here we use the Advanced very high resolution radiometer - Global Inventory Modelling and Mapping Studies NDVI3g data, land cover data of the climate change initiative, and Climatic Research Unit Time Series climate variable (temperature, rainfall) global time series over the last 33 years. First, we estimated the overall trends for vegetation greenness and climate variables over five time periods and analyzed four-season trends. Second, we performed correlation and regression analyses to detect correlations between vegetation greenness and climate variables. Next, we extracted trends and correlation results by mainland cover type (forest, cropland, and grassland). The largest decreasing trend of vegetation greenness and grasslands were found in the mid-latitude regions and in Argentina, western South America, North America South Africa, north Africa, Saudi Arabia, and south and northeast Asia. Temperature and rainfall were the main impacts on vegetation growth; however, in the northern regions, temperature was a more important factor in vegetation greenness when vegetation greenness and rainfall were highly correlated. Regarding temperature, during the last 33 years, hot-spot areas and the largest temperature increases were found in the Amazon, Central America, southern Greenland, east Africa, southeast Asia, and other areas. However, the western part of South America, Angola, the Philippines, Indonesia, and Papua New Guinea saw decreased temperatures. Rainfall decreased the most in the March to May season over most of the world.

Inasa82@gmail.com