# Distribution of Vegetation Growth Abnormality by NDVI's Responses to Precipitation in Mongolia, 2001 to 2020

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Abstract: *With most agricultural lands being pastured, the sustainability of the natural environment, especially grassland, is of foremost importance to Mongolia and Arid, Semi-Arid regions in North Asia. It is easy to observe the rise and fall of vegetation growth represented by NDVI but difficult to directly distinguish vegetation changes due to climatic factors or anthropogenic influences. However, we can evaluate third-party impacts on vegetation growth by how vegetation growth responds to precipitation changes. This paper calculated the Vegetation Growth Abnormality map from the Pearson Correlation Value between NDVI and Precipitation data in Mongolia from 2001 to 2020. Then we factored in MODIS LULC data to calculate the growth rate, ratio of abnormal vegetation growth, utility and average growth season accumulated precipitation, and biomass density of grassland in Mongolia. Finally, we finished the verification discussion by sampling monthly records, aerial photo visual inspections, and population density data. We found that the mean and median values of NDVI-Precipitation in Mongolia from 2001 to 2020 are 0.327 and 0.331, with a standard deviation of 0.204. Grassland has grown 4.69% in the twenty years with increased biomass density and average precipitation. About 51% of grassland is deemed abnormal in population growth, possessing a higher biomass density and average rainfall. The precipitation/biomass density ratio in grassland has increased over the years, hinting at a higher degree of disruption, even though NDVI data suggest Mongolia is getting greener. Besides visual confirmation of human presence in places classified as Abnormal Vegetation Growth region, we have a negative linear regression between population density and NDVI-Precipitation Correlation Value of Correlation = 0.330-0.008 × Biomass Density, linking low correlation value to higher population density and intensified anthropogenic activities behind such number.*

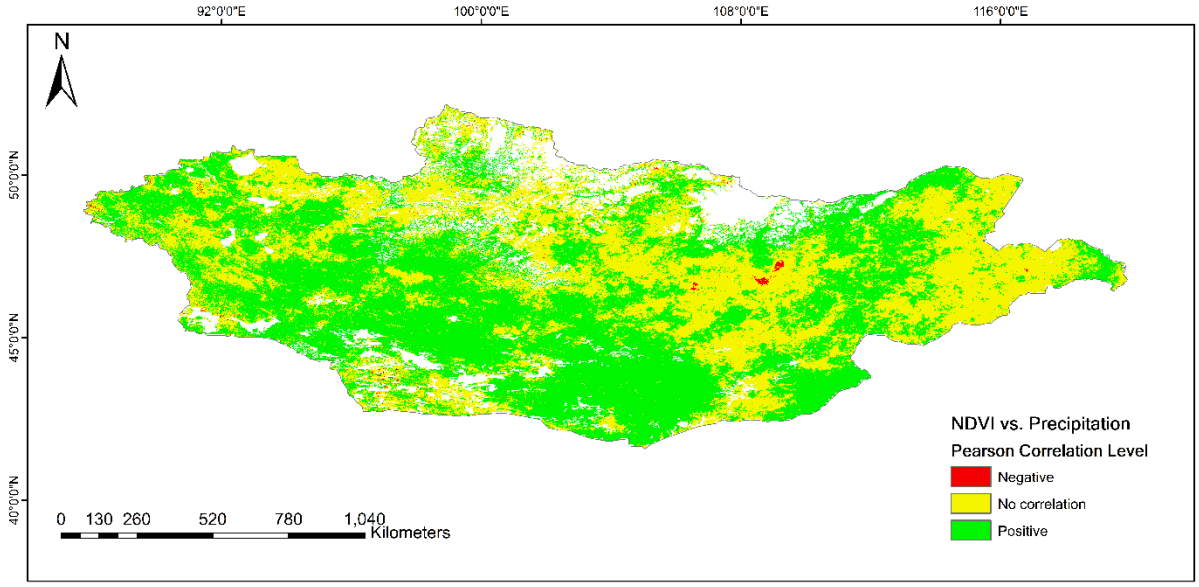


Figure 3.1 The Pearson Coefficients between NDVI and Precipitation from 2001 to 2020. The positive correlation is considered normal and other groups are deemed abnormalities.

Keywords: NDVI, GSMaP, Pearson Coefficients, Time series data, LULC