Quantification of NDVI Variation within the Major Plant Formations in Nunavik

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Abstract : Altered temperature and precipitation regimes associated with climate change generally result in improved conditions for plant growth. For Arctic and sub-Arctic ecosystems, this new climatic context favours an increase in primary productivity, a phenomenon often referred to as "greening". The development of an erect shrub cover has been identified as the main driver of Arctic greening. Although this phenomenon has been widely documented at the circumpolar scale, little information is available at the scale of plant communities, the basic unit of the Arctic, and sub-Arctic landscape mosaic. The objective of this study is to quantify the variation of NDVI within the different plant communities of Nunavik, which will allow us to identify the plant formations that contribute the most to the increase in productivity observed in this territory. To do so, the variation of NDVI extracted from Landsat images for the period 1984 to 2020 was quantified. From the Landsat scenes, annual summer NDVI mosaics with a resolution of 30 m were generated. The ecological mapping of Northern Quebec vegetation was then overlaid on the time series of NDVI maps to calculate the average NDVI per vegetation polygon for each year. Our results show that NDVI increases are more important for the bioclimatic domains of forest tundra and erect shrub tundra, and shrubby formations. Surface deposits, variations in mean annual temperature, and variations in winter precipitation are involved in NDVI variations. This study has thus allowed us to quantify changes in Nunavik's vegetation communities, using fine spatial resolution satellite imagery data.

Keywords : climate change, latitudinal gradient, plant communities, productivity
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