



The Roles of Fractional Vegetation Cover in the Direct Relationship with Green Biomass

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DESCRIPTION

An important biophysical metric used to describe the Earth's surface system is Fractional Vegetation Cover (FVC). The methods covered in this chapter include visual estimating, sampling, the use of optical measuring devices, regression modelling, mixed pixel decomposition, and machine learning techniques. These approaches are utilised for both field measurement and remote sensing retrieval of FVC. In the section describing field measurement, several regularly used techniques are detailed in detail, with real-world examples and discussions provided. The amount of greenery in urban areas has a direct impact on quality of life. Fractional Vegetation Cover (FVC) is a crucial gauge for assessing regional hydrological, ecological, and environmental changes as well as a measure of the health of the surface vegetation. FVC is a key parameter of the Chinese Soil Loss Equation and one of the key elements impacting soil erosion. It can directly reflect changes in plant cover or the effectiveness of vegetation-based methods to mitigate soil erosion. Satellite image analysis is now the main method for determining regional FVC due to the rapid improvement of remote sensing technologies. Technical Regulations on Dynamic Monitoring of Regional Soil Erosion (Trial) were released by the Monitoring Center of Soil and Water Conservation, Ministry of Water Resources of the People's Republic of China, in 2020. These regulations required local governments to use MODIS-NDVI data and Landsat satellite data to calculate regional FVC and provided two calculation methods: the Parameter Revision Method (PRM) and the fusion method.

Planners are compelled to create policies to enhance the quality of the urban environment due to urban growth and the associated environmental issues. Vegetation mapping is therefore essential for urban planning and management. To create a trustworthy map of coverage, we must take into account the urban environment's complicated spectral makeup and the scarce vegetation in these locations. High spatial resolution photos are necessary to accurately depict the vegetation in these

places. At both the regional and global levels, FVC goods can only be produced using remote sensing. Empirical approaches, the pixel un-mixing model, and physical methods are three typical FVC estimate techniques that have been developed and are widely utilised. The main objective of empirical approaches is to build statistical correlations between FVC and remote sensing data, such as vegetation indices and spectral band reflectance. For instance, a regression model might be used to estimate FVC based on each pixel's vegetation index after being trained using known FVC and associated vegetation index data.

The pixel un-mixing model is predicated on the idea that photon multiple scattering between macroscopic materials is comparatively insufficient, and that the fluxes received by the sensor are made up of a total of fluxes from various cover types. The percentage of vegetative cover is referred to as FVC. However, due to the complexity of the land surface conditions and the variety of spectral properties, the endmembers are challenging to identify and extract over wide areas. The physical approaches are based on the inversion of models of canopy radiative transmission that can simulate the physical correlations between vegetation canopy reflectance and FVC.

In arid areas with limited accessibility, satellite-derived vegetation indices have been a helpful tool for tracking regional and temporal FVC change. Despite this, satellite-driven FVC contains a significant amount of uncertainty due to sparse vegetation coverage and heterogeneous soil-plant composition in dry and semi-dry grasslands, particularly when using coarse spatial but high temporal resolution imagery to monitor seasonal and inter-annual vegetation dynamics in large geographic regions. This is a problem when using satellite data to track FVC-related natural grassland hazards like desertification and high livestock mortality across the vast Mongolian steppe. There is still a need for field FVC data that covers a large geographic area and captures the varied soil-plant compositions, as well as a strong statistical test for the association between field FVC and satellite-derived vegetation indices in grassland regions.

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