



Satellite remote sensing assessment of climate impact on forest vegetation dynamics

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Forest vegetation phenology constitutes an efficient bio-indicator of impacts of climate and anthropogenic changes and a key parameter for understanding and modelling vegetation-climate interactions.

Climate variability represents the ensemble of net radiation, precipitation, wind and temperature characteristic for a region in a certain time scale (e.g. monthly, seasonal annual). The temporal and/or spatial sensitivity of forest vegetation dynamics to climate variability is used to characterize the quantitative relationship between these two quantities in temporal and/or spatial

scales. So, climate variability has a great impact on the forest vegetation dynamics.

Satellite remote sensing is a very useful tool to assess the main phenological events based on tracking significant changes on temporal trajectories of Normalized Difference Vegetation Index (NDVIs), which requires NDVI time-series with good time resolution, over homogeneous

area, cloud-free and not affected by atmospheric and geometric effects and variations in sensor characteristics (calibration, spectral responses).

Spatio-temporal vegetation dynamics have been quantified as the total amount of vegetation (mean NDVI) and the seasonal difference (annual NDVI amplitude) by a time series analysis of NDVI satellite images with the Harmonic ANalysis of Time Series algorithm.

A climate indicator (CI) was created from meteorological data (precipitation over net radiation). The relationships between the vegetation dynamics and the CI have been determined spatially and temporally. The driest test regions prove to be the most sensitive to climate impact. The spatial and temporal patterns of the mean NDVI are the same, while they are partially different for the seasonal difference.

The aim of this paper was to quantify this impact over a forest ecosystem placed in the North-Eastern part of Bucharest town, Romania, with Normalized Difference Vegetation Index (NDVI) parameter extracted from IKONOS and LANDSAT TM and ETM satellite images and meteorological data over 1995-2007 period.

For investigated test area, considerable NDVI decline was observed between 1995 and 2007 due to the drought events during 2003 and 2007 years.

Under stress conditions, it is evident that environmental factors such as soil type, parent material, and topography are not correlated with NDVI dynamics.

Specific aim of this paper was to assess, forecast, and mitigate the risks of climatic changes on forest systems and its biodiversity as well as on adjacent environment areas and to provide early warning strategies on the basis of spectral information derived from satellite data regarding atmospheric effects of forest biome degradation .

The paper aims to describe observed trends and potential impacts based on scenarios from simulations with regional climate models and other downscaling procedures.