Agroecological Aspect of Using Spectral Data as Information and Predictions Support

R. Kancheva, D. Borisova

Solar-Terrestrial Influences Laboratory, Bulgarian Academy of Sciences, Bulgaria
(rumik@abv.bg / fax +35928700178)

In the contemporary world aerospace information gathered by different sensors and numerous observation missions has become a genuine necessity in various investigation and application fields. During the last years the destructive processes caused by natural disasters or anthropogenic activities are in the focus of the scientific research and occupy the attention of social communities and government authorities. Remote sensing technologies are widely used for the purpose of natural resources management, crop assessment, land covers change detection, ecosystems preservation and many other world significant problems. Recent developments in environmental studies are greatly connected with the worldwide ecological problems related to anthropogenic impacts on the biosphere and first of all on vegetation. Advanced monitoring and alerting, on-time information extraction, modeling and forecasting technologies are a preposition for successful data application and decision support in environmental studies. In agriculture remote sensing is applied for assessing plant development processes and growth conditions.

This paper is devoted to ground-based spectral modeling as an integral part of vegetation remote sensing monitoring. The influence of soil properties and anthropogenic factors (fertilization, heavy metal pollution) on crop spectral response is studied. Empirical relationships are established between the stress factors, plant spectral response and agronomic variables thus attaching a quantitative measure to the spectral indicators of crop stress. A comparison is made between the stress bioindicators (reduced biomass, chlorophyll inhibition, senescence effects) and a variety of spectral stress indicators demonstrating high correlation and very good correspondence. The obtained results indicate that growth conditions cause statistically significant variations of plant spectral signatures. The latter are used not only to discriminate between stressed and healthy vegetation but also to quantitatively assess the stress impact. Multispectral data are successfully used for crop agrodiagnostics. Good agreement is found between model estimates and ground-truth data.

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