

# ANALYSIS OF BRDF CHARACTERISTICS OF FOREST STANDS WITH A DIGITAL AERIAL FRAME CAMERA

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## ABSTRACT:

The directional reflectance characteristics of the land surface can be described based on concepts of the Bidirectional Reflectance Distribution Function (BRDF). This contribution concentrates on directional reflectance effects in aerial photos of forests. Since the advent of digital metric aerial photography, major efforts have been made to apply quantitative digital automatic methods for the analysis of aerial photos. Directional reflectance effects are important for this: on the one hand, they make analysis more complicated, on the other hand they may provide additional information for deducing land cover (e.g. forest) parameters. Digital aerial photos, when taken with high forward and side overlap, may provide a convenient tool for analysing directional reflectance effects. The main aim of this contribution is to demonstrate the usefulness of digital aerial photos taken with a Vexcel UltraCamD for analysing directional reflectance characteristics of forests. 11 BRDF models are tested for 6 different land cover types focusing on forest cover. The models were evaluated using the coefficient of determination ( $R^2$ ) and the symmetric mean absolute percentage error (sMAPE). It has been shown that the parameters of BRDF models describing individual forest plots can be estimated from digital aerial photos taken with a frame camera with large forward and side overlap. Differences in the performance of the models for different forest plots could be explained taking into account the special assumptions on which the models are based and the special properties of the observed forest stands.

**TOPIC:** Physical modeling and signatures

**ALTERNATIVE TOPIC:** Physical modeling and signatures