



Importance of forest floor information for vegetation remote sensing over boreal forest

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A popular method of satellite-based monitoring of vegetation greenness is to calculate the Normalized Difference Vegetation Index (NDVI) from measurements of the red (RED) and near-infrared (NIR) bands. We discuss the importance of the forest floor greenness for the total NDVI based on airborne spectral reflectance measurements and simultaneous airborne land surface images acquired around Yakutsk, Siberia, using an aircraft from spring to summer 2000. The aerial land surface images (4402 scenes) were visually classified into four types according to the forest condition: no-green canopy and snow floor (Type-1), green canopy and snow floor (Type-2), no-green canopy and no-snow floor (Type-3), and green canopy and no-snow floor (Type-4). The mean spectral reflectance from 350 to 1200 nm was then calculated for these four types. Type-1 had almost no difference in reflectance between the RED and NIR bands, and the resultant NDVI was slightly negative. Although Type-2 showed a significant difference between the two bands because of canopy greenness, the resultant NDVI was rather small due to high reflection from the snow cover on the floor. In Type-3, the significant difference between the two bands was caused by the greenness of the floor, and the NDVI was relatively large. Type-4 had the largest difference between the bands because of the greenness of both the canopy and floor. These results reveal that the NDVI depends considerably on forest floor greenness and snow cover in addition to canopy greenness. The results further suggest that NDVIs for boreal forests calculated from remotely sensed data require careful interpretation.