

Optical Indices for Estimating Biophysical/Physiological Parameters

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Abstract

To meet the objectives of sustainable forest management as expressed by the Canadian Council of Forest Ministers (1998), the measurement/assessment of a variety of bioindicators for large tracts of Canada's forest ecosystems are required to monitor ecosystem health and biological productivity. Potential of airborne imaging spectrometers to identify forest canopy condition has been suggested by (i) the ability to detect and correlate spectral reflectance changes to chlorophyll concentrations; and (ii) field studies confirming the links between reflectance spectra and leaf constituents. The research described here represents a significant effort over a three year period by a group of researchers from York University, the Ontario Forest Research Institute (OFRI) and the Centre for Research in Earth and Space Technologies (CRESTech) to examine the relationship of optical indices to structural and functional measures of forest canopy condition. Broadly defined, the goals of this research are (i) to explore, derive and validate optical indices from airborne imaging spectrometer data that can be related to field-derived bioindicators of forest health and stress status; and (ii) to determine the relationship of optical indices derived from airborne imaging spectrometer data to field derived estimates of structural and biophysical parameters for silvicultural treatments of sugar maple. In addition, the relationship between spatial aggregation/scaling of optical indices and field derived estimates will be examined. Selected preliminary findings of this research effort will be presented.