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Characterizing vegetation indices derived from active and passive sensors

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Abstract

New 'active' sensors containing their own light source may provide consistent measures of plant and soil characteristics under varying illumination without calibration to reflectance. In 2006, an active sensor (Crop Circle) and various passive sensors were compared in a wheat (*Triticum aestivum* L., c.v. Chara) experiment in Horsham, VIC, Australia. The normalized difference vegetation index (NDVI) and soil-adjusted vegetation index (SAVI) were calculated from plot data with a range of canopy cover, leaf area and biomass. The active sensor NDVI and SAVI data were slightly less

effective than corresponding passive sensor data at estimating green cover (r^2 = 0.80−0.90 vs. ~0.95). Passive sensor measurements showed strong non-linearity for

estimating dry biomass and green leaf area index (GLAI), whereas SAVI calculated from the active sensor was linear ($r^2 = 0.86$ and 0.90). Scaling effects were not apparent when point, transect and plot areas were compared at the given level of spatial variation. Sensor height above the target confounded SAVI data probably due to differential irradiance from the light sources and the unbalanced effect of the 'L' factor within the algorithm. The active sensor was insensitive to light conditions ($r^2 = 0.99$ for cloudy vs. clear skies) and had no requirement for optical calibration.

Additional information

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