Estimating dry matter content for winter wheat using MODIS reflectance data

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Abstract The accumulation process of dry matter content during the crop growing period is a good indicator of crop condition and yield. This paper investigated the application of remote sensing in estimating the dry matter content. Several vegetation indices (VI) calculated from the MODIS 500 m reflectance data were used for regression analysis. A negative correlation was found between all the VIs and the dry matter content after the VIs reached the peak. This correlation during the later growth period may be more valuable for NPP estimation since the dry matter content was then directly related to the crop yield. However, the daily VI time series were found to be very sensitive to atmospheric conditions and angular effects, which may cover the changes on the VI induced by the crop growth to a certain degree. The Savitzky-Golay filter was employed to smooth the daily NDVI time-series as a test. The smoothed NDVI temporal curves were found closer to the 8-day composite ones. The correlation between the dry matter content and NDVI was also improved after smoothing. Both of these demonstrated that this method could partly remove the noise in the MODIS data, specifically the cloud effect, and disclose the changes in NDVI from the crop growth.

Key words MODIS; dry matter; vegetation index; Savitzky-Golay filter