

水稻叶面积指数与MODIS植被指数、红边位置之间的相关分析

Analyses of the correlation between rice LAI and simulated MODIS vegetation indices, red edge position

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中文摘要:

对模拟中分辨率成像光谱仪 (MODIS) 两个植被指数归一化植被指数 (NDVI)、增强植被指数 (EVI) 以及红边位置 (REP) 与水稻叶面积指数 (LAI) 进行了相关研究。利用光谱分辨率为3 nm 的ASD FieldSpec UV/VNIR 光谱仪获得了2002年两个不同水稻品种——杂交稻和常规稻整个生长期的高光谱数据, 同时对水稻LAI进行了测定。利用一阶微分计算红边位移。模拟了MODIS 3个波段, 波段1(620~670 nm, 红波段), 波段2(841~876 nm, 近红外)和波段3(459~479 nm, 蓝波段), 并用这些波段计算了MODIS-NDVI和EVI。结果表明: 对于常规稻, MODIS-NDVI、EVI和REP与水稻LAI呈现出良好的相关性; 而对于杂交稻, 与水稻LAI相关性来说, MODIS-EVI和REP要比MODIS-NDVI更敏感。分析原因, 主要是因为杂交稻同常规稻相比在生长的中后期LAI比较大, MODIS-NDVI容易饱和; 而MODIS-EVI和REP由于可以消除背景影响, 增强对LAI的敏感性。因此MODIS-EVI和REP可以更有效地监测水稻叶面积指数。

英文摘要:

In the present study, analyses of the correlation between rice Leaf Area Index (LAI), hyperspectral data, Normalized Difference Vegetation Index (NDVI), Enhanced Vegetation Index (EVI) and the Red-Edge Position (REP) were studied. Hyperspectral data of hybrid rice and common rice in whole growing stage during 2002 was measured using the ASD FieldSpec UV/VNIR Spectroradiometer with resolution of 3 nm and at the same time the rice LAI was measured. The REP may be defined using the first derivative spectrum. The three bands of the Moderate Resolution Imaging Spectroradiometer (MODIS), band 1(620~670 nm, red), band 2(841~876 nm, NIR) and band 3(459~479 nm, blue) were simulated and MODIS-NDVI and EVI were calculated by averaging the continuous reflectance factor (350~1000 nm) over the spectral range of each band. A strong non-linear correlation was found between LAI of two rice varieties and the REP. The REP, MODIS-EVI and MODIS-NDVI were well related with LAI for the common rice, but the REP and MODIS-EVI were more sensitive than MODIS-NDVI to rice LAI for the hybrid rice. The reasons were that LAI of hybrid rice became greater with growth, and MODIS-NDVI was more affected by saturation, but MODIS-EVI and REP were less affected. This showed that the REP and MODIS-EVI will be more effective in monitoring the rice LAI.

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