

基于MODIS EVI的冬小麦产量遥感预测研究

Winter wheat yield estimation based on MODIS EVI

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中文摘要:

Terra-MODIS数据集同时具有归一化植被指数(NDVI)和增强型植被指数(EVI)两种植被指数。为了对比这两种植被指数在农作物估产中的应用效果,该文利用MODIS-NDVI和MODIS-EVI作为遥感特征参量,以对美国冬小麦的长势监测与产量预测为例进行了研究:运用区域作物特定生育期内多年的NDVI和EVI值与作物产量进行相关分析,采用一次线性拟合方法分别建立回归方程,估算当年的农作物产量。结果表明,EVI明显地比NDVI更好地与产量建立回归方程,用EVI建立的回归方程,各州相关系数大多在0.7以上;而用NDVI建立的回归方程,相关性不稳定。因此利用EVI建立的模型对2004年美国冬小麦进行估产,并将预测结果与美国国家统计署6月1号公布的预测结果进行对比,结果发现,美国国家统计署预测单产误差为3.05%,总产误差为-2.56%,而该研究预测结果单产误差为2.62%,总产误差为-1.77%且预测时间比美国国家统计署预测时间提前约半个月。可见EVI可以更有效地进行作物监测及估产,提高预测的准确性。

英文摘要:

Before Terra was launched, NOAA AVHRR was mainly adopted in land cover and vegetation research for global and regional scale. The Terra-MODIS has two vegetation indexes: the normalized difference vegetation index (NDVI) and enhanced vegetation index (EVI). In order to compare the result assessed in crops with these two kinds of vegetation indexes, MODIS NDVI and MODIS EVI were used to monitor growth condition and forecast yield of winter wheat in USA. The NDVI and EVI values and the yields for many years were carried on correlation analysis using the specific breeding time of the regional crop and the one linear method was adopted to set up the regression equation to estimate the yield of that year. The results show that the MODIS-EVI has obvious advantages over the MODIS NDVI. The correlation coefficient of the regression equation was more than 0.7 by using the EVI, but the correlation coefficient of the regression equation was lower and varied greatly by using the NDVI. So the MODIS EVI was used to estimate yield of winter wheat in USA (for 18 states of winter wheat's main product). The estimated yield in 2004 was 52.89 Bushel/Acre and improved by 3.49% compared with that in 2003. The estimated production in 2004 was 1334675000 Bushel and reduced by 12.92% compared with that in 2003. For verifying its accuracy, the estimation result was compared with the forecast result of State Statistics Bureau of USA on June 1 2004, it was found that the yield estimation error of the forecast result of State Statistics Bureau of USA was 3.05% and the production error was -2.56%, however the yield estimation error was 2.62% and the production error was -1.77% in this paper, and forecasting time can be advanced for about two weeks. It is obvious that the MODIS-EVI can monitor and forecast crops more effectively and can improve the predicted accuracy.

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