

基于MODIS数据和模糊ARTMAP的冬小麦遥感识别方法

Winter wheat identification based on MODIS data and Fuzzy-ARTMAP

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中文摘要:

针对国家级农情遥感监测与信息服务系统对农作物遥感识别的需求, 利用Terra/MODIS数据相对于NOAA/AVHRR数据具有的高光谱和中等空间分辨率的优势, 以中国华北地区冬小麦识别为例, 采用多时相和波谱分析方法, 选取合适波段, 构造特征植被指数, 建立模糊ARTMAP影像分类模型进行大尺度农作物识别, 实现农作物遥感自动识别。用Landsat TM 进行局部抽样验证, 结果精度可达到85.9%。研究表明, 仅利用MODIS自身光谱信息, 即可实现作物遥感全覆盖自动识别, 并可达到较高精度, 与传统方法认为冬小麦遥感识别的最佳时间为处于返青期的3月份相比, 在时间上可提前约一个季度, 因此可以确实地为农业决策部门提供信息服务。

英文摘要:

Terra/MODIS has spectral and spatial resolution advantage over NOAA/AVHRR. A method of automatical crop identification on large-scale was set up applying spectral analysis, selecting appropriate bands and using time series characteristics with overall remote sensing images. In the paper, winter wheat identification in North China was taken as an example. First, according to winter wheat phenological stage, the best time phase of identification is at the sowing stage and tillering stage. Second, according to the spectral and biological characteristics of the crop, the spectral reflectances of MODIS were analyzed. One of them, red, blue, NIR and ESWIR bands were selected as working bands for winter wheat identification. And land surface water index(LSWI), which is defined by NIR and ESWIR, enhanced vegetation index(EVI), which is defined by Red, NIR and Blue bands, and EVI21, which is defined by the difference EVI of the two time phase images were used as characteristic parameters to improve the precision. Finally, fuzzy-ARTMAP algorithm was used for winter wheat identification. To verify the result, one Landsat TM was used to verify its precision. The result shows that the precision reaches 85.9%. This shows that it can obviously improve accuracy of crop identification with spectral analysis and times series, and especially the identification time can be advanced for more than three months compared with traditional method, which thinks the best identification time of winter wheat is in March. So it can provide a better operating method for agricultural condition monitoring with remote sensing and information service system at national-level.

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