杜灵通,田庆久,王磊,黄彦,南岭.基于多源遥感数据的综合干旱监测模型构建[J].农业工程学报,2014,30(9):126-132

基于多源遥感数据的综合干旱监测模型构建

A synthesized drought monitoring model based on multi-source remote sensing data

投稿时间： 2013-11-06 最后修改时间： 2014-02-28

中文关键词: 干旱 监测 模型 多源数据 MODIS 山东省

英文关键词:drought monitoring models multi-source data MODIS Shandong province

基金项目:国家自然科学基金(41201438); 国家重点基础研究发展计划(2010CB951503)

作者	单位
杜灵通	1. 宁夏大学西北退化生态系统恢复与重建教育部重点实验室，银川 7500212. 南京大学国际地球系统科学研究所，南京 210093
田庆久	2. 南京大学国际地球系统科学研究所，南京 210093
王磊	1. 宁夏大学西北退化生态系统恢复与重建教育部重点实验室，银川 7500212. 南京大学国际地球系统科学研究所，南京 210093
黄彦	2. 南京大学国际地球系统科学研究所，南京 210093
南岭	3. 宁夏大学西部发展研究中心，银川 750021

中文摘要:

在全球气候变化越来越复杂的大背景下，准确监测华北粮食主产区的旱情对区域农业生产有重要的指导意义。以往的遥感干旱监测方法多侧重于监测土壤或植被等单一干旱响应因子，反映综合信息的能力较差，为此该研究使用中分辨率成像光谱仪（moderate-resolution imaging spectroradiometer，MODIS）、热带降水测量计划（tropical rainfall measuring mission，TRMM）卫星等多源遥感数据，在综合考虑干旱发生发展过程中的土壤水分胁迫、植被生长状态和气象降水盈亏等因素的基础上，利用空间数据挖掘技术，构建综合干旱监测模型，并以山东省为例进行了试验验证。结果表明，模型监测出山东省近年来所经历的重大干旱过程与实际旱情一致，模型输出的旱情指标-综合干旱指数（synthesized drought index，SDI）与小麦的标准化作物单产变量的相关系数均大于0.7（P<0.05）；在小麦和玉米的生长期，综合干旱指数与作物受灾面积的相关系数在?0.67～?0.85之间，与标准化降水指数（standardized precipitation index，SPI）的相关系数在0.44～0.67之间，且通过了P<0.01的极显著检验（3月份除外）。研究结果为综合评估区域干旱提供了一种新的方法。

英文摘要:

Abstract: As global climate change become more complex, accurately monitoring the impact of drought on main grain producing areas in North China Plain has important guiding implication for regional agricultural production planning. The conventional remote sensing methods only monitor single drought response factors such as soil,vegetation. This method does not reflect the comprehensive information of drought. Based on the soil water stress, vegetation growth status and precipitation deficit in drought developing process, a synthesized drought monitoring model was developed using spatial data mining techniques and multi-source remote sensing data includingMODIS and TRMM. For assessing the accuracy of this drought monitoring model, a validation experiment was conducted in Shandong province. The results showed that the main drought events monitored by this model in recent years were consistent with observed droughts in Shandong province. The Synthesized Drought Index (SDI), a drought indicator produced by the model, not only includes agricultural drought informaion but also includes meteorological drought informaion. In the wheat growing period (March-May), the correlation coefficient of accumulated monthly SDI with crop yield as a standardized variable all were exceeding 0.7 (P<0.05) in Heze, Liaocheng and Dezhou, three main wheat producing cities of Shandong province. SDI was negatively correlated with drought affected crop area. The correlation coefficient of monthly SDI with drought affected crop area in wheat (March-May) and maize (July-September) growing period are between ?0.67 - ?0.85 and all passed significance test (P<0.01) except March (P<0.05). The SDI was also significantly correlated with meteorological drought index. In wheat and maize growing period, the correlation coefficients between monthly SDI and Standardized Precipitation Index (SPI) are between 0.44-0.67 and all correlation coefficients passed P<0.01 significance test except March. This work provides a new approach to comprehensive assessing regional drought.

查看全文 下载PDF阅读器

关闭