

Farmland Drought Monitoring And Prediction Based On Multi-source Remote Sensing Data

European PI(s)

Dr. Stefano PIGNATTI, pignatti@imaa.cnr.it

Chinese PI(s)

Dr. YANG Guijun, yanggj@nercita.org.cn

Drought is the major natural disaster in China. Accurate and timely farmland drought information is an urgent need in Disaster Prevention & Reduction and Precision Agriculture. However, the methods of farmland drought monitoring and prediction based on remote sensing data is still far from operational application. So our main objective of this proposal is to develop new methods to monitor and predict farmland drought accurately and timely in agricultural vegetated area, through stereoscopic inspection of crop canopy, superficial soil moisture, and in depth soil moisture based on multi-source Dragon data synergy, which will include:

- (1) To promote the application and mine the potential of Dragon data in agriculture;
- (2) To develop more robust and more effective methods and models to monitor and predict farmland drought and improve the assessment and validation of algorithm and results;
- (3) To improve our understanding about the interaction between remote sensing signal and vegetation-soil in the farmland ecosystem and build new temporal-spatial expansion theory.
- (4) To serve to agricultural management department and increase farmers' profits.

The methods:

- (1) Monitoring crops characteristic parameters induced by drought based on optical data, including crops growth, canopy temperature, vegetation water content, coverage and LAI, etc.
- (2) Monitoring superficial soil moisture under crops cover mainly by SAR data, assisted by optical data;
- (3) Monitoring in depth soil moisture through wireless sensor network data;
- (4) Establishing the integrated farmland drought monitoring index system combining meteorological and hydrological drought index;
- (5) Validation, assessment and application of new methods in our study area

The deliverables corresponding to the project objectives include:

- (1) Building up one solution about farmland drought monitoring for different crops in the whole growth stages;
- (2) Developing new methods in quantitative inversion of crop parameters and soil moisture, and seamless fusion of multi-source data;
- (3) Publishing 6-8 high quality papers;
- (4) Producing a prototype system of farmland drought monitoring;
- (5) Submitting research progress report and scientific report;
- (6) Providing spatial distribution maps and products of farmland drought monitoring and prediction, to guide agriculture production;
- (7) Training young scientists engaged in remote sensing agriculture application.

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基于多源遥感数据的农田干旱监测与预测

欧方项目负责人: Stefano PIGNATTI博士, pignatt@im.aa.cnr.it

中方项目负责人: 杨贵军博士, yanggj@nercita.org.cn

项目目标:

干旱是中国的主要自然灾害。及时准确的农田干旱信息是防灾减灾和精准农业的迫切需求。然而,基于遥感数据的农田干旱监测和预测方法离业务化应用依然还有距离。所以本项目的目标是:协同多源龙计划数据,通过对作物冠层、表层土壤水含量、深层土壤水含量的多层、立体观测,发展针对农作物覆盖区的及时准确监测和预测农田干旱的新方法,包括:

- (1) 促进龙计划数据在农业中应用,挖掘龙计划数据在农业中的潜力;
- (2) 发展更稳健、更有效的模型和方法以监测和预测农田干旱,并改进对算法的验证和结果的评估;
- (3) 改善对遥感信号和农田生态系统中植被-土壤相互作用关系的理解,建立新的时空数据扩展方法;
- (4) 服务农业管理部门,增加农民收益;

项目方法:

- (1) 基于光学遥感数据,监测干旱胁迫下的农作物特征参数,包括作物长势、冠层温度、植被含水量、覆盖度和叶面积指数等;
- (2) 协同SAR数据和光学数据,监测农作物覆盖下的表层土壤水含量;
- (3) 通过无线传感器网络数据监测农田深层土壤水含量;
- (4) 构建集成气象和水文干旱监测指标的综合农田干旱监测指标体系;
- (5) 在研究区进行新方法的验证、评估和应用;

预期产出:

- (1) 构建1套不同作物全生育期的农田干旱监测解决方案;
- (2) 发展作物参数和土壤含水量定量反演、多源数据无缝融合的新方法;
- (3) 发表6-8篇高质量论文;
- (4) 产生农田干旱监测原型系统1个;
- (5) 提交研究进展报告和学术报告;
- (6) 提供农田干旱监测和预测的专题图和产品,指导农业生产;
- (7) 培训参与项目的年轻科学家;

资助来源:

国家科技支撑计划项目(2012BAH29B00,2012-2016),公益性行业(农业)科研专项项目(200903010,2009-2013)。本研究中需要的无线传感器网络数据也主要源自此二个项目。