2022年第43期总364期

# 农业与资源环境信息工程专题

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2022年10月31日

## 前沿资讯

### 1．World Food Forum: Transforming agrifood systems through digital technologies（世界粮食论坛：通过数字技术改造农业食品系统）

**简介：**数字技术帮助解决我们农业食品系统中许多复杂问题的能力和潜力成为世界粮食论坛科学与创新论坛特别活动的焦点。上周五由联合国粮食及农业组织（FAO）在罗马总部主办的农业食品系统数字化活动探讨了数字能力和机会，以在缩小农村鸿沟和赋予青年和妇女权力方面为弱势群体带来变革性影响 获取信息、技术和市场。通过强调科学、技术和创新，该活动提供了一个平台来引发讨论和展示数字技术的具体例子，这些技术正在加速实现可持续发展目标（SDG）和粮农组织的四个更好：更好的生产、更好的营养、 更好的环境，更好的生活，不让任何人掉队。

**来源：**FAO

**发布日期:**2022-10-24

**全文链接:**http://agri.ckcest.cn/file1/M00/03/41/CsgkOYexNUyAMlJ7AAJ5hG-QG_s995.pdf

### 2．Yield Consortium uses satellite data and artificial intelligence to reliably predict agricultural yields（Yield Consortium 使用卫星数据和人工智能准确预测农业产量）

**简介：**The Yield consortium uses satellite data and artificial intelligence to reliably predict agricultural yields. In collaboration with BASF Digital Farming, John Deere, and Munich Re, DFKI develops predictive models for selected arable crops in the focus regions of Europe, South and North America. Later models will extend to other relevant crops and growing regions.

**来源：**SeedQuest

**发布日期:**2022-10-24

**全文链接:**http://agri.ckcest.cn/file1/M00/10/13/CsgkOGNagGeANjAFAAH_dckAQ6k533.pdf

## 学术文献

### 1．High-resolution crop yield and water productivity dataset generated using random forest and remote sensing（使用随机森林和遥感生成高分辨率作物产量和水生产力数据集）

**简介：**Accurate and high-resolution crop yield and crop water productivity (CWP) datasets are required to understand and predict spatiotemporal variation in agricultural production capacity; however, datasets for maize and wheat, two key staple dryland crops in China, are currently lacking. In this study, we generated and evaluated a long-term data series, at 1-km resolution of crop yield and CWP for maize and wheat across China, based on the multiple remotely sensed indicators and random forest algorithm. Results showed that MOD16 products are an accurate alternative to eddy covariance flux tower data to describe crop evapotranspiration (maize and wheat RMSE: 4.42 and 3.81 mm/8d, respectively) and the proposed yield estimation model showed accuracy at local (maize and wheat rRMSE: 26.81 and 21.80%, respectively) and regional (maize and wheat rRMSE:

15.36 and 17.17%, respectively) scales. Our analyses, which showed spatiotemporal patterns of maize and wheat yields and CWP across China, can be used to optimize agricultural production strategies in the context of maintaining food security.

**来源：** Scientific Data

**发布日期:**2022-10-21

**全文链接:**http://agri.ckcest.cn/file1/M00/10/13/CsgkOGNagjGANRwKAFY8OyqkwOA542.pdf

## 2．Transforming agrifood production systems and supply chains with digital twins(用数字孪生改变农业食品生产系统和供应链)

**简介：**Digital twins can transform agricultural production systems and supply chains, curbing greenhouse gas emissions, food waste and malnutrition. However, the potential of these advanced virtualization technologies is yet to be realized. Here, we consider the promise of digital twins across six typical agrifood supply chain steps and emphasize key implementation barriers.

Agrifood production systems and supply chains are currently not on track to meet the sustainable development goals. They are wasteful and polluting, breach several of the so-called planetary boundaries, and fail on their most basic premise to provide an expanding global population with safe and nutritious diets, leaving some 900 million people undernourished1.

As a response, transformation through digital technological innovation is often proposed2,3. In such proposals, computer-enabled technologies, including smart sensors, artificial intelligence (AI) and other embedded systems, are fundamental. Here, we consider the promise of digital twin (DT) technology, which despite its potency and increasing diffusion across industrial domains has not been considered for the purpose of improving agrifood sector sustainability, namely through mitigating malnutrition and undernutrition, reducing greenhouse gas (GHG) emissions and preventing food waste. We then discuss enabling and disabling factors for achieving this yet-to-be-realized potential of virtualized agrifood value chains.

**来源：** npj science of food

**发布日期:**2022-10-10

**全文链接:**http://agri.ckcest.cn/file1/M00/03/41/CsgkOYexNxqAIJItAAnCFDZgBN0055.pdf

## 3．Machine learning can guide food security efforts when primary data are not available(当主要数据无法获取时，机器学习可以指导粮食安全工作)

**简介：**Estimating how many people are food insecure and where they are is of fundamental importance for governments and humanitarian organizations to make informed and timely decisions on relevant policies and programmes. In this study, we propose a machine learning approach to predict the prevalence of people with insufficient food consumption and of people using crisis or above-crisis food-based coping when primary data are not available. Making use of a unique global dataset, the proposed models can explain up to 81% of the variation in insufficient food consumption and up to 73% of the variation in crisis or above food-based coping levels. We also show that the proposed models can nowcast the food security situation in near real time and propose a method to identify which variables are driving the changes observed in predicted trends—which is key to make predictions serviceable to decision-makers.

**来源：** Nature Food

发布日期:2022-09-15
全文链接:http://agri.ckcest.cn/file1/M00/10/13/CsgkOGNag6aAMNFsAB4d4XhqMk4760.pdf