



2022年第29期总350期

## 农业与资源环境信息工程专题

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## ➤ 前沿资讯

### 1 . Government of Canada launches nine new living labs: collaborative on-farm solutions to combat climate change in agriculture (加拿大政府启动了九个新的生活实验室：为农场提供应对气候变化的解决方案 )

**简介：**加拿大农业和农业食品部长于2022年7月14日宣布将在加拿大建立九个新的生活实验室。这些新的生活实验室旨在帮助减少气候变化对加拿大农民和居民的影响，有助于减少温室气体排放并加强加拿大国家食品系统的气候适应能力。加拿大政府在农业气候解决方案（ACS）Living Labs 计划下投资 5400 万美元，第一批的合作项目将在加拿大不列颠哥伦比亚省、阿尔伯塔省、萨斯喀彻温省、新不伦瑞克省、新斯科舍省以及纽芬兰和拉布拉多省扎根。每个生活实验室都将专注于确定全国农民可以采用创新技术和农场管理实践来应对气候变化。开发的解决方案还将有助于保护农场的生物多样性，改善水和土壤质量，并通过有效管理资源，加强农民的福祉。

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## ➤ 学术文献

### 1 . AgroFIMS: A tool to enable digital collection of standards-compliant FAIR data (AgroFIMS：实现符合标准的FAIR数字收集工具)

**简介：**Agricultural research has been traditionally driven by linear approaches dictated by hypothesis-testing. With the advent of powerful data science capabilities, predictive, empirical approaches are possible that operate over large data pools to discern patterns. Such data pools need to contain well-described, machine-interpretable, and openly available data (represented by high-scoring Findable, Accessible, Interoperable, and Reusable—or FAIR—resources). CGIAR's Platform for Big Data in Agriculture has developed several solutions to help researchers generate open and FAIR outputs, determine their FAIRness in quantitative terms<sup>1</sup>, and to create high-value data products drawing on these outputs. By accelerating the speed and efficiency of research, these approaches facilitate innovation, allowing the agricultural sector to respond agilely to farmer challenges. In this paper, we describe the Agronomy Field Information Management System or AgroFIMS, a web-based, open-source tool that helps generate data that is “born FAIRer” by addressing data interoperability to enable aggregation and easier value derivation from data. Although license choice to determine accessibility is at the discretion of the user, AgroFIMS provides consistent and rich metadata helping users more easily comply with institutional, founder and publisher FAIR mandates. The tool enables the creation of fieldbooks through a user-friendly interface that allows the entry of metadata tied to the Dublin Core standard schema, and trial details via picklists or autocomplete that are based on semantic standards like the Agronomy Ontology (AgrO). Choices are organized by field operations or measurements of relevance to an agronomist, with specific terms drawn from ontologies. Once the user has stepped through required fields and desired modules to describe their trial management practices and measurement

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parameters, they can download the fieldbook to use as a standalone Excel-driven file, or employ via free Android-based KDSmart, Fieldbook, or ODK applications for digital data collection. Collected data can be imported back to AgroFIMS for statistical analysis and reports. Development plans for 2021 include new features such ability to clone fieldbooks and the creation of agronomic questionnaires. AgroFIMS will also allow archiving of FAIR data after collection and analysis from a database and to repository platforms for wider sharing.

来源: CGIAR

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## **2 . A database system for querying of river networks: facilitating monitoring and prediction applications (河网查询数据库系统: 促进监测和预测应用)**

简介: The increasing availability of real-time in situ measurements and remote sensing observations have the potential to contribute to the optimisation of water resources management. Global challenges such as climate change, intensive agriculture and urbanisation put a high pressure on our water resources. Due to recent innovations in measuring both water quantity and quality, river systems can now be monitored in real time at an unprecedented spatial and temporal scale. To interpret the sensor measurements and remote sensing observations additional data, for example on the location of the measurement, and upstream and downstream catchment characteristics, are required. In this paper, we present a data management system to support flow-path-related functionality for decision making and prediction modelling. Adding meta-datasets and facilitating (near) real-time processing of sensor data questions are key concepts for the systems. The potential of the database framework for hydrological applications is demonstrated using different applications for the river system of Flanders. In one, the database framework is used to simulate the daily discharge for each segment within a catchment using a simple data-driven approach. The presented system is useful for numerous applications including pollution tracking, alerting and inter-sensor validation in river systems, or related networks.

来源: Water Supply

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## **3 . Blockchain technology in food supply chains: Review and bibliometric analysis (食品供应链中的区块链技术: 回顾与文献计量分析)**

简介: Increase in global population growth and the consequent rise in the demand for food while ensuring quality, preventing wastage, avoiding deforestation, and carbon footprinting has put tremendous pressure on the global food supply chain (FSC). Due to fast computing facilities and availability of data, blockchain technology has emerged as a potential system that may help in developing a safe and secure FSC. Blockchain has gained significant attention among researchers worldwide, which is evident from the extensive literature generated on this subject within a span of a few years. Through this paper, the authors attempt to showcase the immense scope and significance of blockchain in FSCs by examining and analyzing the existing studies. In addition to providing an overview of the application of blockchain in FSCs, this study also discusses challenges

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such as scalability, interoperability, and high cost and suggests potential solutions for the existing difficulties in adopting blockchain in FSCs. Additionally, a bibliometric analysis is provided to acquaint researchers and practitioners with the structure and research trends in this area. The study found that researchers have mostly focused on the applicability of blockchain for product authentication, finance, and logistics. Further, blockchain is likely to become a dominant technology for enhancing transparency and traceability, reducing risk and, most importantly, enhancing trust among different stakeholders in the area of FSC.

来源: Technology in Society

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#### **4 . Artificial intelligence, systemic risks, and sustainability (人工智能、系统风险和可持续性)**

简介: Automated decision making and predictive analytics through artificial intelligence, in combination with rapid progress in technologies such as sensor technology and robotics are likely to change the way individuals, communities, governments and private actors perceive and respond to climate and ecological change. Methods based on various forms of artificial intelligence are already today being applied in a number of research fields related to climate change and environmental monitoring. Investments into applications of these technologies in agriculture, forestry and the extraction of marine resources also seem to be increasing rapidly. Despite a growing interest in, and deployment of AI-technologies in domains critical for sustainability, few have explored possible systemic risks in depth. This article offers a global overview of the progress of such technologies in sectors with high impact potential for sustainability like farming, forestry and the extraction of marine resources. We also identify possible systemic risks in these domains including a) algorithmic bias and allocative harms; b) unequal access and benefits; c) cascading failures and external disruptions, and d) trade-offs between efficiency and resilience. We explore these emerging risks, identify critical questions, and discuss the limitations of current governance mechanisms in addressing AI sustainability risks in these sectors.

来源: Technology in Society

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