中国工程科技知识中心
China Knowledge Centre for Engineering Sciences and Technology

《农业水土资源监控研究》专题快报

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中国农业科学院农业信息研究所　　　　　　　　　　2020年2月5日

【政策法规】

1 . 农业农村部　中央网络安全和信息化委员会办公室关于印发《数字农业农村发展规划（2019-2025年）》的通知（附全文）

发布源：农业农村部 发展规划司

发布时间：2020-01-20

摘要：为贯彻落实《中共中央国务院关于实施乡村振兴战略的意见》《乡村振兴战略规划（2018—2022年）》《数字乡村发展战略纲要》，加快推进农业农村生产经营精准化、管理服务智能化、乡村治理数字化，农业农村部、中央网络安全和信息化委员会办公室制定了《数字农业农村发展规划（2019—2025年）》。

链接:

【动态资讯】

1 . 研究发现植被变化和人类用水已成为影响黄河流域干旱形成的重要因素

【中科院大气物理研究所】流域尺度的干湿变化不仅受气候的影响，土地利用和人类用水等人类活动的作用亦不容忽视。区分并量化人类活动对流域尺度干湿变化的贡献对于有序适应气候变化具有重要的科学意义。但如何量化人类活动对气象、农业和水文干旱的作用仍是一个难点问题。基于SWAT（Soil and Water Assessment Tool）水文模型，中国科学院大气物理研究所东亚区域气候-环境重点实验室的博士生Abubaker Omer设计了一系列数值试验，通过比较模拟与观测的气象、水文和农业干旱的强度和持续时间，成功地区分了自然因素和人类活动对黄河流域六个子流域1991-2010年干湿变化的影响，并进一步量化了二者的相对贡献（如图）。结果表明，土地利用/土地覆盖变化（LULCC）和人类直接用水（DHA）对黄河流域干旱强度和持续时间的影响显著，其中气象干旱向

农业干旱的传播过程主要受LULCC的影响，而气象干旱向水文干旱的传播过程主要受DHA的影响；DHA放大了大多数子流域水文干旱的严重程度和持续时间，仅在三门峡子流域，DHA减小了水文干旱的强度，缩短了水文干旱的持续时间，这是因为该子流域有大量的灌溉回流（如图）；LULCC对不同子流域干旱特征的影响存在明显差异。如在经历了植被破坏的子流域，水文干旱的严重程度和持续时间有所减少，而在造林和恢复草地的子流域，水文干旱的严重程度和持续时间却有所增加。该项研究充分说明了人类活动已成为黄河流域干旱形成的重要原因之一，为进一步开展黄河流域干旱的监测和预测及水资源管理提供了依据。该成果发表在Science of The Total Environment。

链接:

http://agri.ckcest.cn/file1/M00/00/D6/Csgk0V4n6F2AGI4tAAHZ4HmBOS4587.pdf

2．北京：425条河道将启动水生态空间划定

【山西青年报】1月19日，2020年北京市水务工作会召开。市水务局党组书记、局长潘安君介绍2020年重点工作。据悉，2019年，北京南水北调来水11.5亿立方米，累计超过52亿立方米。同时首次引黄河水入京，达到1.9亿立方米。通过最大限度"少采多补"，降水偏少之年全市地下水同比仍回升0.32米。2020年，全市流域面积10平方公里及以上的425条河道将陆续进行水生态空间划定，其中对永定河、北运河等重点水域勘界钉桩。

链接:

http://agri.ckcest.cn/file1/M00/00/D6/Csgk0V4nJx2AJlHEAAFyk5teVII771.pdf

3．U.S. corn crop Is now 92% genetically modified

【AgroNews】How much does crazy weather matter anymore to crop production? That's the question grain traders are scratching their heads over after fresh data showed U.S. farmers churned out another bumper harvest despite some of the wildest growing conditions in years. Under pressure from soggy fields, late planting and bouts of early winter weather, American corn and soy plants proved resilient thanks largely to advances in genetically-modified seeds, precision tools and inputs such as fertilizers and pesticides. In its critical monthly crop report, the U.S. Department of Agriculture on Friday raised yield estimates for both crops. That defied expectations from analysts who, on average, predicted a drop.

链接:

http://agri.ckcest.cn/file1/M00/0F/A7/Csgk0F4nHcuAU5xwAALvhFmDiMg682.pdf

4．山东计划开展"六大行动"助力乡村产业振兴

【华夏经纬网】1月17日，山东省政府新闻办召开新闻发布会，对省政府日前印发的《山东省促进乡村产业振兴行动计划》(以下简称《行动计划》)进行解读。据悉，山东省将推动实施乡村产业平台构筑、融合推进、绿色发展、创新驱动、主体培育、支撑保障"六大行动"，确保到2025年，山东省乡村产业振兴取得重大突破；到2030年，乡村产业体系更加完善，全省半数以上乡村基本实现农业现代化。

链接:

http://agri.ckcest.cn/file1/M00/0F/A7/Csgk0F4nz3eAFGtHAAO-BXnj5Gk971.pdf

5．创新实施"六化"推进农业高质量发展和现代化

【湖北日报】大力推进农业高质量发展，实现农业现代化，应创新实施农业"六化"：一、农业生产经营创新实施规模化二、农业生产作业创新实行机械化三、农业生产过程、生产环境创新实施绿色化四、创新实施农业标准化，确保农产品质量安全五、农产品销售创新实施电子商务化六、农业管理创新实现智能化

链接:

http://agri.ckcest.cn/file1/M00/0F/A7/Csgk0F4nIw-AQfepAAUWzJbrfHQ030.pdf

6．Local water availability is permanently reduced after planting forests

【AAAS and EurekAler】River flow is reduced in areas where forests have been planted and does not recover over time, a new study has shown. Rivers in some regions can completely disappear within a decade. This highlights the need to consider the impact on regional water availability, as well as the wider climate benefit, of tree-planting plans.

链接:

http://agri.ckcest.cn/file1/M00/00/D6/Csgk0V4nIU2AYWcuAAEyzEB4N5Y696.pdf

7．中粮引领全球农业绿色发展

【经济日报】1月21日至24日，主题为"凝聚全球力量，实现可持续发展"的世界经济论坛第50届年会将在达沃斯召开，会议重点围绕生态、经济、技术、社会、地缘政治、行业等六大领域展开讨论。联合国可持续发展目标（SDGs）呼吁所有企业利用其创造力和创新能力来应对可持续发展的挑战。其中，领先企业是发挥正面影响、推动社会可持续发展的关键一环。作为具有领导地位的国际大粮商，中粮集团对照全球倡议相关要求，将可持续发展理念融于自身发展战略之中，不断改革创新，坚持绿色发展，依托全产业链创新可持续发展商业模式，为人类社会可持续发展做出了有益探索。

8．未来农村，将会有哪些行业会崛起呢？

【**实体经济守望者**】近年来，为了进一步推动农村农业的发展，国家在农业上推行了一系列的政策和措施，今年的中央一号文件，公布了全面落实乡村振兴战略的方针政策。未来的农村，农业发展必将会呈现出不一样的面貌。个人觉得，在未来农村，休闲农业、中小型农场、有机农业、互联网农业、共享农场这几个方面的行业将会崛起。

9．Who turned up the temperature? Climate change, heatwaves and wildfires

【**Unenvironment program/climate Change**】 The global warming crisis surrounds us today and we must act now to protect ourselves. On 15 January 2020, the World Meteorological Organization confirmed that 2019 was the second hottest year on record after 2016, according to the organization's consolidated analysis of leading international datasets. Average temperatures for the five-year (20152019) and ten-year (20102019) periods were the highest on record. Since the 1980s, every decade has been warmer than the previous one. This trend is expected to continue because of record levels of heat-trapping greenhouse gases in the atmosphere that has caused our climate to change.

10．Rediscovering Cover Crops and the Power of 'Green Manure'

【**USDA**】 Farmers throughout history have taken advantage of off-season plant growth to enhance their next year's crops. These plants, called cover crops, are beneficial in many ways, including protection against weed infestation and soil erosion, as well as feed for farm animals. Some farmers use cover crops in no-till farming systems. However, when cover crops are incorporated into the soil, they become a fertility-enhancing mulch what some call "green manure."

1．Agri-Info: Cloud Based Autonomic System for Delivering Agriculture as a Service

文献源：Internet of Things,2020

摘要：The Internet of Things (IoT) and cloud computing paradigms offer enhanced services for agricultural applications to manage the data efficiently. To provide an effective and reliable agriculture as a service, there is a need to manage Quality of Service (QoS) parameters to efficiently monitor and measure the delivered services dynamically. This paper presents a QoS-aware cloud based autonomic information system called Agri-Info for delivering agriculture related information as a service through the use of latest Internet-based technologies such as cloud computing and IoT which manage various types of agriculture related data based on different domains of agricultural industry. Proposed system gathers information from various users through preconfigured IoT devices (mobiles, laptops or iPads). It further manages and delivers the required information to users and diagnoses the agriculture status automatically. We have developed the web and mobile-based application and evaluated the performance of the proposed system in cloud environment using CloudSim toolkit based small scale environment. Results demonstrate our system yields in a reduction on 12.46% cost, on 15.52% network bandwidth, on 10.18% execution time and 13.32% in latency. Furthermore, a case study of an Indian village is presented to identify the customer satisfaction of farmers.

链接:

http://agri.ckcest.cn/file1/M00/00/D6/Csgk0V4oBlGAafNfAC3lQ7y3wlE453.pdf

2．Ecological water conveyance drives human-water system evolution in the Heihe watershed, China

文献源：Environmental Research,2020

摘要：Watersheds are coupled with human-water systems where human, and water resources interact and coevolve with each other. Restoration management not only affects the ecosystem itself but also alters the mutual feedback relationship between humans and water, resulting in additional effects and impeding the ecological restoration process. Taking the lower reaches of the Heihe River as an example (Inner Mongolia, PR China), this study investigated the evolution of the human-water system after the implementation of ecological water conveyance using multiple data sources (e.g., remote sensing data, hydrological data, field data and socioeconomic data). We found that (1) after the implementation of ecological water conveyance, vegetation recovered in the last 15 years

with an NDVI increasing from 0.10 to 0.13 across the region except some degraded areas near the river; (2) besides restoring the target ecosystem, ecological water conveyance also promoted socioeconomic development and affected the water resources utilization; (3) after 15 years' water conveyance, the coupledhuman-water system changed from the early ecological water deficit to the present ecological-socioeconomic water-use trade-off with negative impact resulted from agriculture expansion and water usage conflict between the middle and the lower reaches. These effects impeded the restoration of the ecological environment and aggravated the conflicts of water resources utilization within the whole Heihe watershed, consistent with of the hypothesized disturbance effect transmutation. Our results highlighted that analysis on the mutual feedback effect in the coupled human-water system, and dynamic adjustments for restoration measures are needed for sustainable watershed management.

链接:

http://agri.ckcest.cn/file1/M00/00/D6/Csgk0V4n8qyACN_fADMZYLcNAgo489.pdf

3．Monitoring soil water content for decision supporting in agricultural water management based on critical threshold values adopted for Andosol in the temperate monsoon climate

文献源：Agricultural Water Management,2020

摘要：Maintaining soil water content within the readily available range is optimum concerning crop production and water use. In this regard, the continuous monitoring of soil water content is a crucial element for identifying the key parameters for sustainable agricultural water management. In this study, volumetric soil water content (θ v) was monitored and analyzed in a bare soil agricultural field (Sakaecho experimental field of Tokyo University of Agriculture and Technology). The field consisting of volcanic ash soils was monitored from June 2016 to September 2017 using capacitance sensor (CS). The optimal range of readily available water for plant uptake was defined as the range between field capacity and depletion level (θ Dep). These values were determined from the soil water potentials and θ v values measured using pressure plate and soil cores, respectively. The 16-month period monitoring result revealed substantial temporal variability in θ v in response to rainfall, evaporation and deep percolation. The monitored values of θ v were above the θ Dep (0.307 cm3 cm−3 measured at suction (pF) value of 3.0) throughout the monitoring period for the 1020 and 2030 cm soil layers. In contrast, for the surface soil

(010 cm), the θ v fell below θ Dep for 27% of the monitoring period despite the high rainfall during those periods owing to high evaporation and deep percolation. The below θ Dep results for the surface soil suggests the need to conduct continuous θ v monitoring, to support decision for planning efficient irrigation water management to avoid yield loss of shallow-rooted crops and deep-rooted crops at their earliest growth stages as well as quality reductions due to moisture stresses.

链接:

http://agri.ckcest.cn/file1/M00/00/D6/Csgk0V4oAnmAMLrCACEh1yBvbRc374.pdf

4．Strengthening agricultural decisions in countries at risk of food insecurity: The GEOGLAM Crop Monitor for Early Warning

文献源：Remote Sensing of Environment,2020

摘要：Crop Monitor provides consensus crop assessments for countries at risk. The goal is to reduce ambiguity in crop assessments for food security decisions. Achieved through international coordination sharing of data, methods and expertise. EO play key role in early warning especially in countries at risk. Early warning of reduced production is key component of SDG2 Zero Hunger.

链接:

http://agri.ckcest.cn/file1/M00/00/D6/Csgk0V4oBKyACOLsALiH-Bb2VK8614.pdf

5．The value of information for the management of water resources in agriculture: Assessing the economic viability of new methods to schedule irrigation

文献源：Agricultural Water Management,2020

摘要：This study develops a methodology to assess the comparative advantages of new methods to plan irrigation with respect to prevailing existing irrigation practices. The methodology consists of a comparative cost-benefit analysis based on the Value of Information approach that makes it possible to analyse whether an improvement in the information available to farmers generates economic benefits. The method is applied to the problem of comparing computer irrigation models (providing irrigation advice based on measurements, water balance models and weather predictions) and prevailing irrigation practices (at times based on soil and plant observations, or on advanced technologies) in estimating and predicting crop water requirements, in pilot experiments located in four different European regions. The results reveal that the introduction of the alternative

method improves the performance of irrigation practices in Mediterranean regions that are characterised by high weather variability and for those crops for which the consequences of failing to meet predictions are relatively low (i.e. tomato instead of maize, drip irrigated crops instead of sprinkler irrigated crops). Under favourable conditions, the use of the alternative technology generates a 020% increase in gross margin and a 1030% water saving with respect to prevailing existing irrigation practices. The study concludes by addressing the conditions that justify the use of advanced information systems to schedule irrigation interventions and by offering some policy recommendations to drive their uptake. These include subsidising research at the evaluation stage and public investments aimed at knowledge creation (weather and shallow water table monitoring stations) and knowledge sharing (counselling) at the adoption stage.

链接:

http://agri.ckcest.cn/file1/M00/00/D6/Csgk0V4oCNyAW1ZxAB3hWcn1ZOl986.pdf

6．Remote sensing for agricultural applications: A meta-review

文献源：Remote Sensing of Environment,2020

摘要：Agriculture provides humanity with food, fibers, fuel, and raw materials that are paramount for human livelihood. Today, this role must be satisfied within a context of environmental sustainability and climate change, combined with an unprecedented and still-expanding human population size, while maintaining the viability of agricultural activities to ensure both subsistence and livelihoods. Remote sensing has the capacity to assist the adaptive evolution of agricultural practices in order to face this major challenge, by providing repetitive information on crop status throughout the season at different scales and for different actors. We start this review by making an overview of the current remote sensing techniques relevant for the agricultural context. We present the agronomical variables and plant traits that can be estimated by remote sensing, and we describe the empirical and deterministic approaches to retrieve them. A second part of this review illustrates recent research developments that permit to strengthen applicative capabilities in remote sensing according to specific requirements for different types of stakeholders. Such agricultural applications include crop breeding, agricultural land use monitoring, crop yield forecasting, as well as ecosystem services in relation to soil and water resources or biodiversity loss. Finally, we provide a synthesis of the emerging opportunities that should strengthen the role of remote sensing in providing operational, efficient and long-term

services for agricultural applications.

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http://agri.ckcest.cn/file1/M00/0F/A7/Csgk0F4oB2OAQOuLABB71POydIA569.pdf

7．Evaluation of global land use/land cover products for hydrologic simulation in the Upper Yom River Basin, Thailand

文献源：Science of The Total Environment,2020

摘要：Recently, the availability of global landuse and land cover data has made hydrological simulation studies possible in data scarce regions. However, the suitability of these products as inputs in the hydrological modeling has not been investigated in detail. Therefore, this study aims to evaluate the use of global landuse and land cover products to simulate the hydrology of the Upper Yom River Basin located in the Northern part of Thailand. Three types of global landuse and landcover products i.e. ESACCI, MCD12Q1, GLC2000 were compared with the landuse product from Land Development Department (LDD) of Thailand. All of these products were used as input in hydrological model, Soil and Water Assessment Tool (SWAT), and performance of the model was compared to simulate hydrological regime including high flow, low flow and seasonal discharge at the outlet and upstream of the basin. The results show that the performance of the hydrological model in simulating the discharge at the basin outlet is better than in the upstream areas while using all types of landuse and land cover data. The model well simulated the annual discharge, wet-season discharge and base flow while using landuse and land cover products of ESACCI and MCD12Q1. Similarly, the high flow and dry-season discharge is well simulated while using MCD12Q1 landuse and landcover products compared to other three products. The results of this study is useful in selecting landuse and land cover products in simulating hydrology for water resources planning and management in data scarce regions.

链接:

http://agri.ckcest.cn/file1/M00/0F/A7/Csgk0F4n8qaAc8UgACmZewZgwks168.pdf

8．Achieving sustainable performance in a data-driven agriculture supply chain: A review for research and applications

文献源：International Journal of Production Economics,2020

摘要：The lack of industrialization, inadequacy of the management, information inaccuracy, and inefficient supply chains are the significant issues in an agri-food supply chain. The

proposed solutions to overcome these challenges should not only consider the way the food is produced but also take care of societal, environmental and economic concerns. There has been increasing use of emerging technologies in the agriculture supply chains. The internet of things, the blockchain, and big data technologies are potential enablers of sustainable agriculture supply chains. These technologies are driving the agricultural supply chain towards a digital supply chain environment that is data-driven. Realizing the significance of a data-driven sustainable agriculture supply chain we extracted and reviewed 84 academic journals from 2000 to 2017. The primary purpose of the review was to understand the level of analytics used (descriptive, predictive and prescriptive), sustainable agriculture supply chain objectives attained (social, environmental and economic), the supply chain processes from where the data is collected, and the supply chain resources deployed for the same. Based on the results of the review, we propose an application framework for the practitioners involved in the agri-food supply chain that identifies the supply chain visibility and supply chain resources as the main driving force for developing data analytics capability and achieving the sustainable performance. The framework will guide the practitioners to plan their investments to build a robust data-driven agri-food supply chain. Finally, we outline the future research directions and limitations of our study.

链接:

http://agri.ckcest.cn/file1/M00/0F/A7/Csgk0F4oCMeAbz3xABM8_eyy10o901.pdf

9．An evaluation of China's agricultural green production: 1978–2017

文献源：Journal of Cleaner Production,2020

摘要：Green development and low-carbon economy play important roles to achieve sustainable society. Since agricultural production is the foundation of the Chinese national economy, agricultural green production acts as the driving force in green economy development, as well as a prerequisite to realize green behavior and sustainable ecology. Different from traditional agricultural production, the idea of agricultural green production also put many factors including economy, environment, and social development into comprehensive consideration. It provides the future directions of China's agriculture. This research aims to systematically sort the agricultural green production goals from five dimensions: supply capacity, resource utilization, environment quality, ecosystem maintenance, and farmers' lives. An agricultural green production assessment index system was constructed based on national agricultural census data indicators. Furthermore, the gap

between China's agricultural green production status and target value, as well as the vertical and spatial evolution of agricultural green production levels in China have been determined empirically relying on the data from three national agricultural censuses and additional statistical data from national statistical yearbooks and coefficient manuals. Moreover, key recommendations were provided for path optimizing and China's agricultural green production upgrading.

链接:

http://agri.ckcest.cn/file1/M00/00/D6/Csgk0V4oB4OACK3NABU-HwxEezU472.pdf

10．Information asymmetry, input markets, adoption of innovations and agricultural land use in Khyber Pakhtunkhwa, Pakistan

文献源：Land Use Policy,2020

摘要：This paper presents empirical evidence on the effects of information asymmetry in input markets on the adoptionof innovations and agricultural land use in rainfed districts of Khyber Pakhtunkhwa, Pakistan. Farmers' input market integration may contribute to innovation and adoption among farmers, which may in turn positively influence the sustainable use of agricultural land. To examine this hypothesis, we conducted a study of farmers and input providers to assess the potential constraints on quality inputs, prices, and extension information. We used a multistage random sampling technique to collect data from 395 respondents. We then compared differences among adopters and non-adopters using the Mann-Whitney U test and Mood's median test. Our results indicate that there is a significant difference between the adopters and non-adopters when considering their perceptions of asymmetric market information. Non-adopters are suspicious of exaggerated prices, the nonavailability of price lists, adulteration of agricultural inputs, unbalanced input weight and the supply of lowquality alternate commodities (e.g., fertilizers and pesticides) in place of the recommended commodities in themarkets. Our results call for the reformulation and implementation of appropriate policies to ensure transparentand equal information sharing among farmers engaged in input markets and for the provision of timely and quality inputs assured by regulatory checks and price checks. Free availability of information on innovations and appropriate oversight over markets appear not only to motivate farmers to adopt agricultural technologies but also to influence more sustainable land use practices.

链接:

11．Monitoring progress of the Sendai Framework using a geospatial model: The example of people affected by agricultural droughts in Eastern Cape, South Africa

文献源：Progress in Disaster Science,2020

摘要：The Sendai Framework for Disaster Risk Reduction (SFDRR) was adopted by 187 countries and offers a tangible agenda for evidence-based policy for disaster risk reduction as an integral part of the overall post-2015 global development agenda. The progress of implementation of the seven Global Sendai Targets at the national level is tracked by a set of 38 indicators. However, despite the formal commitment, the majority of countries is currently not in the position to monitor the implementation of the Global Targets. The lack of information on disaster-related loss and damage is mainly due to gaps in data availability, quality, and accessibility, which impairs an accurate, timely and high quality monitoring process. This research addressed this gap by developing a model approach, which aimed at "translating" indicators described by the technical guidance of the United Nations Office for Disaster Risk Reduction (UNDRR) into a geospatial procedure which builds on remote sensing data, climate data, land cover and land use data, agricultural statistics and population census data. With this geospatial model approach, we quantified indicators of the SFDRR for Target B "number of people affected" for the example of agricultural drought in the Eastern Cape province of South Africa in a spatially explicit way. We conducted a media content analysis to generate proxy reference data for evaluation of the model results. In addition, we explored the sensitivity of the model using three different input data on drought hazard, namely the Vegetation Condition Index (VCI), the Standard Precipitation Evapotranspiration Index (SPEI) and the combination of these. The spatial distribution of number of people affected corresponded very well with reference data from the media content analysis; however, model results were very sensitive to different hazard input data. This geospatial model based on remote sensing and geostatistical data is to the best of our knowledge the first attempt to measure Sendai indicators in the absence of national loss and damage databases and provides a unique opportunity to support many countries in implementing the framework. Due to its retrospective nature, even a baseline measure of the indicators can be derived as a reference for monitoring progress. However, the model needs to be further validated in order to qualify the underlying assumptions made to determine thresholds of people being affected. Future research should transfer this model

to different hazard contexts to allow hazard-specific monitoring of loss and damage in order to develop targeted disaster risk reduction measures.

链接: