

## 《农业水土资源监控研究》专题快报

2022年第3期（总第64期）

中国工程科技知识中心农业分中心

中国农业科学院农业信息研究所

2022年2月5日

### 【动态资讯】

#### 1. 宁夏出台新政强化耕地保护

**【农民日报】**宁夏回族自治区自然资源厅、财政厅联合印发《宁夏回族自治区跨县域补充耕地指标交易管理暂行办法》（以下简称《暂行办法》），旨在落实最严格的耕地保护制度，提高耕地占补平衡管理水平，确保补充耕地指标交易公正、公开、公平。根据《暂行办法》，跨县域补充耕地指标交易是指在宁夏回族自治区范围内耕地后备资源相对匮乏、新开垦耕地不足以补充所占耕地的县（市、区）人民政府，由于实施国家和自治区重大建设项目无法落实耕地占补平衡，在耕地后备资源相对丰富、补充耕地指标充裕的县（市、区）人民政府落实补充耕地任务的行为。补充耕地指标包括耕地数量、水田规模和粮食产能三项指标。《暂行办法》明确，跨县域补充耕地指标交易必须坚持耕地保护优先，强化耕地用途管制，从严控制建设占用，促进土地集约节约利用；坚持先建成再调剂，以县域自主平衡为主、自治区内调剂为辅，合理确定调剂规模，确保公正、公开、公平；坚持运用经济手段约束耕地占用，发挥经济发达与资源丰富县（市、区）资金资源互补优势，建立收益调节分配机制，助推脱贫攻坚和乡村振兴。今后，跨县域补充耕地指标交易的出让方应当在满足本地区耕地占补平衡的前提下，库存补充耕地数量指标在100公顷以上、水田规模指标在50公顷以上、粮食产能指标在100万公斤以上的，方可交易。受让方库存补充耕地数量指标在50公顷以上、水田规模指标在20公顷以上、粮食产能指标在50万公斤以上的，不得受让。耕地数量和粮食产能需同时交易，不得单独交易。国家、自治区审批的单独选址项目和批次用地占用耕地需跨县（市、区）落实补充耕地任务的，必须通过自治区补充耕地指标交易平台进行，交易方式为挂牌出让。

**链接:**

<http://agri.ckcest.cn/file1/M00/03/20/Csgk0YZXfy6AMyLbAAnUNXNKYv8652.pdf>

## 2. 建立黑土保护“双长制”

【农民日报】为更好保护黑土地，黑龙江省二道河农场有限公司实施“双长制”，为辖区内每个河流配备“河长”，并建立档案，对辖区内每块土地建立了身份证，并配备“田长”，以便对每块土地的施肥、有机质含量以及秸秆还田和农作物的情况进行登记造册，将耕地保护落到实处。黑龙江省二道河农场有限公司要求分公司董事长、总经理任总田长，各管理区主任、书记任分田长，各管理区工作人员设立为网格长，并建立考核体系，考核结果与薪资直接挂钩。公司的土肥部门负责对辖区的黑土含量有机质等各项数据进行化验对比，对于指标降低的单位进行整改。同时，每个管理区建立农业废弃物回收站，农业废弃物有效回收率达到100%。为加强保护性耕种技术推广，由农场创造的旱平免提浆保护性耕种措施，在辖区内推广7万亩，每亩增收100多元。同时，农场与高校联合开展黑土粮仓试验，促进黑土地保护。据了解，2021年黑龙江省二道河农场有限公司加强投资建设高标准建设基本农田1万亩，2022年将再建高标准农田1万亩。

链接:

<http://agri.ckcest.cn/file1/M00/03/20/Csgk0YZXgHKAdWM9AFyZgD6bJg4027.pdf>

## 3. 多方筹资支持农田建设

【农民日报】近日，在湖南省永州市零陵区大庆坪乡田家湾村上洞下洞高标准农田工程建设现场，机声隆隆，挖掘机、工程车分布在河岸间，20余名工人师傅忙着河道疏浚、沙石转运、灌浆护砌……田家湾村党支部书记唐检国说：“我们村高标准农田项目建设平整土地340多亩，范围内实施部分田块合并、翻耕，铺设管道5.5公里，新建机耕道7条3.8公里、附建大型机耕桥3座，盖板涵3座、下田坡口68处、过路涵管47处，总投资293.47万元。工程建设完工后，可增加旱涝保收粮田面积1000亩以上。”湖南省永州市零陵区是粮食生产大县，连续多年被评为全省粮食生产先进县区。为提高粮食生产效能，去年入秋以来，该区采取“政府带动、社会联动、项目拉动、群众行动”的方法，坚持节、挤、压、减、攒、贷、筹等多条腿走路，多方筹措建设资金7572万元。同时，该区将高标准农田建设与兴修水利、小农水、“安全饮水”、堤坝除险加固、中小河流治理、农村节水改造工程、水体流失综合治理等结合起来，与乡村振兴、新农村建设有机相结合，与抗旱排涝、防洪保安结合起来，与产业发展、巩固脱贫成果结合起来。据了解，全区15个农村乡镇、23个高标准农田项目先后开工建设，新修灌溉渠达100公里，新修机耕道97条共55公里，新修、加固山塘27口，已投资建设高标准农田4.86万亩，投资金额和建设规模分别比上年增幅30%以上。

链接:

<http://agri.ckcest.cn/file1/M00/0F/F2/Csgk0GIAzYeAZMHfAFyZgE38l14793.pdf>

## 【文献速递】

### 1. Synergistic effects of biological nitrification inhibitor, urease inhibitor, and biochar on NH<sub>3</sub> volatilization, N leaching, and nitrogen use efficiency in a calcareous soil–wheat system

文献源: ScienceDirect,2022-02-07

摘要: Urease inhibitors (UIs), chemical nitrification inhibitors (CNIs), and biochar (BC) are commonly applied nitrogen (N) management strategies in reducing soil N loss and increasing nitrogen use efficiency (NUE) in agriculture. Biological nitrification inhibitors (BNIs) are natural abilities of certain plant roots to suppress soil nitrifier activity. They have some advantages over chemical nitrification inhibitors (CNIs), but their effects on N loss and NUE are not critically examined yet. In this study, the synergistic effects of BNI of methyl 3-(4-hydroxyphenyl) propionate (MHPP at dosage of 1000 mg kg<sup>-1</sup>), UI of N-(n-butyl), thiophosphoric triamide (NBPT, 2% of applied\_urea\_N), and BC (w heat straw biochar, 1% (w/w)) on NH<sub>3</sub> volatilization, inorganic N leaching, plant N uptake (N<sub>yield</sub>), and NUE are explored through a wheat growth pot experiment. MHPP and BC can increase NH<sub>3</sub> volatilization, which increased by 18.5% in the BC treatment and 32.9% in the MHPP\_BC treatment. Individual application or co-application of MHPP, NBPT, and BC significantly decreased N leaching by 25.4% to 42.6% (P < 0.05). The treatments of MHPP, BC, MHPP\_NBPT, and MHPP\_BC significantly increased the N<sub>yield</sub> in the range of 7.41%–10.3% and the NUE in the range of 9.94%–13.7% compared with the CF treatment (P < 0.05). The partial mechanism of those strategies in regulating N pathways was by causing niche differentiation between ammonia oxidizing bacteria (AOB) and ammonia oxidizing archaea (AOA), and changing community structure mainly of AOB. NBPT, MHPP, and BC were found mainly in the targeted Nitrosospira cluster 3a.2 and Nitrosospira cluster 3b. In general, the application of MHPP\_NBPT is a promising strategy for simultaneously reducing NH<sub>3</sub> and increasing NUE.

链接:

<http://agri.ckcest.cn/file1/M00/0F/F2/Csgk0GIA3q-AYAXdAB2ghifVTcM000.pdf>

### 2. Land surface phenology retrievals for arid and semi-arid ecosystems

文献源: ScienceDirect,2022-02-06

摘要: Land surface phenology (LSP) plays a critical role in the regulation of photosynthesis,

evapotranspiration, and energy fluxes. Significant progress has been made in extracting LSP information over large areas using satellite data, yet LSP retrievals remain a challenge over vast arid and semi-arid ecosystems because of sparse greenness, high variability and the lack of distinct annual patterns; for example, the MODerate Imaging Spectrometer (MODIS) Land Cover Dynamics Product MCD12Q2 that provides LSP metrics globally often failed to provide LSP information in these ecosystems. In this study, we used a modified threshold algorithm to extract LSP timing metrics, including the start, peak, and end of growing seasons, using the 16-day composite Enhanced Vegetation Index (EVI) time series from MODIS data. We applied this regionally customized algorithm across all arid and semi-arid climate regions of Australia (75% of the continental land area) encompassing shrublands, grasslands, savannas, woodlands, and croplands, extracting LSP metrics annually from 2003 to 2018, with up to two (phenology) seasons accounted for in each year. Our algorithm yielded an average of 64.9% successful rate of retrieval (proportion of pixels with retrieved LSP metrics) across 16 years in Arid and Semi-arid AUstralia (AS AUS), which was a significant increase compared to the 14.5% rate of retrieval yielded in our study area by the global product and the major cause of the different performances between these two approaches was the different EVI amplitude restrictions utilized to avoid spurious peaks (i.e. EVI amplitude  $\geq 0.1$  used by the global product and peak EVI  $\geq$  time series average EVI used by our algorithm). Gross primary productivity (GPP) measurements at OzFlux eddy covariance (EC) tower sites were used to cross-compare with the presence/absence of growing seasons detected by our algorithm, and 97% of our retrieved seasons matched with those extracted using EC data. Preliminary tests at five OzFlux sites showed that our algorithm was robust to view angle-induced sensitivity of the input data and showed similar performance when using EVI data calculated using MODIS Nadir BRDFAdjusted Reflectance product. Our retrieved LSP metrics revealed that vegetation growth in arid ecosystems is highly irregular and can occur at any time of the year, more than once in a year, or can skip a year. The proportion of pixels with two growing seasons was found to be correlated with the average annual precipitation of the study area ( $p < 0.01$ ), providing an estimation approach of LSP via rainfall. Our study improves the detection and measurement of vegetation phenology in arid and semi-arid regions by improving the spatial extend of LSP retrievals, which contributes to studies on LSP variations and dryland ecosystem resilience to climate change.

链接:

<http://agri.ckcest.cn/file1/M00/03/20/Csgk0YZXklqALkfhAMms4Onx7Vvk383.pdf>

### **3. Role of traditional ecological knowledge on field margin vegetation in sustainable development: a study in a rural-urban interface**

文献源: ScienceDirect,2022-02-06

摘要: Field Margin Vegetation (FMV) is an important part of agrobiodiversity which provides a range of ecological and economic benefits. Those services are mostly unaccounted in spite of having potential contribution to biodiversity conservation, well-being of farming households, climate change, mitigation etc. The structure and composition of FMV and socioeconomic transformation are closely linked to each other. Transformation which influences FMV negatively leads to erosion of traditional ecological knowledge of the community that is associated with the use, management and conservation of native vegetations in the agroecosystems. There has been research on the function and composition of field margin vegetations, more specifically in the West but the documentation of traditional ecological knowledge on field margin vegetation from the viewpoint of socio-ecological sustainability is not readily available. Through this research an attempt is made to understand and document the uses of FMV by farmers and related traditional knowledge in rural-urban interface of Bengaluru, India. The agricultural landscape under study was found to be rich in FMV species belonging to 43 families. These species are used for a variety of purposes by the people of the landscape. This is a preliminary, yet substantial attempt that provides insights into the socioecological significance of the FMV component of agroecosystem. The findings would help in strategising actions to enhance its stake in initiatives to achieve sustainable development goals through health and nutrition, sustainable farming, environmental conservation and economic well-being. The study suggests scientific assessment of ecosystem services of FMV and use of traditional knowledge in enhancement of its value.

链接:

<http://agri.ckcest.cn/file1/M00/03/20/Csgk0YZXjQOAU0okABlvvDCge-4163.pdf>

### **4. Soil phytoremediation reveals alteration in soil microbial metabolic activities along time gradient of cover crop mulching**

文献源: ScienceDirect,2022-02-05

摘要: The vitality and diversity of soil microbial metabolism are the core of soil function expression, cover crop is an environmentally friendly agricultural production practice;

however, shifts in soil microbial metabolic activities along time gradient of cover crop remain unclear. Here, we used metagenomic and biological techniques to investigate soil microbial potential function and carbon (C) source utilization capacity in the time series of white clover (WC, *Trifolium repens* L.) for 6, 10, and 15 years in a typical semiarid apple orchard. Conventional tillage (CT) was taken as the control. This study demonstrated that living mulch 6 years of WC had little effect on soil microbial functions. However, after 10 and 15 years of crop cover, an enrichment of genes related to amino acid metabolism, carbon cycle, and nitrogen metabolism was observed in soil microorganisms. Furthermore, average well color development (AWCD) was increased in 10 and 15 years of cover crop, soil microbiome exhibited a stronger preference for carbohydrates, amino acids, and polymers as C sources. The results mainly provided insight into the variation character of microbial metabolic function under increasing duration of cover crop.

链接:

<http://agri.ckcest.cn/file1/M00/03/20/Csgk0YZXjoaASgB4ACLU7NMCLjg005.pdf>

## **5. Predicting crop yields using a new robust Bayesian averaging model based on multiple hybrid ANFIS and MLP models**

文献源: ScienceDirect,2022-02-05

摘要: Predicting crop yield is an important issue for farmers. Food security is important for decision-makers. The agriculture industry can more accurately supply human demand for food if the crop yield is predicted accurately. Tomato is one of the most important crops so that 160 million tonnes of tomatoes are produced annually around the world. In this study, tomato yield based on data of 40 cities of Iran country including annual average temperature (T), relative humidity (RH), effective rainfall (R), wind speed (WS), and Evapotranspiration (EV) for the period of 1968-2018 was predicted using a new Bayesian model averaging (BMA). The paper's main innovation is the use of the new BMA so that it allows the modellers to quantify the uncertainty of model parameters and inputs simultaneously. For this aim, first, the multiple Adaptive neuro-fuzzy interface system (ANFIS) and multi-layer perceptron (MLP) were used for predicting crop yield. To train the ANFIS and MLP model, a new algorithm, namely, multi verse optimization algorithm (MOA) was used. Also, the ability of MOA was benchmarked against the particle swarm optimization (PSO), and firefly algorithm (FFA). In the next level, the new BMA used the outputs of the ANFIS-MOA, MLP-MOA, ANFIS, FFA, MLP-FFA, ANFIS-PSO, MLP-PSO, ANFIS,

and MLP for predicting tomato yield in an ensemble framework. The five- input combination of RH, T, and R, WS, and EV gave the best result. The mean absolute error (MAE) of the BMA in the testing level was 20.12 (Ton/ha) while it was 24.12, 24.45, 24.67, 25.12, 29.12, 30.12, 31.12, and 33.45 for the ANFIS-MOA, MLP-MOA, ANFIS-FFA, MLP-FFA, ANFIS-PSO, MLP-PSO, ANFIS, and MLP models. Regarding the results of uncertainty analysis, the uncertainty of BMA was lower than those of the ANFIS-MOA, MLP-MOA, ANFIS-FFA, MLP-FFA, ANFIS-PSO, MLP-PSO, ANFIS, and MLP models while the MLP model provided the highest uncertainty. The results of this study indicated that BMA using multiple MLP and ANFIS model was useful for predicting tomato yield.

链接:

<http://agri.ckcest.cn/file1/M00/0F/F2/Csgk0GIA3R6ANpP5AEulpD1Dbrc438.pdf>

## 6. 桂林会仙岩溶湿地土地利用方式对球囊霉素相关土壤蛋白分布的影响

文献源: 地球学报,2022-01-30

摘要: 土壤丛枝菌根真菌分泌的球囊霉素相关土壤蛋白 (GRSP) 是土壤碳库变化的重要指标,为明确其在会仙岩溶湿地不同土地利用方式下的分布特征及影响因素,以会仙岩溶沼泽,并由其转变而来的水稻田、旱地、果园和弃耕地4种不同土地利用方式为研究对象,采集0—10 cm、10—20 cm和20—40 cm这3个层次的土样,对不同土地利用方式下球囊霉素相关土壤蛋白分布特征及其与土壤因子的关系进行了研究。结果表明,不同土层总球囊霉素相关土壤蛋白 (T-GRSP) 含量为1.08~3.35 mg/g,占土壤有机碳的12.33%~19.73%,球囊霉素相关土壤蛋白是湿地土壤中的一个重要碳库。球囊霉素相关土壤蛋白在不同土地利用方式和土层之间均表现出显著差异,随土层深度的增加表现出降低趋势。沼泽土壤中总球囊霉素相关土壤蛋白、易提取球囊霉素相关土壤蛋白 (EE-GRSP) 含量和有机碳 (SOC) 的含量均高于其它4种土地利用方式 (水稻田、旱地、园土和弃耕地)。GRSP分别与蛋白酶、SOC和全氮 (TN) 呈极显著正相关 ( $P<0.01$ ),分别与速效氮 (AN)、速效磷 (AP)、粘粒和粉粒呈显著正相关 ( $P<0.05$ )。EE-GRSP与SOC和TN呈极显著正相关 ( $P<0.01$ ),分别与蛋白酶和粘粒呈显著正相关 ( $P<0.05$ )。主成分分析表明,粉粒、SOC、AN和TN是影响球囊霉素相关蛋白分布特征和反映会仙岩溶湿地土壤营养状况的主要因子。会仙岩溶湿地土壤中的球囊霉素相关土壤蛋白对土壤碳封存具有重要贡献。

链接:

[http://agri.ckcest.cn/file1/M00/0F/F2/Csgk0GIA2qKADcv\\_AAqE-Rud\\_I0976.pdf](http://agri.ckcest.cn/file1/M00/0F/F2/Csgk0GIA2qKADcv_AAqE-Rud_I0976.pdf)

## 7. 喀斯特不同土地利用方式和生态恢复模式的土壤磷素特征

文献源: 生态学杂志,2022-01-30

摘要: 为了探究不同土地利用方式和生态恢复模式对喀斯特地区土壤磷素循环特征的影响, 选择长期控制试验样地的3种土地利用方式(果树林(枇杷)、牧草地、退化干扰地)和4种生态恢复模式(常绿乔木林、落叶乔木林、常绿落叶混交林、自然恢复林)作为研究对象, 分析了土壤磷素(全磷(TP)、有效磷(AP)、微生物生物量磷(MBP))含量变化及其与pH和有机碳(SOC)、全氮(TN)、氨态氮(NH<sub>4</sub><sup>+</sup>-N)、硝态氮(NO<sub>3</sub><sup>-</sup>-N)、交换性钙(Ca) 镁(Mg)、微生物生物量碳(MBC)和氮(MBN)含量的关系。结果显示: 持续开发利用的土地土壤TP含量均高于生态恢复模式的土地, 而MBP含量正好相反。在3种持续开发利用的土地中, 牧草地土壤TP和AP含量显著高于果树林和退化干扰地, 而MBP最低; 果树林的土壤MBP含量最高, 退化干扰地的土壤TP和AP含量最低。在4种生态恢复模式中, 自然恢复林和落叶乔木林土壤AP和MBP含量显著高于常绿落叶混交林和常绿乔木林, TP则变化不大。土壤TP与SOC、TN和交换性Ca具有显著正相关, AP与pH、MBC、MBN、MBP和交换性Mg具有显著正相关, MBP与交换性Ca和Mg、MBC和AP具有显著正相关。冗余分析发现, 土壤MBC、MBN是影响3种土地利用方式和4种生态恢复模式土壤磷素含量变化的主要因子, 说明在喀斯特地区不同土地利用和恢复方式中, 土壤微生物活动对土壤磷素有效性变化具有重要影响。另外, 在3种持续利用的土地中, 果树林的土壤TP、AP和MBP含量较高、更接近于生态恢复模式下土壤状况, 意味着这是较好的土地利用方式; 4种生态恢复模式中, 落叶乔木林的土壤TP、AP、MBP含量均高于常绿落叶混交林和常绿乔木林, 更接近于自然恢复林。为了使生态系统更快恢复, 可以在植被恢复区人为配植更多的落叶树种。

链接:

<http://agri.ckcest.cn/file1/M00/03/20/Csgk0YZXiW6AU2SHAA-3BjjAu7o325.pdf>

## 8. 耕地生产力隐性退化遥感监测与影响因素分析

文献源: 农业机械学报,2022-01-27

摘要: 以江苏省永久耕地为例, 基于2001—2019年中分辨率成像光谱仪(Moderate resolution imaging spectroradiometer, MODIS)遥感影像, 开展耕地生产力隐性退化遥感监测和影响因素分析。BFAST(Breaks for additive seasonal and trend)算法用于建模历史时期耕地生产力变化的预期行为, 并以此为基准判断监测时期耕地生产力是否存在隐性退化风险。基于地理探测器, 从3个准则层的8项指标变量对耕地生产力隐性退化进行了主导影响因素探测和因子交互分析。研究表明: 江苏省存在生产力隐性退化的耕地比例为21.9%, 具有显著的空间差异。西北地区的徐州市、宿迁市的耕地生产力隐



性退化比例最高，分别为47.2%和43.4%，且表现出聚集性。东南地区的苏州市、无锡市和南通市的耕地生产力隐性退化比例较低，均不足10%。因子探测分析表明外流人口数量、种植业从业人员数量和农业机械总动力3项指标对江苏省耕地生产力隐性退化的解释力最强。多因子交互耦合后，人口因素与生产条件解释力增强最为显著。耕地生产力隐性退化的地域分异类型划分为生产条件约束型、产出效益约束型和人口因素约束型。农业机械化总动力、农业产值和外流人口数量分别为3种约束类型的首要因素。从地域空间来看，人口条件约束型地区在江苏省占比最大，主要集中于苏北地区。对于不同约束类型区域分别提出加强高标准农田建设，实施惠农政策，减缓劳动力析出等相应的政策建议。

**链接:**

<http://agri.ckcest.cn/file1/M00/0F/F2/Csgk0GIA2b6AfWu2ABMUeuf5Ziw656.pdf>

### 9. 三峡库区小流域土地利用结构对土壤养分流失及水质影响

文献源: 水生态学杂志,2022-01-15

摘要: 三峡水库生态屏障区土地利用类型及其结构快速变化,直接影响入库的土壤侵蚀、径流及土壤养分流失输出;研究土地利用结构对地表径流养分输出及地表水质影响,可为控制地表水质和水体富营养化提供基础数据。选取三峡库区低山丘陵区的秭归县兰陵溪小流域集水区,代表以林地(S1)、林地+园地(S2)、园地(S5)为主的典型土地利用结构,自动采集水样,常规监测及典型降雨径流过程连续监测,探究地表径流土壤养分氮磷浓度的动态变化过程。结果显示,雨季集水区间径流的氮素浓度存在较大差异,S5的氮磷输出浓度都显著高于S1和S2( $P<0.05$ );集水区间径流的氮磷浓度变幅差异显著( $P<0.05$ ),氮磷输出浓度表现为 $S1<S2<S5$ ;园地为集水区(S5)径流养分浓度对降雨响应较S2和S5迅速。研究表明,适当增加林地比例,控制园地、耕地比例以及在河岸边设立缓冲林带,实行茶林间作等方式,可降低径流氮磷浓度;通过优化土地利用结构,可降低土壤氮磷输出负荷。

**链接:**

<http://agri.ckcest.cn/file1/M00/03/20/Csgk0YZXi8WASbX8ABuLT4YsH30731.pdf>

### 10. 土地利用变化对西南喀斯特土壤团聚体组成、稳定性以及C、N、P化学计量特征的影响

文献源: 环境科学,2021-12-22

摘要: 土壤团聚体稳定性和养分化学计量特征对土地利用变化的响应研究对当前脆弱生态环境保护与修复具有重要意义。为探明西南喀斯特山地土地利用方式变化对土壤团聚

体组成、稳定性与C、N、P养分化学计量特征的影响规律，选取了西南喀斯特典型区域为研究区，针对7种主要土地利用方式建立了系列样地，开展了土壤团聚体组成与稳定性、团聚体C、N、P含量与计量比特征研究。结果表明，土地利用变化显著影响了土壤团聚体稳定性。玉米地和撂荒地的土壤团聚体稳定性相对较高，草地和裸地的团聚体稳定性相对较低，土壤团聚体稳定性总体随土层增加呈现降低趋势。不同土地利用方式土壤团聚体C、N和P含量存在显著差异。疏林地和撂荒地土壤团聚体C和N含量较高，草地土壤团聚体C和N含量较低，裸地和撂荒地土壤团聚体P含量相对较高。土地利用变化对土壤团聚体C、N和P计量比也存在明显影响。乔木林地、疏林地和撂荒地土壤团聚体C:N相对较高，草地土壤团聚体C:N最低；乔木林地和疏林地土壤团聚体C:P较高，明显高于灌木林地和草地；乔木林地、疏林地和灌木林地土壤团聚体N:P较高，明显高于裸地和撂荒地。喀斯特土壤团聚体组成和稳定性与土壤C、N和P化学计量特征存在显著或极显著的相关性。土壤团聚体稳定性与大团聚体质量分数呈正相关。土壤大团聚体质量分数增加，团聚体稳定性增加，有利于土壤C、N和P养分的保持和积累。研究结果对喀斯特生态系统植被修复、水土保持和土地利用调控具有重要意义。

**链接:**

<http://agri.ckcest.cn/file1/M00/0F/F2/Csgk0GIA24GAJ5ZfAAvxfkFJi-k768.pdf>

## 11. 基于DWT-WFGM (1,1) -ARMA组合模型的农业用水量预测

文献源：灌溉排水学报,2021-11-15

摘要：农业用水量预测对于区域水资源规划与管理具有重要意义。【目的】针对农业用水量序列的振荡性以及传统模型预测结果输出单一的问题,提出一种新的组合预测模型DWT-WFGM (1,1) -ARMA对区域农业用水量进行预测。【方法】通过离散小波变换将原始用水量序列分解为近似序列和细节序列,并分别采用自回归滑动平均模型和分数阶灰色模型预测细节序列和近似序列,并结合加权马尔可夫链对近似序列进行误差修正,将不同成分序列的预测结果进行线性叠加得到农业用水量的预测值和预测区间。利用该模型分别对陕西省和内蒙古自治区的农业用水量进行预测,并与灰色模型GM (1,1)、DWT-GM (1,1) -ARMA模型和DWT-FGM (1,1) -ARMA模型对比分析。【结果】DWT-WFGM (1,1) -ARMA模型在陕西省和内蒙古自治区的评价指标平均绝对百分比误差分别为1.25%和1.01%,预测精度高于其他模型,且预测区间为研究区未来时期的农业用水量提供了合理的波动范围,具有一定的实际参考价值。【结论】本文构建的组合模型能够有效提高农业用水量预测的精度,同时预测区间的提出可以为区域农业用水量预测提供更加可靠的依据。

**链接:**

<http://agri.ckcest.cn/file1/M00/03/20/Csgk0YZXif2AUqrDABtxOhDCERE216.pdf>

【会议论文】

**1. Estimation of Root zone Soil Moisture Profile by Reduced-Order Variational Data Assimilation using Surface Soil Moisture Observation**

发布源: IEEE

发布时间: 2022-02-04

摘要: Soil moisture plays an important role in the global water cycle and has an important impact on energy fluxes at the land surface. It also defines the initial and boundary condition of terrestrial hydrological processes, including infiltration, runoff, and evapotranspiration. Therefore, accurate estimation of soil moisture pattern is of critical importance. Satellite-based soil moisture can be obtained with well-defined temporal and spatial resolutions and with global coverage. However, they only provide surface soil moisture at the upper few centimeters of the soil column. Soil moisture simulation models can produce estimates of soil moisture profile up to several meters of depth in different time steps. However, uncertainty in model parameters (e.g., unknown initial soil moisture profile) and meteorological forcing can substantially alter the accuracy of the model estimates. In this study, the potential of using surface soil moisture measurements to retrieve the initial soil moisture profile will be explored in a synthetic study, using two proposed reduced-order variational data assimilation (VDA) techniques and a simple 1D-soil moisture model. The accuracy and feasibility of the proposed approaches are confirmed by comparing the initial soil moisture profiles estimated using the proposed reduced-order VDA techniques versus the full-adjoint VDA technique. Results illustrated that the reduced-order VDA techniques can estimate initial soil moisture profile from surface soil moisture observation with the comparable level of accuracy as full-adjoint VDA. The effectiveness of the reduced-order VDA in retrieving the initial soil moisture profile is further demonstrated by assimilating surface soil moisture into HYDRUS-1D, mimicking real-world errors.

链接:

<http://agri.ckcest.cn/file1/M00/0F/F2/Csgk0GIA0ZqAUpViAB7Ptzopl14394.pdf>

**2. A Vision Transformer Model for Convolution-Free Multilabel Classification of Satellite Imagery in Deforestation Monitoring**

发布源: IEEE

发布时间: 2022-02-02

摘要: Understanding the dynamics of deforestation and land uses of neighboring areas is of vital importance for the design and development of appropriate forest conservation and management policies. In this article, we approach deforestation as a multilabel classification (MLC) problem in an endeavor to capture the various relevant land uses from satellite images. To this end, we propose a multilabel vision transformer model, ForestViT, which leverages the benefits of the self-attention mechanism, obviating any convolution operations involved in commonly used deep learning models utilized for deforestation detection. Experimental evaluation in open satellite imagery datasets yields promising results in the case of MLC, particularly for imbalanced classes, and indicates ForestViT's superiority compared with well-established convolutional structures (ResNET, VGG, DenseNet, and MobileNet neural networks). This superiority is more evident for minority classes.

链接:

<http://agri.ckcest.cn/file1/M00/03/20/Csgk0YZXhIWAdbXmACEttkikxP4183.pdf>

### **3. Mapping Irrigated Area at Field Scale Based on the Optical TRapezoid Model (OPTRAM) Using Landsat Images and Google Earth Engine**

发布源: IEEE

发布时间: 2022-01-31

摘要: Irrigation is critical to agricultural production in arid and semi-arid regions, and it is imperative to map high-resolution irrigated area to improve water productivity. This study proposes a field-scale (30 m resolution) irrigated area mapping method based on soil moisture change detection using remote sensing data only. First, normalized soil moisture is obtained using the optical trapezoid method (OPTRAM) and then converted to soil water content. Next, individual irrigation events are identified in the time series of soil water content using threshold detection. Finally, irrigation events are accumulated over the time series, and then the irrigated area map can be obtained. This method was tested using Google Earth Engine (GEE) to analyze remote sensing images and map irrigated areas in a typical arid and semi-arid region called Hexi Corridor in northwestern China in the past 30 years. In situ validation shows that this method has an accuracy close to 100%. The shortcoming of low recall is also overcome by long-term observations. Application of the

proposed method shows that the irrigated cropland of Hexi Corridor has increased by 4,840 km<sup>2</sup> (42.2%) over a 31-year time period (1990-2020). This field-scale irrigated area mapping method can improve the management of water resources.

链接:

[http://agri.ckcest.cn/file1/M00/0F/F2/Csgk0GIA1mCAJoHUAETpdTWJ\\_BI957.pdf](http://agri.ckcest.cn/file1/M00/0F/F2/Csgk0GIA1mCAJoHUAETpdTWJ_BI957.pdf)

#### **4. A Long Range Reliable Precise Irrigation System Based on LoRaP2P Protocol**

发布源: IEEE

发布时间: 2022-01-26

摘要: Manpower shortages is a severe challenge in many agricultural countries when it comes to the development of modern agriculture. Irrigation is one of the most important aspects of farming. However, because it requires a lot of personnel, new technologies must be introduced to cut labor costs and make the planting process automatic and intelligent in order to boost crop output while lowering costs. In this article, we employ LoRaP2P, an improvement of the LoRaWAN protocol, to realize remote mass control of water valves, so that farmers can easily achieve mass irrigation without manual operation. The LoRaP2P protocol is employed to build and develop a water valve control system for precise irrigation. The system combines the long-range, low-power advantages of LoRa with the low latency characteristics of p2p mode to control water valves. Experimental results show the proposed irrigation system features long-distance communication, low power consumption, low latency, and high reliability, making it perfect for modern agriculture. Furthermore, the system's simplicity makes it straightforward to use via a web platform or mobile app, removing the need of learning.

链接:

<http://agri.ckcest.cn/file1/M00/03/20/Csgk0YZXg0mAQqONAAm8uiAdc6Q819.pdf>

#### **5. JAGAN: A Framework for Complex Land Cover Classification Using Gaofen-5 AHSI**

Images

发布源: IEEE

发布时间: 2022-01-25

摘要: Owing to their powerful feature extraction capabilities, deep learning-based methods have achieved significant progress in hyperspectral remote sensing classification. However, several issues still exist in these methods, including a lack of hyperspectral datasets for

specific complicated scenarios and the need to improve the classification accuracy of land cover with limited samples. Thus, to highlight and distinguish effective features, we propose a hyperspectral classification framework based on a joint channel-space attention mechanism and generative adversarial network (JAGAN). To relearn feature-based weights, a higher priority was assigned to important features, which was developed by integrating a two-joint channelspace attention model to obtain the most valuable feature via the attention weight map. Additionally, two classifiers were designed in JAGAN: sigmoid was used to determine whether the input data were real or fake samples produced by the generator, while Softmax was adopted as a land cover classifier to yield the prediction type labels of the input samples. To test the classification performance of the JAGAN model, we used a selfconstructed complex land cover dataset based on GaoFen-5 AHSI images, which consists of mixed landscapes of mining and agricultural areas from the urban-rural fringe. Compared with other methods, the proposed model achieved the highest overall classification accuracy of 86.09%, the highest kappa amount of 79.41%, the highest F1 score of 85.86%, and the highest average accuracy of 82.30%, indicating the JAGAN can effectively improve the classification accuracy for limited samples in complex regional environments using GF-5 AHSI images.

链接:

[http://agri.ckcest.cn/file1/M00/03/20/Csgk0YZXh\\_WAdpXhABqjdIBhUIQ524.pdf](http://agri.ckcest.cn/file1/M00/03/20/Csgk0YZXh_WAdpXhABqjdIBhUIQ524.pdf)

## **6. Plant Signal Extraction and Classification with Built-in Automatic Irrigation System**

发布源: IEEE

发布时间: 2022-01-20

摘要: Irrigation has been practiced in India and other Asian countries from early times as they are primarily agriculture-based nations. Along with the requirement of external application of water, plant health also depends on factors like temperature, humidity, nutrition etc. In this paper, an automated plant irrigation system that monitors soil moisture and controls the water suction pump is proposed. The system also has a plant health monitoring system that logs the temperature and humidity values from the DHT sensor and methane content in the environment from the MQ sensor via an Arduino microcontroller. A real time clock (RTC) is used to maintain continuous time during the data log even when there is power disruption. The data is analyzed along with the plant's electrical signals that are amplified via an instrumentation amplifier, which can show how plants change their

own growth in response to changes in their environment.

链接:

<http://agri.ckcest.cn/file1/M00/0F/F2/Csgk0GIA02OAYJgIAB0gPX-xJ7Q595.pdf>

## **7. Multiresolution Mapping of Land Cover From Remote Sensing Images by Geometric Generalization**

发布源: IEEE

发布时间: 2021-05-14

摘要: Land cover multiresolution mapping of remote sensing images contributes greatly to land-use management, environmental protection, and city planning. In traditional mapping of this type, the representation of different land-use types depends on the image resolution, and the geometric, topologic, and semantic characteristics are not considered. This approach can cause a loss of useful information and the redundancy of useless information. In this study, we propose a superpixel-based land cover (multiresolution representation SULR) method for remote sensing images that employs multifeature fusion. In this process, we first define three basic superpixel operations, collapse, connection, and cutting, as the basic operators of multiresolution land cover mapping. Then, the topological adjacent land parcels are combined through the amalgamation of polygons with heterogeneous properties and aggregation of polygons with homogeneous properties based on the three proposed superpixel operators. Finally, the geometric boundaries of parcels are simplified by combining the superpixel collapse operator and image thinning technologies. Compared with traditional image scale transformation methods, the proposed method can more effectively achieve multiresolution mapping of land cover from remote sensing images by considering the geometric, topologic, and semantic characteristics of land parcels.

链接:

<http://agri.ckcest.cn/file1/M00/0F/F2/Csgk0GIA2ImAEnmEAMWXKdjqrM0048.pdf>

---

主编: 赵瑞雪  
地址: 北京市海淀区中关村南大街12号  
电话: 010-82106649

本期编辑: 陈亚东  
邮编: 100081  
邮件地址: [agri@ckcest.cn](mailto:agri@ckcest.cn)