

《智慧农业发展战略研究》专题快报

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中国工程科技知识中心农业分中心

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【动态资讯】

1 . Smart farming to push agricultural exports

【Businessnews】 Agriculture has the potential to become an export-oriented sector once automated systems and new technologies are adopted by local farmers, according to the 2020 Agriculture Factbook recently published by the Investment Development Authority in Lebanon (IDAL). Increasing the production of high-value crops while focusing on reaching countries that are investing in importing these types of produce is key for Lebanese farmers. Strawberries tomatoes, avocados, and almonds are among such crops as well as livestock. The price of some of these crops reaches \$2,000 per ton. The report also identified a list of agricultural products with untapped potential, along with their respective unexploited markets. Top prospective export-oriented products include apples, wheat and meslin flour, cabbage, lettuce, peaches, nectarines, pears, and quinces.

链接:

<http://agri.ckcest.cn/file1/M00/00/E7/Csgk0V6HK6mAXPMmAAIXFdWQBm8675.pdf>

2 . 合肥携手中科院合肥物质科学研究院共建“智慧农业谷”

【合肥日报】此次双方共建的“智慧农业谷”，将瞄准农业装备与人工智能国际前沿，突破一批核心共性关键技术，打造符合我国国情的绿色智慧农业发展的示范样板，把合肥“智慧农业谷”打造成国内领先、国际一流的绿色智慧农业高端人才汇聚基地、核心技术创新基地、装备产业聚集基地。双方共建内容包括建设智慧农业创新院、智慧农业装备与技术产业园、智慧农业试验示范基地。其中，智慧农业创新院将联合智慧农业领域的高校院所，集聚学科优势，争取国家级研发平台和相关研究成果优先落户，并吸引国内外相关人才集聚，形成技术创新生态系统，产出国内领先、国际一流的创新成果。

链接:

<http://agri.ckcest.cn/file1/M00/00/E6/Csgk0V6G7iWAB-XCAAI2gPUKB84000.pdf>

3 . Government intensifies smart agriculture

【The Herald】 The Government has said it will intensify climate smart agriculture, a farming technique that helps farmers to be more productive on a warming planet, than adopting “harmful” genetically modified crops. This comes against the backdrop of growing calls by Genetically Modified Organisms (GMOs) advocates pushing for the Government to adopt a policy that embrace the GM technology in light of successive failed harvests due to droughts linked to climate change. Those actively campaigning for the GMOs are also arguing that the country is already consuming imported GMOs while maintaining the GM non-use policy was making the country’s agricultural produce uncompetitive.

链接:

<http://agri.ckcest.cn/file1/M00/00/E7/Csgk0V6HIVOAeWAwAAIycAIJakg369.pdf>

4 . 日媒：日本推行智慧农业 施肥无人机和自动插秧机登场

【新华社】日媒称，日本出现了在稻作领域利用高科技推行智慧农业的动向。据《日本经济新闻》3月31日报道，鸟取县大米生产法人田中农场从今春生产大米之际开始推行“智慧农业”。田中农场已购买在农田撒肥的无人机以及搭载全球定位系统（GPS）的插秧机等。报道称，包括菜地和果园在内，田中农场种植面积约为120公顷，远超过日本全国平均水平（1.2公顷）。该农场租借邻近农田增加了种植面积，但由于人手短缺势头逐渐下降。报道还称，滋贺县福原农场自2019年春天购买了自动插秧机等。农场希望减少劳动时间，降低成本，生产更多价格符合餐饮店要求的大米。会长福原昭一表示：“一袋（60公斤）大米价格跌破1万日元只是时间问题。我们希望实现低价也能赚钱的农业。”

链接:

<http://agri.ckcest.cn/file1/M00/00/E6/Csgk0V6G7w6ADZexAAHjhRgdLtw994.pdf>

5 . 智慧农业助力农民增收致富

【银川日报】贺兰县习岗镇新平园区现代农业温棚中草莓、桑葚进入了丰收季，新鲜水果成了市场的香饽饽。园区近两年共引进推广瓜菜新品种8类45个，建成1560栋日光温棚。温室智能监控，可视化、远程诊断及培训，温室自动卷帘控制，触摸查询、气象信息服务为一体的物联网信息化体系平台等智慧农业应用，为园区内已建成的温棚插上了

智慧翅膀，也为农民带来可观的收入。据了解，习岗镇新平村去年全村农民人均纯收入14800元，村集体经济纯收入达43万元以上。

链接:

<http://agri.ckcest.cn/file1/M00/00/E6/Csgk0V6G81aAaEzEAASGtf4vIMA144.pdf>

6 . 全国的農地情報 デジタル地図へ集約

【日本农业新闻】農水省は、全国の農地情報のインターネット上での一元管理に乗り出す。行政機関や農業団体がばらばらに管理してきた農地情報を集約し、同省の地図データと組み合わせて「デジタル地図」を作成。2022年度から一部機能の運用を始める。生産者は補助金などの申請にかかる労力が大幅に減る他、将来的には農業機械の自動運転の活用などにもつなげる。「デジタル地図」は、各機関が持つ情報をひも付けして一元管理する。

链接:

<http://agri.ckcest.cn/file1/M00/00/E7/Csgk0V6HG2mAZzJcAAQAT-gS1sl031.pdf>

7 . 南京农业大学：智慧农业为精准春耕“开处方”

【新华网】新华网南京3月30日电（记者陈席元）“这款小程序可以精确定位到田块，看到每一个田块的小麦苗情。”江苏省兴化市农技推广中心副站长陈春生日前向记者演示“江苏稻麦生产服务”小程序。这款小程序由南京农业大学智慧农业研究院设计。该院副院长田永超教授告诉记者，眼下正是小麦抽穗的关键期，小程序里包含了今年二三月份江苏各地小麦苗情数据及田间管理建议。“疫情期间，农技人员足不出户，看手机就能掌握苗情。”田永超说，科研团队架设“天眼地网”，卫星遥感、无人机、田间物联网传感器等实时获取苗情生长状况、空气温度湿度、土壤墒情等11个技术指标的数据，通过苗情图这一可视化手段呈现出来。“以往一名农技人员一天最多跑两三个县的田块，拿到的数据也只是单个点上的。苗情图能够对全省各地的苗情分类分级，全面、精确，一目了然。”陈春生说。田永超介绍，根据长势由强到弱分类，苗情图用蓝、绿、红三种颜色分别表示一、二、三类苗。今年2月，江苏部分小麦产地受到不同程度的冻害影响，从图上看，苏北局部地区红色偏多，代表当地三类苗比例高，长势不佳。而兴化以蓝、绿色为主，说明长势乐观。

链接:

<http://agri.ckcest.cn/file1/M00/00/E6/Csgk0V6G77uAfQRuAAJOkjgmaoY782.pdf>

8 . Sony collaborates with four ag tech firms to create expanded farming solutions

【Sony Electronics Inc.】 SAN DIEGO, Calif. — Sony Electronics has announced an expanded ecosystem for its newly enhanced Smart Agriculture Solution with ag tech providers. The system is being integrated with farming solutions from Drones Made Easy, BirdsEyeView Aerobotics, Rantizo and Progeny Drone Inc. Sony’s Smart Agriculture Solution supports day-to-day crop management by collecting and analyzing data on growth and health status. Version 2.0, shown recently at the 2020 Commodity Classic, combines high-resolution drone imagery with AI for a more accurate and efficient approach to plant counting and analysis. “Our team thoroughly researched the various needs for a drone-based remote sensing solution with some of the top agriculture companies, researchers and universities,” said Theresa Alesso, pro division president at Sony Electronics. “That feedback was incorporated into the recent upgrade of Sony’s Smart Agriculture Solution and is the basis for the providers selected thus far for this expanded ecosystem. These integrations provide comprehensive, new ways of working for today’s growers that will increase yield with far greater efficiency.” Version 2.0 adds Sony’s imaging and AI-based technology for stand counting. Stand counting allows growers to assess the plant establishment, enabling replanting decisions to be made earlier and with greater accuracy. The enhanced solution consists of a drone-mounted multi-spectral sensing unit and Fast Field Analyzer image analytics software for in-the-field crop management, monitoring and insights. The Version 2.0 update is designed to allow growers to precisely and easily analyze large areas.

链接:

<http://agri.ckcest.cn/file1/M00/00/E7/Csgk0V6HL6SAaxi6AAWgN6eohXk747.pdf>

9 . Chinese agriculture drone makers see demand rise amid coronavirus outbreak

【CNBC】 While the coronavirus outbreak in China has hit many industries hard, some technology start-ups in agriculture are seeing demand rise. “In the first two months of 2020, we delivered 4,000 units of our newly released agricultural drones,” Justin Gong, co-founder of XAG, a major agricultural drone maker based in the southern city of Guangzhou, said in Mandarin, according to a CNBC translation. XAG is not alone. In the north, Beijing Yifei Technology’s Chief Marketing Officer Liu Zhuo said he expects the company’s revenue to at least quadruple this year to over 30 million yuan (\$4.31 million).

链接:

<http://agri.ckcest.cn/file1/M00/00/E7/Csgk0V6HLkqAUuBkAAPxbEsZHXw307.pdf>

【文献速递】

1 . A review of remote sensing applications in agriculture for food security: Crop growth and yield, irrigation, and crop losses

文献源: Journal of Hydrology,2020

摘要: The global population is expected to reach 9.8 billion by 2050. There is an exponential growth of food production to meet the needs of the growing population. However, the limited land and water resources, climate change, and an increase in extreme events likely to pose a significant threat for achieving the sustainable agriculture goal. Given these challenges, food security is included in the United Nations' Sustainable Development Goals (SDGs). Since the advent of Sputnik, followed by the Explorer missions, satellite remote sensing is assisting us in collecting the data at global scales. In this work, we review how satellite remote sensing information is utilized to assess and manage agriculture, an important component of ecohydrology. Overall, three critical aspects of agriculture are considered: (a) crop growth and yield through empirical models, physics-based models, and data assimilation in crop models, (b) applications pertaining to irrigation, which include mapping irrigation areas and quantification of irrigation, and (c) crop losses due to pests, diseases, crop lodging, and weeds. The emphasis is on satellite sensors in optical, thermal, microwave, and fluorescence frequencies. We conclude the review with an outlook of challenges and recommendations. This paper is the first of a two-part review series. The second part reviews the role of satellite remote sensing in water security, wherein we discuss the aspects of water quality and quantity along with extremes (floods and droughts).

链接:

http://agri.ckcest.cn/file1/M00/00/E7/Csgk0V6HCTiAW_ukABF4BQaC7jM226.pdf

2 . An automatic method for weed mapping in oat fields based on UAV imagery

文献源: Computers and Electronics in Agriculture,2020

摘要: The accurate detection and treatment of weeds in agricultural fields is a necessary procedure for managing crop yield and avoiding herbicide pollution. With the emergence of unmanned aerial vehicles (UAV), the ability to acquire spatial data at the desired spatial and temporal resolution became available, and the resulting input data met high standards for weed management. In this paper, we tested four independent classification algorithms for the creation of weed maps, combining automatic and manual methods, as well as object-based and pixel-based classification approaches, which were used separately on two subsets. Input UAV data were collected using a low-cost RGB camera due to its affordability

compared to multispectral cameras. Classification algorithms were based on the random forest machine learning algorithm for weed and bare soil extraction, following an unsupervised classification with the K-means algorithm for further estimation of weeds and bare soil presence in non-weed and non-soil areas. Of the four classification algorithms tested, the automatic object-based classification method achieved the highest classification accuracy, resulting in an overall accuracy of 89.0% for subset A and 87.1% for subset B. Automatic classification methods were robustly developed, using at least 0.25% of the scene size as the training data set in all circumstances anticipated for the random forest classification algorithm to operate. The use of the algorithm resulted in weed maps consisting of zoned classes and covering areas with similar biological properties, making them ready for use as inputs in weed treatments that use agricultural machinery.

链接:

<http://agri.ckceest.cn/file1/M00/00/E7/Csgk0V6HBTiALKm3AMAlfj8IK-k127.pdf>

3 .Collaboration of human pickers and crop-transporting robots during harvesting – Part II:

Simulator evaluation and robot-scheduling case-study

文献源: Computers and Electronics in Agriculture,2020

摘要: Harvest-aid robots that transport empty and full trays during manual harvesting of specialty crops such as strawberries or table grapes can increase harvest efficiency, by reducing pickers' non-productive walking times. In Part I of this work, a modeling framework, and a stochastic simulator were presented for all-manual and robot-aided harvesting. This paper reports Part II of our work, which utilized data gathered in two strawberry fields during harvesting, to estimate the stochastic parameters involved in modeling pickers, and evaluate the prediction accuracy of the simulator for all-manual picking. Then, as a case study, non-productive time and harvest efficiency were estimated for robot-aided harvesting, for various picker-robot ratios and three priority-based reactive dispatching strategies for the robots. The simulator predicted the pickers' non-productive time during all-manual harvesting, with 6.4%, 3%, and 1.2% errors for the morning, afternoon, and "all-day" harvesting shifts, respectively. Statistical testing verified that predicted non-productive times followed the same distributions as the measured non-productive times (5% significance level). Simulations robustness was assessed by using morning data to simulate afternoon harvesting and vice-versa: non-productive times distributions were predicted accurately (10% significance level). Robot-aided simulation results using the

calibrated simulator for a 25-picker crew showed that all-manual harvest efficiencies of 81.8% and 78.2% for morning and afternoon shifts increased to 92% and 86.5%, respectively, when five robots were deployed. Different scheduling policies did not affect efficiency when more than five robots were used, because there were always enough robots to serve pickers' requests immediately. Also, harvest efficiency plateaued when more than five robots were used, as a consequence of the time needed for a robot to travel to a picker.

链接:

<http://agri.ckcest.cn/file1/M00/00/E7/Csgk0V6HBj6ADoYHALYi22Om2xM425.pdf>

4 . In-field automatic detection of maize tassels using computer vision

文献源: Information Processing in Agriculture,2020

摘要: The heading stage of maize is an important period during its growth and development and indicates the beginning of its pollination. In this regard, an automated method for maize tassel detection is highly important to monitor maize growth. However, the recognition of maize heading stage mainly relies on visual evaluation. This method presents some limitations, such as expensive and subjective. This work proposed a novel method for automatic tassel detection. In the proposed algorithm, a color attenuation prior model was used to model the scene depth of saturation graph to remove image saturation. An Itti visual attention detection algorithm was used to detect the area of interest. Texture features and vegetation indices were used to develop a classification model to eliminate false positives. Pictures were captured using a commercial camera for two years to verify the stability of the proposed algorithm. Three indices were calculated to quantitatively assess and rate the algorithms. Experimental results show that the proposed method outperforms other existing methods, and its recall, precision, and F1 measure values are 86.30%, 91.44%, and 88.36%, respectively. Results indicate that the proposed method can effectively detect maize tassels in field images and remain stable with time.

链接:

http://agri.ckcest.cn/file1/M00/00/E7/Csgk0V6G_92AVuW1ACyQASY3ARI396.pdf

5 . 基于机器视觉的农田地头边界线检测方法

文献源: 农业机械学报,2020

摘要: 非结构复杂农田作业环境中, 实现农机在地头处的自主导航转弯是目前实现农机田间全程自主导航行走的关键技术之一, 而实现前者的首要任务是及时、准确地感知地

头的空间位置信息，尤其是地头边界位置。本文基于机器视觉技术，首先依据农田内外像素灰度的跳变特征来实现地头是否出现的判断，通过建立正向和负向分布偏差两个度量值来确定是否存在该灰度跳变特征。随后，将图像沿水平方向平均分成8个子区域，针对各子处理区域求取其行灰度平均值分布图，基于局部加权回归法对其平滑处理，并建立按序离群度参数，通过寻找平滑曲线上首个按序离群程度较大的波峰点或波谷点以及相应的跳前波谷点或波峰点，最终确定跳变特征点的像素坐标，并基于稳健回归法线性拟合跳变特征点，获取实际非规整地头边界的主体延伸方位线。最后，将主体延伸方位线向下平行移动，直至其线上像素的灰度平均值接近于田内像素的灰度分布特征时，认为抵达安全位置处，由此获得农机在当前地头处安全转向掉头的边界线。试验结果表明，地头出现与否判断准确率不低于96%，地头边界线检测准确率不低于92%，可为农机在地头处实施自主导航转弯，提供准确、可靠的地头边界位置信息感知技术支持。

链接:

http://agri.ckcest.cn/file1/M00/00/E7/Csgk0V6HR5CAR3T_ABMiZ4jhUVI621.pdf

6 . Using a cross-scale simulation tool to assess future maize production under multiple climate change scenarios: An application to the Northeast Farming Region of China

文献源: Climate Services,2020

摘要: The Northeast Farming Region (NFR) is a major maize cropping region in China, which accounts for about 30% of national maize production. Although the regional maize production has an increasing trend in the last decades, it has greater inter-annual fluctuation. The fluctuation is caused by the increased variations of the local temperature and precipitation given the dominance of rainfed maize in the region. To secure high and stable level of maize production in the NFR under the warmer and drier future climate conditions, we employed a cross-scale model-coupling approach to identify the suitable maize cultivars and planting adaptation measures. Our simulation results show that, with proper adaptations of maize cultivars and adjustments of planting/harvest dates, both maize planting area and yield per unit of land will increase in most regions of NFR. This finding indicates that proactive adaptation can help local farmers to reap the benefits of increasing heat resource brought in by global warming, thus avoiding maize production losses as reported in other studies. This research can potentially contribute to the development of agricultural climate services to support climate-smart decisions for agricultural adaptations at the plot, farm and regional scales, in terms of planning the planting structure of multiple crops, breeding suitable maize varieties, and optimizing

planting and field management schedules.

链接:

<http://agri.ckcest.cn/file1/M00/00/E7/Csgk0V6HHWiAU3OsAB7KupCb19s734.pdf>

7 . Irrigated pinto bean crop stress and yield assessment using ground based low altitude remote sensing technology

文献源: Information Processing in Agriculture,2020

摘要: The pinto bean is one of widely consumed legume crop that constitutes over 42% of the U.S dry bean production. However, limited studies have been conducted in past to assess its quantitative and qualitative yield potentials. Emerging remote sensing technologies can help in such assessment. Therefore, this study evaluates the role of ground-based multi-spectral imagery derived vegetation indices (VIs) for irrigated the pinto bean stress and yield assessments. Studied were eight cultivars of the pinto bean grown under conventional and strip tillage treatments and irrigated at 52% and 100% of required evapotranspiration. Imagery data was acquired using a five-band multispectral imager at early, mid and late growth stages. Commonly used 25 broadband VIs were derived to capture crop stress traits and yield potential. Principal component analysis and Spearman's rank correlation tests were conducted to identify key VIs and their correlation (r_s) with abiotic stress at each growth stage. Transformed difference vegetation index, nonlinear vegetation index (NLI), modified NLI and infrared percentage vegetation index (IPVI) were consistent in accounting the stress response and crop yield at all growth stages ($r_s > 0.60$, coefficient of determination (R^2): 0.500.56, $P < 0.05$). Ten other VIs significantly accounted for crop stress at early and late stages. Overall, identified key VIs may be helpful to growers for precise crop management decision making and breeders for crop stress response and yield assessments.

链接:

http://agri.ckcest.cn/file1/M00/00/E7/Csgk0V6HA2-AMwz8ADq8-3P_rv4233.pdf

8 . A protocol of field-based phenotyping procedure for no-till wheat root system architecture based on data-driven model-assist

文献源: Artificial Intelligence in Agriculture,2020

摘要: Field-based phenotyping (FBP) of crop root system architecture (RSA) provides a way to quantify the root growth and distribution in field with a smaller scale. Studies on a better

understanding of the interrelations between field crop root physiological traits, root developmental phases and environmental changes are hindered due to deficiency of in situ root system architecture testing and quantitative methods for field crop. The present study aimed to propose a protocol for field-based wheat root system architecture with technical details of key operational procedures. Phenotyping of RSA traits from root spatial coordinate data acquisition and visualization software presented scaled illustrations of wheat RSA dynamics and root developmental phases which also revealed the root topological heterogeneities, either within a plant or among individuals. Percentage of horizontal and vertical soil coverage by root showed that root foraging capability along soil depth was better than within the horizontal dimension. In brief, our data indicated that FBP of wheat RSA could be achieved using the protocol of data-driven model-assisted phenotyping procedure. The proposed protocol was demonstrated useful for FBP of RSAs. It was proved effective to illustrate the topological structures of the wheat root system and to quantify RSA-derived parameters, this could be a useful tool for characterizing and analyzing the structural distortion, heterogeneous distribution and the soil space exploration characteristics of wheat root.

链接:

<http://agri.ckcest.cn/file1/M00/00/E7/Csgk0V6HStSAK-VeABYCRRNCpFk632.pdf>

【相关专利】

1 . 基于地表水文过程的农业洪涝灾害监测预报系统及方法

发布源: 国家知识产权局

发布时间: 2020-03-27

摘要: 本发明属于农业洪涝灾害监测预报技术领域,公开了一种基于地表水文过程的农业洪涝灾害监测预报系统及方法,所述农业洪涝灾害监测预报系统包括: 降雨量监测模块、水流速监测模块、遥感影像监测模块、环境数据监测模块、中央控制模块、灾害范围提取模块、灾害风险评估模块、数据采集模块、数据处理模块、警报模块、发布模块、数据存储模块、无线通信模块、终端模块、供电模块、显示模块。本发明通过灾害范围提取模块提取出水体覆盖的洪涝灾害范围;通过灾害风险评估能够有效提高变化环境下区域或流域洪涝灾害风险的评价速率,精确挖掘评价指标与洪涝灾害风险等级之间的内在联系,显著提高评价结果的可靠性与精确性,为防洪决策提供依据。

链接:

<http://agri.ckcest.cn/file1/M00/00/E7/Csgk0V6HTb2ASl1JACA0hm5gXOQ973.pdf>

【会议论文】

1. 运用北斗卫星导航系统的植保无人机发展现状研究

发布源：中科北斗汇(北京)科技有限公司会议论文集

发布时间：2020-05-23

摘要：北斗卫星导航技术可以应用于农业生产，增加农作物产量，降低种植培育资本、维护土壤环境，还可用于农机引导、农场规划、田间测图、土壤取样、作物田间监测、产量统计和预测系统等等。精细农业是一种现代化农业理念，许多发达国家，譬如美国、德国和日本早在上个世纪就开始研究精确农业技术。但是国内起步稍晚，随着北斗卫星导航系统的逐渐完善以及北斗卫星定位技术的不断提高，北斗卫星导航系统进入国内精细农业领域。将北斗卫星导航系统提供的无源定位服务应用到植保无人机上，植保无人机通过农业航空施药保障国家粮食安全和生态安全，有效的支持现代精细农业生产方式。植保无人机作业迅速高效，环保安全、节约药剂使用量，根据北斗卫星导航系统提供的精确定位服务保障了智能用药准确无误。本文研究了运用北斗卫星导航系统的植保无人机发展现状，以应用在玉米、水稻、棉花方面的植保无人机为例综述了目前阶段的研究状况。并结合目前植保无人机普及道路的阻碍和发展壁垒，展望了国内植保无人机改进的具体内容和未来发展方向。

链接：

<http://agri.ckcest.cn/file1/M00/00/E7/Csgk0V6HRZyANUMDAAgZ-IgYxE0828.pdf>

2. 北斗卫星系统在“一带一路”资源环境监测评估中的应用

发布源：中国卫星导航定位协会会议论文集

发布时间：2019-09-10

摘要：北斗导航卫星系统的快速发展,使其在“一带一路”倡议的实施中发挥着越来越大的作用。目前,北斗导航卫星系统除了在定位、导航、授时(PNT)等领域广泛应用外,也在大气环境监测、农业发展、智慧物流、防灾减灾等领域逐步融合发展,基于不同目标所研发的诸多新技术,为“一带一路”资源环境监测与评估的信息化、智能化提供了重要支撑。通过梳理北斗卫星在导航、定位及信息传输等方面的技术特点,凝练出了“BDS+”及物联网和SNLST在“一带一路”建设中的地位和作用。

链接：

<http://agri.ckcest.cn/file1/M00/00/E7/Csgk0V6HRJSAN6GtAAngSv92x9U557.pdf>

【科技图书】

1 . Remote Sensing of Vegetation

发布源: Springer

发布时间: 2019-07-17

摘要: How is the vegetation distribution influencing the erosion and surface formation in the different eco zones of Chile? To answer this question, it is mandatory to possess fundamental knowledge about plant species habitats, occurrence and their dynamics. In his study Christian Bödinger utilizes satellite imagery in combination with machine learning to derive maps of land use and land cover (LULC) in four study sites along a climatic gradient and to monitor vegetation using monthly Normalized Difference Vegetation Index (NDVI) time series. The findings contribute to a better understanding of climate impacts on Chilean vegetation and serve as a basis of landscape evolution models.

链接:

<http://agri.ckcest.cn/file1/M00/00/E7/Csgk0V6HGNaAS0ZjAAb-67EMlwE204.pdf>

【标准】

1 . 自走式农业机械导航系统作业性能要求及评价方法

发布源: 中国知网

发布时间: 2018-12-28

摘要: 本标准规定了自走式农业机械自动导航系统的术语和定义、作业性能要求、检测条件、检测流程、测试报告及性能评级。本标准给出了农机导航系统在不同速度、不同平整度及坡度地面上的直线路径跟踪性能评价指南。本标准适用于与自走式农业机械配套使用的农机导航系统(基于全球导航卫星定位技术)。

链接:

<http://agri.ckcest.cn/file1/M00/00/E7/Csgk0V6HQzqASgV3AAyYrJNBWJM103.pdf>

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