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《农业水土资源监控研究》专题快报

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【文献速递】

1．基于Google Earth Engine与机器学习的黄土梯田动态监测

文献源：浙江农林大学学报,2021-05-10

摘要：【目的】梯田是黄土高原最重要的水土保持措施和农业生产措施，高效、准确地获取长时间序列黄土梯田分布信息，对黄土高原的水土保持监测和评价十分重要。【方法】在Google Earth Engine（GEE）的支持下，以宁夏回族自治区固原市为研究区，使用遥感影像监督识别技术，对比随机森林（RF）、决策树（CART）、支持向量机（SVM）等3种机器学习算法的识别精度，并探讨LandTrendr算法在长时间序列动态监测中的优化应用，最终获取固原市近30 a梯田分布信息。【结果】（1）3种算法识别精度从大至小依次为随机森林、决策树、支持向量机。（2）使用随机森林算法识别梯田，基于样点检验总体精度达94.10%,Kappa系数达0.87，基于实地斑块检验总体精度达93.33%,Kappa系数达0.80。（3） LandTrendr算法能有效校正时间序列中的错误值。（4）1988-2019年，固原市梯田面积减少了45.90%。（5）固原市西部的梯田使用时间较东部更长。【结论】采用本研究方法在GEE云平台可以高效、准确地遥感监测长时序、大尺度的黄土梯田。固原市近30 a梯田农业比例逐渐下降，促进了生态环境持续向好发展。

链接:

http://agri.ckcest.cn/file1/M00/02/D6/Csgk0WCn6iuAfdkGAA9Fd3mCPyM477.pdf

2．地基雷达的微波面散射模型对比与土壤水分反演

文献源：遥感学报,2021-04-25

摘要：为了探究地基合成孔径雷达（c GBSAR）后向散射信号的时空变化规律和研究雷达土壤水分反演的影响因素,在内蒙古闪电河流域的昕元牧场站进行了地基雷达观测试验,本文结合以上观测试验的地基雷达数据进行波段、入射角度、极化通道3个雷达参数

以及地表粗糙度参数对雷达的后向散射系数影响的分析,然后利用以上分析结果选择地表微波面散射模型,最后利用选定的地表微波面散射模型构建人工神经网络数据集来反演地表土壤水分。结果表明:(1)在地基雷达视场内,各地表微波面散射模型的模拟结果与地基雷达实测的L波段全极化数据拟合效果最佳的是AIEM-Oh模型。(2)通过对20°—60°范围内的雷达入射角度的AIEM-Oh模型后向散射系数模拟的绝对残差分析发现,雷达入射角为25°、41°和53°时模拟结果最接近雷达实测值。(3)最后通过分析土壤水分反演结果发现,当雷达入射角度为41°时的土壤水分反演精度最高,相关系数R是0.8080,RMSE是0.0385 m3m3。本文的结论是雷达后向散射信号受到雷达入射角度和地表粗糙度相互作用的影响,因此通过考虑地表粗糙度来合理的选取雷达入射角能够提高土壤水分的反演精度。

链接:

http://agri.ckcest.cn/file1/M00/02/D6/Csgk0WCn9gCAL6Y2AB4sCxw0SX0999.pdf

3. 遥感土壤水分对蒸散发估算的影响

文献源:遥感学报,2021-04-25

摘要:地表实际蒸散发是联系陆表水循环、能量平衡和碳收支等物理过程的重要生态水文变量,同时也是目前水循环研究中的薄弱点,定量化土壤水分对蒸散发的胁迫作用是估算地表蒸散发的一个关键过程和难点。本研究基于2018年9月闪电河流域水循环与能量平衡遥感综合试验星—机—地联合观测数据,采用机载观测和卫星遥感反演土壤水分输入到ETMonitor模型估算地表实际蒸散发,在时间和空间两个维度上评估不同土壤水分产品对蒸散发估算的影响。从时间变化上来说,与地面观测蒸散发时间序列相比,基于ESA CCI (European SpaceAgency Climate Change Initiative)融合土壤水分产品、SMAP (Soil Moisture Active and Passive)土壤水分产品和国产风云三号气象卫星(FY-3C)土壤水分产品估算的蒸散发最接近地面站点观测蒸散发,而基于ASCAT (TheAdvanced Scatterometer)和SMOS (Soil Moisture Ocean Salinity)土壤水分估算蒸散发分别明显的高于和低于地面观测蒸散发。从空间分布上来说,利用卫星反演土壤水分估算的蒸散发与基于机载观测土壤水分估算蒸散发具有一致的空间分布,能较好地反映该区域地表蒸散的空间分布格局,其中基于SMAP和SMOS土壤水分估算蒸散发与基于机载观测土壤水分估算蒸散发空间一致性最好。本研究评估遥感反演土壤水分对蒸散发影响,对区域及全球遥感蒸散发估算和土壤水分产品评估具有一定的指导意义。

链接:

http://agri.ckcest.cn/file1/M00/02/D6/Csgk0WCn9LOAYzlMACLdfdEWUbg772.pdf

4．剔除土壤背景的冬小麦根域土壤含水率遥感反演方法

文献源：农业机械学报,2021-04-25

摘要：为剔除无人机多光谱图像中的土壤背景、提高作物根域土壤含水率反演精度,以不同水分处理的拔节期冬小麦为研究对象,利用无人机多光谱相机分别在09:00、11:00、13:00、15:00和17:00等5个时刻获取高分辨率多光谱图像,采用改进的植被指数阈值法快速确定植被像元与土壤像元的分类阈值,通过阈值划分剔除土壤背景,并根据阈值变化研究土壤背景对冬小麦冠层反射率的影响,建立了剔除土壤背景前后基于植被指数的土壤含水率反演模型。结果表明,应用改进的植被指数阈值法可有效剔除多光谱图像中的土壤背景,其中基于植被指数RDVI的剔除精度最高,总体精度在91.32%以上;土壤背景对冬小麦冠层近红外波段的反射率影响较大,红边波段次之,而对可见光波段的反射率影响较小;剔除土壤背景前后的植被指数与土壤含水率均呈线性关系,剔除土壤背景对反演土壤含水率的精度有显著提高,其中NGRDI反演深度10～20 cm的冬小麦根域土壤含水率效果最好,建模集R2和RMSE分别为0.739和2.0%,验证集R2和RMSE分别为0.787和2.1%。

链接:

http://agri.ckcest.cn/file1/M00/02/D6/Csgk0WCn8xaAXjOFABT4dG98pQ4291.pdf

5．AMSR-E土壤水分产品评价及在干旱监测中的应用

文献源：干旱区研究,2021-04-14

摘要：土壤水分在地表能量交换和气候变化中有重要作用。干旱为常见的自然灾害，土壤水分是反映干旱最直观的指标，利用微波遥感监测地表土壤水分具有明显优势，微波土壤水分产品也在干旱监测中具有重要作用，但由于地表下垫面的差异和反演算法的精度，使土壤水分产品的应用受到了限制，因此，本研究对广泛使用的AMSR-E （Advanced Microwave Scanning Radiometer-Earth Observing System）土壤水分产品在中国范围内的精度及在干旱监测中的作用进行评价。结果表明：AMSR-E能较好的反映站点不同深度的土壤水分情况，大多数站点存在极显著相关关系，但20 cm相关性低于10 cm，且高相关系数区域明显缩小；下垫面为白地的农试站观测的土壤水分和AMSR-E土壤水分产品之间的相关性显著高于种植作物下的农田区这2种数据的相关性；对于大多数下垫面类型，站点土壤水分和AMSR-E土壤水分之间存在明显的正相关关系，且达到极显著相关，对10 cm土壤水分观测，相关性最好的是种植高粱下观测的土壤水分，相关性达到了0.579，对20 cm土壤水分观测，相关性最好的是棉花下观测的土壤水分，相关性达到0.528。春季、夏季和秋季的相关性较高，而冬季相关性略低；在种植作物的情况下，东北、华南和西北地区，站点和AMSR-E土壤水分观测相关性较好，仅考虑白地的情况下，西北、西南和华中区域，这两种数据的相关性更高些；AMSR-E较农试站土壤水分

取值范围宽，但不同区域AMSR-E土壤水分取值峰值不同，华北区域2种土壤水分观测分布和波动较为一致；AMSR-E基本能反映北方干旱和南方多雨引起的土壤水分差异趋势；大多数站点和大多数作物类型下，10 cm站点土壤水分和AMSR-E土壤水分相关性较好的情况下，20 cm也会有这样的表现。其次，AMSR-E土壤水分产品提取的土壤水分距平百分率，和同期的降水距平百分率之间的相关性较好，尤其在西北地区和北方大部分区域更明显，AMSR-E土壤水分产品能较好的反映降水的波动，和干旱的发生状况。

链接:

http://agri.ckcest.cn/file1/M00/02/D6/Csgk0WCn6vqATWoNABD1kbG8mYM174.pdf

6．遥感干旱指数在洛川苹果干旱监测中的适用性分析

文献源：遥感技术与应用,2021-02-05

摘要：目前对苹果干旱研究较少且主要运用站点数据,对空间信息表征有限,遥感干旱指数可用于大范围干旱时空动态监测,但在苹果干旱监测中的适用性还有待研究。基于2014～2018年MODIS反射率、地表温度以及地表覆被数据,结合土壤湿度数据和野外调查资料,分析洛川苹果区温度植被干旱指数（TVDI）、归一化植被水分指数（NDWI）、植被供水指数（VSWI）与10 cm深度土壤湿度（SM）的一致性,探索遥感干旱指标对土壤干湿状况表征能力,并进一步研究遥感干旱指标对干旱响应敏感时段。结果表明:（1）由增强型植被指数（EVI）计算的VSWI与SM的时空一致性最好,其在2014、2017年表现出的干旱特征与实际旱情相符;（2）VSWI（EVI）和TVDI（EVI）与SM的相关性分别高于VSWI（NDVI）和TVDI（NDVI）与SM的相关性,使用EVI能提高VSWI和TVDI对干旱的表征能力;（3）TVDI、NDWI、VSWI对SM存在不同时间的反应滞后,滞后3时相（24 d）的VSWI（EVI）与SM的相关性最高,而NDWI对SM滞后时间短,对干旱响应较及时,结合VSWI（EVI）和NDWI可能更有利于监测苹果干旱;（4）在不同苹果生育期,遥感指标对土壤湿度敏感性不同,VSWI在不同生育期敏感性差异最明显:新梢旺长期（5、6月）对土壤湿度敏感性高于萌芽开花期、果实膨大期、成熟期;该结果符合洛川县苹果不同生育期需水规律和洛川降水、干旱发生特征。研究结果可为遥感监测苹果干旱提供参考依据。

链接:

http://agri.ckcest.cn/file1/M00/02/D6/Csgk0WCn7iCAQaNPAB6CvgvVAdg269.pdf

7．基于Landsat-8影像的干旱区土壤水分含量反演研究

文献源：土壤通报,2021-02-05

摘要：土壤水分含量的精确监测对区域生态环境保护与可持续发展具有重要意义。本文以内蒙西部额济纳旗东南的居延泽地区为研究区,基于多期Landsat-8遥感影像和野外实

测不同深度的土壤水分含量数据,构建了温度植被干旱指数(TVDI)、垂直干旱指数(PDI)、归一化干旱监测指数（NPDI）和土壤湿度监测指数（SMMI）等四种干旱指数模型,探讨了上述模型在居延泽地区土壤水分含量反演中的精度与适用性,选取精度较优的TVDI模型反演了研究区2015年至2017年的土壤水分含量,并使用随机森林分类法将研究区分为沙地、盐碱地、裸地、植被和滩涂五种地类,探讨了不同地类的土壤水分含量差异。结果表明四种干旱指数均与土壤水分含量实测值呈负相关;从拟合精度看,四种干旱指数均与表层土壤水分含量具有最高的拟合精度,且随着土层深度的增加,拟合精度逐渐变劣。其中TVDI综合表现最优,尤其在表层,R2可达到0.76;研究区不同地类的土壤水分含量存在差异,呈现出从沙地、盐碱地、裸地、植被到滩涂依次升高的规律。

链接:

http://agri.ckcest.cn/file1/M00/02/D6/Csgk0WCn78eASrgFAdzzCFXKPvw569.pdf

【会议论文】

1．Design of Soil Humidity Monitoring System Using the Internet of Things Concept and MQTT

发布源：IEEE

发布时间：2021-04-27

摘要：Agriculture has been a relevant field that attracted attention in recent years caused by the growing population, which has raised the problem of food sufficiency. Therefore, one of the solutions that this study offered is to improve production results through innovations by performing an automatic plantation's watering process that can be monitored remotely. The purpose of this study is to help farmers to be able to control the condition of the soil moisture, together with the automatic watering process. The hardware used in this research is the NodeMCU Board with Wi-Fi ESP-32, Relay, and Moisture Sensors. This research applied the concept of the Internet of Things (IoT), where each sensor module was assembled to be an object that has been programmed to carry out its tasks. A fuzzy-based module was developed to regulate the pump control, measure soil moisture, and control the water pump machine. Furthermore, each object was given its own identity to facilitate the communication process of every object. This process was connecting each object through the internet network by applying a lightweight communication protocol, the MQTT protocol. The data from sensors that represented the condition of each object were displayed on a graph in real-time. There were also tables of data that can be printed into a document file. This research was able to assist farmers in the process of watering their plants. Therefore, the harvesting process had increased, with only a little maintenance cost.

链接:

http://agri.ckcest.cn/file1/M00/02/D6/Csgk0WCn5TuAfHoKABKGlCMeF5c125.pdf

2．IoT Based Real Time Soil Nutrients Detection

发布源：IEEE

发布时间：2021-04-09

摘 要： This paper is about the proposed portable, real time, cloud-based soil nutrient detection framework. Soil nutrients and parameters such as temperature, humidity, pH values are seized by our proposed setup and can be made available anywhere in the world with valid cloud channel verification credentials. For proposed framework, Soil analysis is performed with RGB color sensor and soil doctor plus kit. For demonstration of proposed cloud based, real-time soil analysis, we have collected Soil samples from various farms near Pune city (India). An important contribution of the proposed work is that farmers can get real-time soil parameter analysis at their fingertips, hence our work can be named as a “Soil Doctor kit”. The proposed method is able to communicate all real time soil parameters such as pH, Nutrients, temperature values anywhere in the world. Hence proposed cloud-based soil analysis setup can be used by farmers for adding deficient soil nutrients and increasing crop yield, without waiting for results from testing Labs.

链接:

http://agri.ckcest.cn/file1/M00/02/D6/Csgk0WCn5yOAbnWGAAXUghDxJkk389.pdf

3．Agriculture monitoring and prediction using Internet of Things (IoT)

发布源：IEEE

发布时间：2021-01-15

摘要：Agriculture has become the most significant growing sector all over the world because of increasing the population. The main challenge in the agriculture industry is to improving farming efficiency and quality without constant physical monitoring to full fill the speedily increasing demand for the food. Apart from the mounting population, the climate circumstance is also a huge challenge in the agricultural industry. The aim of this research paper is to propose a smart farming model based on the Internet of Things using the clustering to deal with the adverse condition. in this model, we use the different types of the sensors like soil moisture, air pressure, rain detection and humidity sensors for a different purpose. The data will collect on the cloud and calculated automatically. The smart

agriculture can be adopted from the crop control, collection of useful data, and analysis automatically. The purpose of this paper is how the implement the Internet of Things (IoT) in the monitoring of humidity, soil condition, temperature, and supply water to the field, level of water, climate condition. The IoT based Smart Farming System being planned via this report is integrated with different Sensors and a Wi-Fi module producing live data feed that can be obtained online.

链接:

http://agri.ckcest.cn/file1/M00/02/D6/Csgk0WCn4RaAMyaGAAdby0Btg6s567.pdf

4．Automatic Monitoring and Control System in Aeroponic Plant Agriculture

发布源：IEEE

发布时间：2020-12-04

摘 要： This paper describes the implementation of an automatic control system for aeroponics. This system contains a lattepanda as the main processing unit and an adjustable interface to suit the needs of the cultivated plant. It gets input from temperature sensors, light sensors and humidity sensors and displays the output on the LCD screen module. The system results are simulated with the help of simulation software. And then the evaluation of the experimental results of the control system applied to aeroponics is based on environmental factors. The proposed lecture grows on an aeroponic device. The green plant was chosen to build an automatic control system in aeroponics. The results show that the system can be more efficient in saving labour and increasing the economic value of the product.

链接:

http://agri.ckcest.cn/file1/M00/02/D6/Csgk0WCn5E2AZ9VnAAWBn3S8eEI571.pdf

5．Monitoring of Soil Parameters and Controlling of Soil Moisture through IoT based Smart Agriculture

发布源：IEEE

发布时间：2020-11-04

摘要：Agriculture plays a vital role in the economical growth and development of any nation. Changing climatic condition have badly affected the production of agriculture products. Therefore, to improve the quality and quantity of agriculture products, many new technologies are being developed to practice smart agriculture which can adapt to the

changing climatic condition. In this paper, one such method is proposed. The developed method is a new and simple internet of thing based approach to practice smart agriculture. In this proposed approach, a hardware and software setup is used to monitor important soil parameters from a remote location and automatic control of soil moisture content. The proposed approach helps in remote monitoring and water conservation process.

链接:

http://agri.ckcest.cn/file1/M00/02/D6/Csgk0WCn40OAeAx0AAyavQTnIYw462.pdf

6. Real-Time Monitoring of Agricultural Land with Crop Prediction and Animal Intrusion Prevention using Internet of Things and Machine Learning at Edge

发布源：IEEE

发布时间：2020-09-16

摘要：Agriculture is considered as a foundation of life, since it is the primary source of food and other raw materials. It plays a crucial part in the country's economic development. Sadly, many of our farmers cultivate their land using the conventional methods. we should replace these obsolete techniques of farming with advanced techniques. The proposed system describes how the use of the IOT and ML techniques can be combined to make the irrigation smart. The proposed system saves time avoiding problems like constant vigilance over the field by using IOT devices, crop prediction helps the farmers to grow suitable crops depending on the soil parameters by the use of machine learning techniques and it also helps in prevention of the intruders like wild animals into the field. It also helps in water conservation by supplying the plants / field with minimal amount of water automatically through the help of sensors depending on the water requirements. and finally, SMS and Email notifications will be sent to the farmer mobile phone during the abnormal conditions of his farm. The proposed system can be used for taking edge decisions in real time.

链接:

http://agri.ckcest.cn/file1/M00/02/D6/Csgk0WCn4BKAWzOyAAtNICU1p9k051.pdf

7. Proficient Smart Soil based IoT System for Crop Prediction

发布源：IEEE

发布时间：2020-09-01

摘要：IoT plays a vital role in everyday life of a human being. It is almost used in every domains. Every year crops growth is reduced due to lack of climatic conditions and

inadequate of nutrients supports. Soil fertility is the most important factor to be considered while growing a crop. The measurement of Soil nutrients is required for a better plant growth. All soils are not suitable for all types of crops. In this work, the proposed mechanism is to effectively predict the crop which is suitable to that soil. Conventional soli testing process uses chemicals to test the soil fertility and it is a time taken process. This issue has been resolved by proposing a mechanism that monitors by taking all the parameters into account that can predict the crop by depending upon the pH, moisture, temperature and humidity values. The main objective of this work is that it produces accurate and reliable results and also cost-effective when compared to other existing mechanisms. It helps the farmer to analyze the fertility of their field and plant the better crop to increase their productivity and profit.

链接:

http://agri.ckcest.cn/file1/M00/02/D6/Csgk0WCn5k2AWq2YABVUaiFKVb0931.pdf

【相关专利】

1．一种土壤环境质量分区方法及系统

发布源：国家知识产权局

发布时间：2021-05-11

摘要：本发明提供一种土壤环境质量分区方法及系统,该方法包括：基于主成分分析法提取目标区域中监测点的土壤环境质量综合特征；采用地理探测器,筛选出土壤环境质量主要影响指标；建立系列初始化预分类方案,以贝叶斯信息准则确定最佳预分类方案；以最佳预分类方案构建高斯混合模型,通过EM算法对高斯混合模型中表示样点类别的隐变量参数进行估算,得到监测点的初始分类；基于监测点相应泰森多边形获得初始分区,并结合目标区域的自然边界信息,对目标区域进行最终分区。本发明以监测点的土壤环境质量综合特征为基础,构建了基于EM算法的高斯混合模型,实现了基于高维属性特征的土壤环境质量的综合分区。

链接:

http://agri.ckcest.cn/file1/M00/02/D6/Csgk0WCn_GuAS6_NABuik4gme8s171.pdf

2．一种多星数据融合的GNSS-IR土壤湿度监测方法

发布源：国家知识产权局

发布时间：2021-05-11

摘要：本发明公开了一种多星数据融合的GNSS-IR土壤湿度监测方法,涉及土壤监测领域,

包括S1选取土壤湿度采样点,获取土壤湿度采样点的GNSS观测数据；S2确定观测时段内过境卫星的高度角和信噪比；S3拟合每颗过境卫星观测时段内高度角和信噪比数据,获取反射信号；S4确定每颗过境卫星反射信号的相位分量；S5建立GNSS-IR土壤湿度反演模型,实现土壤湿度的动态监测；通过对GNSS接收机观测数据预处理,获取GNSS反射信号,利用Lomb-Scargle频谱分析获取反射信号频率,将其转换为有效反射高代入非线性最小二乘余弦拟合以提取相位,最后将多星相位数据与土壤湿度实测数据建立MARS模型以反演土壤湿度。

链接:

http://agri.ckcest.cn/file1/M00/02/D6/Csgk0WCn-2eAS93sAAmiR8BSjms114.pdf

3．一种农业监测装置

发布源：国家知识产权局

发布时间：2021-05-04

摘要：本实用新型提供一种农业监测装置,所述装置包括：全景摄像机、球机和电脑。全景摄像机用于360度全景拍摄监控,获得拍摄监控数据；球机,与所述全景摄像机连接,用于根据联动信号调节所述全景摄像机；电脑,分别与所述全景摄像机和所述球机连接,用于接收所述拍摄监控数据,并将所述拍摄监控数据进行显示；还用于发出联动信号。本实用新型实现了360度全方位全景监测的同时还能通过球机调节所述全景摄像机,降低了监测成本。

链接:

http://agri.ckcest.cn/file1/M00/02/D6/Csgk0WCn_cqAeQ4mAAU0tOfTpZk658.pdf

4．一种利用宇宙射线缪子监测土壤含水量的方法

发布源：国家知识产权局

发布时间：2021-04-23

摘要：本发明公开了一种利用宇宙射线缪子监测土壤含水量的方法,具体包括：建立土壤水分分布模型；采用蒙特卡洛模拟软件模拟宇宙射线缪子在土壤中的输运过程,得到不同土壤含水量情况下地下主探测器计数的理论值；建立土壤含水量与地下主探测器计数的对应关系；将副探测器置于土壤表面上作为参考探测器,用于监测地表的缪子通量；处理主探测器、副探测器的实测数据,利用建立好的土壤含水量与地下主探测器计数的对应关系反演出土壤水含量。本发明的有益效果是,解决了宇宙射线快中子法测量土壤含水量时的受地表环境影响大和测量深度浅的不足,减弱了地表环境对土壤含水量测量的影响,增加了对土壤水分的探测深度。

链接:

http://agri.ckcest.cn/file1/M00/02/D6/Csgk0WCn_r6Aa1HSAAZDPs1gx6s194.pdf

【专业会议】

1．2021 International Conference on Computer, Remote Sensing and Aerospace（CRSA 2021）

发布源：AEIC

发布时间：2021-05-21

摘要：This conference mainly focuses on the latest research on "information science" and "artificial intelligence", and aims to gather experts, scholars, researchers and related practitioners in this field from all over the world to share research results, explore hot issues, and exchange new ideas, experience and technology. We warmly welcome experts and scholars in related fields to submit their new research or technical contributions to CRSA 2021, and share valuable experiences with scientists and scholars from all over the world!

链接:

http://agri.ckcest.cn/file1/M00/02/D6/Csgk0WCn9rWAaqcJAA2jmD-zv00868.pdf

2．The 6th Int'l Conference on Remote Sensing Technologies and Applications (ICRSTA 2021)

发布源：学术会议云

发布时间：2021-05-20

摘要：The 6th Int'l Conference on Remote Sensing Technologies and Applications (ICRSTA 2021) will be held from July 16-18, 2021 in Kunming, China. The conference will cover issues on Automated feature extraction, Classification and Data Mining Techniques, GIS / Earth Monitoring and Mapping, Global change studies, Global Positioning and Navigation Systems, Hazard monitoring, Image Processing Techniques, etc. It dedicates to creating a stage for exchanging the latest research results and sharing the advanced research methods in related fields.

链接:

http://agri.ckcest.cn/file1/M00/02/D6/Csgk0WCn-l6ALExMABWCvzBDVCs163.pdf

3．2021 4th International Forum on Geoscience and Geodesy (IFGG 2021)

发布源：AEIC

发布时间：2021-05-20

摘要：2021 4th International Forum on Geoscience and Geodesy (IFGG 2021) will be held on October 15-17, 2021 in Chengdu, China. IFGG 2021 is to bring together innovative academics and industrial experts in the field of geoscience and geodesy to a common forum. The primary goal of the symposium is to promote research and developmental activities in geoscience and geodesy, and another goal is to promote scientific information interchange between researchers, developers, engineers, students, and practitioners working all around the world. An ideal platform for seeking global partners had been established. We sincerely invited you to attend the symposium to share views and experiences in geoscience, geodesy and related areas.

链接:

http://agri.ckcest.cn/file1/M00/02/D6/Csgk0WCn9_aAKO75ABZt50_vW5o877.pdf

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