PROCEEDINGS OF SPIE

Remote Sensing for Agriculture, Ecosystems, and Hydrology XXIII

Christopher M. U. Neale Antonino Maltese Editors

13-17 September 2021 Online Only, Spain

Sponsored by SPIE

Cooperating Organisations
European Optical Society
EARSeL—European Association of Remote Sensing Laboratories (Germany)
ISPRS—International Society for Photogrammetry and Remote Sensing
CENSIS (United Kingdom)
SEDOPTICA

INEUSTAR/INDUCIENCIA (Supporting Organisation)

Published by SPIE

Volume 11856

The papers in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. Additional papers and presentation recordings may be available online in the SPIE Digital Library at SPIEDigitalLibrary.org.

The papers reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from these proceedings:

Author(s), "Title of Paper," in Remote Sensing for Agriculture, Ecosystems, and Hydrology XXIII, edited by Christopher M. Neale, Antonino Maltese, Proc. of SPIE 11856, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510645561

ISBN: 9781510645578 (electronic)

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA Telephone +1 360 676 3290 (Pacific Time)

SPIE.org

Copyright © 2021 Society of Photo-Optical Instrumentation Engineers (SPIE).

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of fees. To obtain permission to use and share articles in this volume, visit Copyright Clearance Center at copyright.com. Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher.

Printed in the United States of America by Curran Associates, Inc., under license from SPIE.

Publication of record for individual papers is online in the SPIE Digital Library.



Paper Numbering: A unique citation identifier (CID) number is assigned to each article in the Proceedings of SPIE at the time of publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online and print versions of the publication. SPIE uses a seven-digit CID article numbering system structured as follows:

- The first five digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc. The CID Number appears on each page of the manuscript.

Contents

	AGRICULTURE: BIG DATA AND POLICY
11856 03	MORERA: latest Earth observation system to translate big data to agriculture [11856-1]
11856 04	Supporting the common agricultural policy with Sentinel-2 data and deep recurrent networks [11856-2]
	MAPPING WITH SENTINEL-2
11856 06	Land cover mapping at national scale with Sentinel-2 and LUCAS: a case study in Portugal [11856-5]
11856 07	A case of study of land surface phenology for CAP management: using Sentinel-2 data to obtain phenometrics for winter cereals in Andalusia, Spain [11856-6]
11856 08	Characterising the spring and autumn land surface phenology of Macaronesian species using Sentinel-2 data: the case of Canary Island [11856-7]
	NITROGEN, CHLOROPHYLL, AND CHG MONITORING
11856 09	Estimation of chlorophyll content in radish leaves using hyperspectral remote sensing data and machine learning algorithms [11856-8]
	ADVANCES IN INTERPRETATION AND MAPPING
11856 OE	Deep learning for sub-pixel palm tree classification using spaceborne Sentinel-2 imagery [11856-14]
11856 OF	Google Earth Engine for land surface albedo estimation: comparison among different algorithms [11856-16]
11856 0G	On the sensitivity of snow bidirectional reflectance to variations in grain characteristics [11856-17]
	ENERGY BALANCE AND EVAPOTRANSPIRATION
11856 OH	Comparative analysis of evapotranspiration using the SEBAL model and the evaporimeter pan method in the Huancane basin of Puno, Peru [11856-18]

11856 OI	Remote sensing and GIS based approaches to estimate evapotranspiration in the arid and semi-arid regions [11856-19]
11856 OK	Development of GIS models via optical programming and python scripts to implement four empirical methods of reference and actual evapotranspiration (ETo, ETa) incorporating MODIS LST inputs [11856-21]
	VEGETATION MONITORING AND MAPPING
11856 OL	Multi-sensor data acquisition for assessing the condition of vegetation [11856-23]
11856 OM	Satellite imagery and climate variables suggest variations in the phenology of olive groves in Southern Spain [11856-24]
11856 ON	Use of satellite remote sensing and climate data to predict the potential habitat distribution of Prosopis cineraria in the UAE [11856-25]
11856 OR	Recurrence techniques for the analysis of vegetation indices and climate anomalies: a study case in semiarid grasslands [11856-29]
	YIELD RETRIEVAL AND WATER PRODUCTIVITY
11856 OS	Estimation of olive groves cover crops net primary productivity using remote sensing data [11856-32]
	WATER MONITORING APPLICATIONS
11856 OU	Evaluating the effects of distinct water saturation states on the light penetration depths of sand-textured soils [11856-34]
11856 OV	Improving water bodies detection from Sentinel-1 in South Africa using drainage and terrain data [11856-35]
11856 OW	Coupling physically-based modeling and deep learning for long-term global freshwater availability monitoring and prediction [11856-36]
	UAV AND AIRBORNE SENSING
11856 0X	Estimation of leaf area index at the late growth stage of crops using unmanned aerial vehicle
	hyperspectral images [11856-54]

11856 OZ	Application of UAV and spectrometric survey results to determine agrochemical parameters of zonal soils used in agriculture (East of European Russia) [11856-39]
11856 10	Using radiative transfer models for mapping soil moisture content under grassland with UAS-borne hyperspectral data [11856-41]
	CLIMATE, DROUGHT, AND SOIL WATER CONTENT
11856 11	Analysis of agronomic drought context based on satellite remote sensing over Western Mediterranean region [11856-42]
11856 12	ALOS-2 and Sentinel-1 use for retrieving soil moisture over cereal fields in semi-arid area: the Kairouan plain – central Tunisia [11856-43]
11856 13	Root-zone soil moisture from process-based and remote sensing features in ANN [11856-44]
11856 14	Detecting changes in vegetation and climate that serve as early warning signal on land degradation using remote sensing: a review [11856-45]
	POSTER SESSION
11856 15	Monitoring crop coefficient values with Sentinel-2 images to minimize irrigation water losses [11856-22]
11856 16	Estimation of holm oak flowering intensity in dehesa farms using high-resolution aerial images [11856-40]
11856 19	Unauthorized landfills of solid household and industrial wastes detection in the Arctic and subarctic territories using remote sensing technologies [11856-49]
11856 1A	Spectral signature profiles of winter wheat in different growth stages under various environmental conditions [11856-51]
11856 1C	Reflectance composites from multispectral satellite imagery for crop monitoring [11856-53]
11000 10	g.,