PROCEEDINGS OF SPIE

Remote Sensing for Agriculture, Ecosystems, and Hydrology XXV

Christopher M. Neale
Antonino Maltese
Editors

3–6 September 2023
Amsterdam, Netherlands

Sponsored by
SPIE

Cooperating Organisations
Cranfield University (United Kingdom)

Published by
SPIE

Volume 12727

Proceedings of SPIE 0277-786X, V. 12727

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

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 XXV*, edited by Christopher M. Neale, Antonino Maltese, Proc. of SPIE 12727, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X
ISSN: 1996-756X (electronic)

ISBN: 9781510666832
ISBN: 9781510666849 (electronic)

Published by
SPIE
P.O. Box 10, Bellingham, Washington 98227-0010 USA
Telephone +1 360 676 3290 (Pacific Time)
SPIE.org
Copyright © 2023 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.

SPIE. DIGITAL LIBRARY
SPIEDigitalLibrary.org

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

vii *Conference Committee*
ix *Introduction*

MACHINE LEARNING AND DEEP LEARNING I

12727 02 **Multisensor data fusion for automatized insect monitoring (KInsecta)** [12727-1]

12727 03 **ConvLSTM-based drought prediction using vegetation health index (VHI)** [12727-2]

12727 04 **Comparison of deep learning-based models for forecasting precipitation using era-5 and radar images** [12727-3]

12727 05 **Generating mustard crop maps using planet scope high resolution dataset by applying machine learning algorithms** [12727-50]

SURFACE, COASTAL, AND GROUND WATER

12727 06 **Remote sensing data upon application of methodology for defining the adjoining lands and flooding river stripes in Bulgaria** [12727-6]

12727 09 **Neyman-Pearson detection of ground water and nonwater sites using Sentinel-1 SAR data** [12727-9]

12727 0A **Country-wide flood monitoring service: methods, applications, and functionalities** [12727-10]

12727 0B **A radiometric contouring approach to map the shoreline** [12727-11]

FOREST MAPPING AND MONITORING I

12727 0C **Mapping forest microclimates using Sentinel 1 radar data: insights and complementarity with LiDAR and optical data** [12727-12]

12727 0E **Assessing the vulnerability of Western Himalayan ecosystem to climate change using machine learning algorithms** [12727-15]

FOREST MAPPING AND MONITORING II

12727 0H **Automatic extraction of former WWI battlefields from ancient maps** [12727-18]

AGRICULTURAL VEGETATION

12727 0J **Insights into entangled variations in the red edge position and red to far-red ratios of soybean leaves** [12727-20]

12727 0L **Potential of optical and radar satellite observations to estimate rice biophysical variables and rice yield estimation** [12727-22]

12727 0M **Towards optimising the derivation of phenological phases of different crop types over Germany using optical high resolution image time series** [12727-23]

12727 0N **The dynamics of rice biophysical variables in irrigated and non-irrigated systems during the growing season** [12727-24]

12727 0O **Mapping rice paddy fields in semiarid northeastern Thailand using Sentinel-1 and -2 time series data and phenological clustering** [12727-25]

MACHINE LEARNING AND DEEP LEARNING II

12727 0Q **Feasibility analysis of using Sentinel-1 images to phenologically differentiate the areas of soybean seed and sub-irrigated bean planting in the period of sanitary void in the tropical floodplains of the Formoso River basin, Tocantins, Brazil** [12727-27]

12727 0R **Texture descriptors and machine learning algorithms for mistletoe detection in urban forests using multispectral imagery** [12727-28]

WILDFIRE MONITORING

12727 0S **Evaluation of orbit results on wildfire detection using a broad single-channel microbolometer sensor sensitive in the thermal infrared** [12727-30]

HYPERSPECTRAL, HIGH SPATIAL RESOLUTION

12727 0U **Adequacy of Mediterranean forest simulations from DART radiative transfer model and UAV laser scanning data to hyperspectral images** [12727-35]

12727 0V **Foliar spectral responses of sugarcane and maize: how comparable are they?** [12727-38]

ENERGY BALANCE, EVAPOTRANSPIRATION

12727 0W **Association of catchment characteristics to Budyko hydrologic model's uncertainty in humid catchments (Best Student Paper Award)** [12727-39]

12727 0X **Regional daily evapotranspiration estimation using remote sensing data and atmospheric-land exchange inverse energy model in Brazil** [12727-41]

12727 0Y **The feasibility of combining the two-source energy balance (TSEB) model with object-based approaches to estimate surface heat fluxes** [12727-42]

12727 0Z **Remote sensing-based evapotranspiration modeling for several land uses using SETMI model for Nebraska** [12727-43]

12727 10 **Evaluation of the SEBAL and SAFER models in the estimation of the actual evapotranspiration and crop coefficients of sugarcane in Colombia** [12727-44]

MODELLING, MACHINE LEARNING, AND DEEP LEARNING

12727 11 **Deep-learning-based image super-resolution for enhanced root hair visualization and root traits analysis** [12727-47]

UAV, LIDAR, AND SMART SOLUTIONS FOR FARMING

12727 15 **Grassland vegetation parameters estimation using UAV hyperspectral data** [12727-52]

12727 17 **Evaluation of the performance of DIAL system for the determination of ethylene concentration in an agricultural area** [12727-54]

12727 18 **TEBAKA: a technological platform for Apulian crop monitoring** [12727-55]

ENVIRONMENTAL REMOTE SENSING

12727 1A **Joint estimation of LSA SAF vegetation parameters with multi-task Gaussian processes** [12727-57]

12727 1C **Application of remote sensing for monitoring restoration measures in habitats under Natura 2000: a case study for Bulgaria** [12727-59]

POSTER SESSION

12727 1F **Infrared imaging for proximal and remote detection of soil-borne diseases on wild rocket** [12727-61]

12727 1G **Using Sentinel-1 data for soybean harvest detection in Vojvodina province, Serbia** [12727-62]

12727 1H **Assessment of elevation and slope exposure impact on snow cover distribution in the mountainous region in Bulgaria using Sentinel-2 satellite data** [12727-63]

12727 1I **Application of optical data from Sentinel-2-MSI for snow cover monitoring on the territory of the mountainous region of Bulgaria** [12727-64]

12727 1J **Satellite and drone multi-spectral and thermal images data fusion for intelligent agriculture monitoring and decision making support** [12727-65]

12727 1K **Drone multispectral and thermal images data processing for intelligent agriculture support** [12727-66]

12727 1L **Coupling multiscale remote and proximal sensors for the estimation of crop water requirements** [12727-68]

12727 1M **Design and development of an innovative online modular device for both water and wastewater monitoring** [12727-72]

12727 1O **Monitoring and spatial-temporal analysis of Stryama river flood event, Karlovo municipality, Bulgaria, occurred on 02.09.2022 by the methods of remote sensing** [12727-74]

12727 1Q **Development of drone acquisition imagery and AI-based field crop status and growth prediction model** [12727-76]