

PROCEEDINGS OF SPIE

Remote Sensing for Agriculture, Ecosystems, and Hydrology XXIV

**Christopher M. U. Neale
Antonino Maltese**
Editors

**5–7 September 2022
Berlin, Germany**

Sponsored by
SPIE

Cooperating Organisations
Cranfield University (United Kingdom)
OpTecBB (Germany)
International Society for Photogrammetry and Remote Sensing
European Association of Remote Sensing Companies

Published by
SPIE

Volume 12262

Proceedings of SPIE 0277-786X, V. 12262

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 SPIDigitalLibrary.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 XXIV*, edited by Christopher M. U. Neale, Antonino Maltese, Proc. of SPIE 12262, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

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

ISBN: 9781510655270
ISBN: 9781510655287 (electronic)

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA

Telephone +1 360 676 3290 (Pacific Time)

SPIE.org

Copyright © 2022 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**

SPIDigitalLibrary.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*

UAV

12262 05 **Design of an active laser-induced fluorescence observation system from unmanned aerial vehicles for artificial seed-like structures** [12262-4]

PRECISION FARMING AND SMART SOLUTIONS FOR FARMERS

12262 06 **Visually assessing maize leaves: from spectral sampling to high-fidelity color reproduction** [12262-6]

12262 07 **Chromatic and numerical approaches for the monitoring of corn plants under moderate water stress** [12262-5]

12262 08 **Evaluation of PhenoCam phenology of barley** [12262-7]

FOREST AND AGRICULTURAL PRODUCTIVITY

12262 0C **Spatiotemporal dynamics of forest productivity in Western Himalayan region** [12262-10]

CONVOLUTIONAL NEURAL NETWORK AND DECISION TREES

12262 0G **Characterizing agri-forestry systems in Portugal through high-resolution orthophotos and convolutional neural networks** [12262-14]

12262 0J **Predicting the variability of dam water levels with land-use and climatic factors using random forest and vector autoregression models** [12262-17]

MACHINE LEARNING CLASSIFICATION

12262 0K **Combining OBIA approach and machine learning algorithm to extract photovoltaic panels from Sentinel-2 images automatically** [12262-18]

12262 0L **Detection and classification of changes in agriculture, forest, and shrublands for land cover map updating in Portugal** [12262-19]

- 12262 0M **Mapping annual crops in Portugal with Sentinel-2 data** [12262-20]
- 12262 0N **Tree species classification based on machine learning techniques: mapping Chir pine in Indian Western Himalayas** [12262-21]
- 12262 0P **Multiclass classification of hyperspectral remote sensed data using QSVC** [12262-48]

DEEP LEARNING CLASSIFICATION

- 12262 0Q **Predicting household water supply using satellite imagery and deep learning** [12262-23]
- 12262 0S **Remote sensing and deep learning techniques for impact assessment of Shaheen cyclone at Al Batinah governorate of Oman** [12262-25]
- 12262 0U **Supervised detection of Alternaria solani on ultra-high-resolution modified RGB UAV images** [12262-27]
- 12262 0V **Deep learning based windthrow detection for winter storms** [12262-28]

HYDROLOGY I

- 12262 0Y **Simplified analysis of the influence of climate change on the melting of Chimborazo Mountain glacier using partial least squares (PLS) and remote sensing** [12262-31]

HYDROLOGY II

- 12262 10 **Analysis of spatial and temporal consistency of soil moisture multispectral indices based on optical satellite data** [12262-33]
- 12262 11 **Application of remote sensing and GIS technique to identify resource potential zone for sustainable watershed: a case study of Takoli Gad watershed, Tehri Garhwal, Uttarakhand, India** [12262-34]

POSTER SESSION

- 12262 14 **Water quality monitoring in an estuary using UAV hyperspectral imaging and satellite algorithms** [12262-37]
- 12262 16 **Comparison of active thermography techniques for copper detection on plants** [12262-39]
- 12262 18 **Development of four GIS models of empirical methods computing daily mean reference evapotranspiration (ET_o) with MODIS LST inputs** [12262-41]

12262 19 **Infrared multispectral monitoring of cereal crops [12262-42]**

12262 1E **Two-source energy balance modeling of evapotranspiration with thermal remote sensing at different spatial resolutions: a case study of the European Alps [12262-49]**