## PROCEEDINGS OF SPIE

## Remote Sensing of Clouds and the Atmosphere XXVIII

Adolfo Comerón Evgueni I. Kassianov Klaus Schäfer Richard H. Picard Konradin Weber Editors

5–6 September 2023 Amsterdam, Netherlands

Sponsored by SPIE

Cooperating Organisations
Cranfield University (United Kingdom)

Published by SPIE

**Volume 12730** 

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 of Clouds and the Atmosphere XXVIII, edited by Adolfo Comerón, Evgueni I. Kassianov, Klaus Schäfer, Richard H. Picard, Konradin Weber, Proc. of SPIE 12730, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510666894

ISBN: 9781510666900 (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.



**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

| SESSION 1 | REMOTE SENSING OF CLOUDS, AEROSOLS, TRACE GASES AND METEOROLOGICAL PARAMETERS I  |
|-----------|--|
| 12730 02  | An overview of the enhanced cloud and water vapour products from EUMETSAT new generation imagers [12730-1]   |
| 12730 03  | Analysis and applications of the geostationary environment monitoring spectrometer (GEMS) data [12730-2]   |
| 12730 05  | Cloud detection on satellite imagery using U-Net architecture [12730-4]  |
| SESSION 2 | REMOTE SENSING OF CLOUDS, AEROSOLS, TRACE GASES AND METEOROLOGICAL PARAMETERS II   |
| 12730 06  | Simultaneous retrieval from the full IASI spectrum of cloud and atmospheric parameters using the new all-sky forward model $\sigma$ -IASI/F2N: the first day-night infrared retrieval of the Antarctica ozone hole (Invited Paper) [12730-5] |
| 12730 07  | Analysis of atmospheric aerosol properties using lidar measurements and their impact on radiative budget in Barcelona over the past 20 years [12730-7]   |
| 12730 08  | In search of a location-centric freezing height model [12730-8]  |
| 12730 09  | Investigating atmospheric and convective boundary layer heights via active optical sensor signals and statistical techniques [12730-9]   |
| 12730 0A  | Cloud detection using SDGSAT-1 thermal infrared data [12730-10]  |
|           |  |
| SESSION 3 | RADIATIVE TRANSFER AND APPLICATIONS  |
| 12730 OB  | Comparison of unfiltered CERES shortwave radiances measured in the minor plane over snow/ice of Greenland during summer solstices [12730-11]   |
| 12730 OC  | Comparison of the IASI water deficit index and other vegetation indices: the case study of the intense 2022 drought over the Po Valley [12730-12]  |
| 12730 0D  | Innovative remote-sensed thermodynamical indices to identify vegetation stress and surface dryness: application to southern Italy over the last decade (Best Student Paper Award) [12730-13]   |

| SESSION 4 | TECHNOLOGIES, TECHNIQUES AND ALGORITHMS FOR ACTIVE AND PASSIVE REMOTE SENSING I  |
|-----------|--|
| 12730 OF  | Retrieval of water vapor in the atmosphere and its spectral content: from OLCI to GPS [12730-15]   |
| 12730 OG  | A new method of retrieving atmospheric refractivity (Best Student Paper Award) [12730-16]  |
| 12730 OH  | Study of spatial distributions of aerosol in the troposphere according to the data of the DELIC. [12730-18]  |
| 12730 01  | CarbonNET: carbon dioxide retrieval from satellite using neural networks [12730-19]  |
| SESSION 5 | TECHNOLOGIES, TECHNIQUES AND ALGORITHMS FOR ACTIVE AND PASSIVE REMOTE SENSING I  |
| 12730 OJ  | Dual comb integrated path DIAL lidar for gas monitoring: design and experimental implementation [12730-20]   |
| 12730 OK  | Observation of horizontal temperature variations by a limb-sounding spatial heterodyne interferometer [12730-21]   |
| 12730 OL  | Worldwide high-frequency weather forecasts for the optimization of Earth observation satellit planning [12730-22]  |
| 12730 OM  | Robust molecular wind lidar with Quadri Mach-Zehnder interferometer and UV fiber laser for calibration/validation and future generation of Aeolus [12730-23] |
| 12730 ON  | Digital holography for temperature investigations in space and transparent media [12730-24]  |
|           | POSTER SESSION   |
| 12730 00  | Verification of reproducibility of biomass burning aerosol distribution by regional modeling [12730-25]  |
| 12730 OP  | Significance of simultaneous observations of polarization and radiance with SGLI [12730-26]  |
| 12730 OQ  | Determining background concentrations of major atmospheric pollutants using Sentinel-5P TROPOMI data [12730-27]  |
| 12730 OR  | Spatiotemporal behavior of atmospheric pollutant ingredients over Bulgaria, based on open access GAMS data [12730-28]  |

| 12730 OT | Machine learning clustering of cloud regimes using synergetic ground-based remote sensing observations [12730-30] |
|----------|---|
| 12730 OU | Exploring the aerosol-cloud transition zone from advanced all-sky camera observations [12730-31]                  |