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# *Remote Sensing of Clouds and the Atmosphere XIII*

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**Michiel van Weele**
*Editors*

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**Klaus Schäfer,** Forschungszentrum Karlsruhe (Germany)

# Introduction

The Thirteenth Conference on Remote Sensing of Clouds and the Atmosphere, held in Cardiff, UK, included 40 papers divided into six oral sessions and a poster session. The areas covered were: radiative transfer; cloud remote sensing; lidar, radar, and passive atmospheric measurement techniques; spectroscopic methods, including FTIR and DOAS; profiling of aerosols, trace gases, and meteorological parameters; and ultraviolet measurements, retrievals, and models. The papers presented included a broad range of methodologies from basic theoretical principles of atmospheric phenomena and remote-sensing techniques to end-user applications of remote-sensing products. Modeling, experimental and instrumental techniques and methods, and inversion algorithms were all addressed. Summary conclusions relating to particular areas and arising from conference papers are addressed in the following paragraphs.

Space-based remote sensing is well suited to producing global data products. Current satellite instruments have matured and are producing useful data products. Long-term data sets are being acquired, and there is a trend to pushing satellite-derived products to finer spatial scales and to lower near-surface altitudes. Planning for the future is apparent, and it seems likely that new satellite instruments and an entirely new range of capabilities will be available in the future.

Ground-based sensing, yielding valuable local data, has also shown significant advances. Ground-based measurements are especially valuable for studying small-scale phenomena. While such data are extremely valuable in their own right, they are also essential to provide ground truth for space-based sensors. By forming networks of ground-based instruments, coordinated data on extended regions (and perhaps eventually on regions of global extent) can be obtained. Effective coordinated measurements may also depend on accurate cross-calibration methods and the availability of powerful computational facilities.

Models are essential partners in the interpretation of remote-sensing measurements, and the modeling area is responding to the challenges offered by ever more sophisticated remote-sensing instruments. There is continuing progress on atmospheric radiative transfer, with attention being directed to more complex geometries and boundary conditions. For sensing of the earth surface, atmospheric correction techniques have become more sophisticated and more physically grounded.

The trends noted above are expected to continue in the future, with more reliable long-term global data sets of finer-scale phenomena available from space, along with extended networking of more powerful ground-based instruments. In addition, there is a significant opportunity to expand small-scale measurements to remote or difficult-to-reach areas through reliance on a broader range of platforms, including ships, aircraft, and unmanned aerial vehicles. Models will continue to improve, taking advantage of more powerful computers and computational techniques, and fusion of separate data sets and of data with models will become more accessible and routine.

These proceedings contain the reviewed and revised papers corresponding to the conference presentations.

We would like to thank the authors for the very high quality of their papers and thank the SPIE staff for their invaluable work in the organization of the conference and the editing of these proceedings.

**Richard H. Picard**
**Adolfo Comeron**
**Klaus Schäfer**
**Aldo Amodeo**
**Michiel van Weele**