This special issue on advances in remote sensing focusing on airborne geophysics and advances in remote sensing is an outcome of two independent initiatives. Recent advances in both science areas suggest that the characterization of the land will be extended from surface sensing to three dimensions by combining optical and active remote sensing techniques. Indeed, beyond the spatial, spectral, directional, and temporal dimensions, active sensing techniques now enable us to derive terrestrial surface and subsurface properties beyond the classical interaction of photons with matter.

Multi-sensor based approaches using all of the above methods in combination with in situ sensing and measurement enables us to see more and deeper into system Earth. This issue is a contribution to foster the application of various sensing techniques in combination with advanced modeling and interpretation methods.

The issue brings together in its first section four papers describing applications of airborne geophysics, in particular airborne electromagnetics (AEM) to salinity management and groundwater prospecting in Australia, where the promise of new information from airborne geophysics was responsible for the initiation of a National Action Plan for Salinity and Water Quality in 2000. This plan in particular included new airborne geophysical surveys that sparked advances in technique and interpretation. Even though the reported activities are confined to Australia, they have implications for drylands everywhere on the terrestrial surface. The findings of these activities were also highlighted in a symposium named Advances in airborne and satellite imagery: assessing land and water resources hosted by ISRIC-World Soil Information in Wageningen in 2004.

The papers submitted on the topic of airborne electromagnetics discuss aiding salinity management decisions from catchment to paddock scale in the Lower Balonne and Upper Broughton areas in Australia (Cresswell et al., 2007). The series on AEM is continued by predicting salinity impacts of land-use change: groundwater modeling with airborne electromagnetics and field data (Macaulay and Mullen, 2007), estimating groundwater salinity using AEM and borehole data (Mullen and Kellett, 2007), and the three-dimensional mapping of salt stores in the Murray–Darling Basin (Australia) with calculating landscape salt loads from AEM and laboratory data (Mullen et al., 2007). The AEM topic is summarized in a broader context in the use of environmental geophysics for mapping salinity and water resources (Dent, 2007).

The second section of this special issue is composed of five contributions discussing advances in remote sensing and has been compiled in the frame of a new educational concept. Educational curricula at graduate level increasingly require a full understanding of the scientific publication process to complete a PhD program. Most of today’s PhD theses will be a collection of peer-reviewed journal articles but the process of publication and the practise of writing scientific papers is rarely a big part of the curriculum. For this reason, we have chosen to introduce a Master Class with the topic State-of-the-art remote sensing in agro-ecosystems. The aim is to combine a scientific
workshop with a moderated session for PhD students where practised scientists coach the students in writing a paper on their research topic. In this case, the writing teams were grouped by thematic interest and the topics of the papers were identified during the session. Subsequently one PhD candidate was identified to lead a particular writing team (and was assigned first authorship of the paper), finally leading to the submission of paper. The task of the PhD candidates was to deliver the scientific input; the senior scientists screened the paper on quality and coached the candidates during the writing process. All parties agreed upon the substantial learning benefits. The Master Class was embedded in the symposium *Trends in Geo-Information* held on October 7th and 8th 2004 in Wageningen, The Netherlands with contributions by A. Bregt (Wageningen University), M. Molenaar (ITC), S. de Jong (Utrecht University), M. Rast (ESA/ESTEC) all from The Netherlands; K. Itten and J. Nieker (University of Zurich) A. Vckovski, P. Kohler, J. Brazile (Netcetera AG) from Switzerland; T. Painter (NSIDC, USA), F. Baret (INRA, France) and finally the inauguration of M. Schaepman as Professor of Geo-Information Science with special emphasis on Remote Sensing at Wageningen University.

The papers submitted in the frame of the Master Class ranges from scaling dimensions in spectroscopy (Malenovsky et al., 2007), to capturing the fugitive (Leyequien et al., 2007), data assimilation techniques for enhanced agro-ecosystem modeling (Dorigo et al., 2007), to the assessment of iron in soils (Bartholomeus et al., 2007). The special issue concludes discussing the advances achieved using spectro-directional imaging approaches (Schaepman, 2007).

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M.E. Schaepman*
J.G.P.W. Clevers
Centre for Geo-Information,
Wageningen University and Research Centre,
P.O. Box 47, NL-6700 AA Wageningen,
Gelderland, The Netherlands

D.L. Dent
ISRIC-World Soil Information, P.O. Box 353,
NL-6700 AJ Wageningen, The Netherlands

*Corresponding author. Tel.: +31 317 47 46 45;
fax: +31 317 41 90 00
E-mail addresses: Michael.Schaepman@wur.nl
(M.E. Schaepman)
Jan.Clevers@wur.nl (J.G.P.W. Clevers)
David.Dent@wur.nl (D.L. Dent)

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