

---

# **SECOND RECENT ADVANCES IN QUANTITATIVE REMOTE SENSING**

Auditori de Torrent, Spain  
25-29 September 2006

Editor

**José A. Sobrino**  
Global Change Unit  
Universitat de València, Spain

Published by  
Publicacions de la Universitat de València.  
C/del Batxiller, 1-1  
46010 València  
publicacions@uv.es

**SECOND RECENT ADVANCES IN QUANTITATIVE REMOTE SENSING**  
Edited by  
José A. Sobrino  
Universitat de València, Spain

Typesetting: G. Sòria, J. C. Jiménez, M. Zaragoza, M. Atitar, A. Barella and Y. Julien.

Copyright © 2006 by the Authors

All rights reserved. This book or parts thereof, may not be reproduced in any form or by any means, electronic or mechanical, including photocopying, recording or any information storage and retrieval system now known or to be invented, without written permission from the authors.

**ISBN: 84-370-6533-X ; 978-84-370-6533-5**  
Depósito legal:  
Printed in Spain by

## *Preface*

The Second International Symposium on Recent Advances in Quantitative Remote Sensing, was held in Torrent, Spain from September 25 to 29, 2006. It was sponsored and organized by the University of Valencia (UVEG), Global Change Unit (GCU), Spain. Other sponsors include:

- City Council of Torrent (Spain);
- National Aeronautics and Space Administration (NASA);
- European Space Agency (ESA);
- European Commission (EU)
- Consellería de Empresa, Universidad y Ciencia de la Generalitat Valenciana (Spain);
- Ministerio de Educación y Ciencia (MEC), Spain.

This Symposium addressed the scientific advances in quantitative remote sensing in connection with real applications. Its main goal was to assess the state of the art of both theory and applications in the analysis of remote sensing data, as well as to provide a forum for researcher in this subject area to exchange views and report their latest results. In this book 176 contributions presented in both plenary and poster sessions are arranged according to the scientific topics selected. The papers are ranked in the same order as the final programme.

To conclude, I would particularly like to thank the participants who have contributed to constructive discussions and the members of the International Scientific Committee, who greatly contributed to select the papers presented at the Symposium providing an attractive scientific programme. The symposium took place in Torrent in excellent conditions thanks to the UVEG, City Council of Torrent, NASA, ESA, EU, MEC, and Consellería de Empresa, Universidad y Ciencia de la Generalitat Valenciana for their material and financial support. The success is also due to the efforts made by the Organizing Committee: by the chairperson Pilar Gómez-González, and by the members Mónica Gómez, Juan Carlos Jiménez, Guillem Sòria, Juan Cuenca, Mireia Romaguera, Malena Zaragoza, Yves Julien, Guadalupe Sepulcre, Jauad El Kharraz, Anaïs Barella, Mariam Atitar and also by the collaboration of María M. Martínez. Many thanks to all of them.

José A. Sobrino  
Symposium Chairperson  
Global Change Unit,  
Universitat de València

Valencia, November 2006

## **International Scientific Committee:**

**Chairperson:**

J. A. Sobrino University of Valencia, Spain

## Members:

G. Asrar	USDA, Washington, D. C., USA
F. Baret	INRA, Avignon, France
S. Briggs	ESA/ESRIN, Italy
G. Chehbouni	IRD, France
A. P. Cracknell	University of Dundee, UK
A. Gillespie	University of Washington, USA
R. O. Green	NASA, JPL, Pasadena, USA
A. Huete	University of Arizona, USA
M. Leroy	MEDIAS/CNES, Toulouse, France
Z.-L. Li	LSIIT, Strasbourg, France
S. Liang	University of Maryland, USA
J. Moreno	University of Valencia, Spain
F. Nerry	LSIIT, Strasbourg, France
A. Olioso	INRA, Avignon, France
F. Prata	NILU, Norway
J. Privette	NASA/GSFC, USA
S. Quegan	University of Sheffield, UK
M. Rast	ESA/ESTEC, The Netherlands
A. Royer	University of Sherbrooke, Canada
J. Shi	ICESS, UCSB, USA
Z. Su	ITC, Enschede, The Netherlands
Z. Wan	UCSB, USA
J. P. Wigneron	INRA, Bordeaux, France
P.J. Zarco-Tejada	IAS, CSIC, Spain

## **Organizing Committee:**

**Chairperson:**

P. Gómez-González Symposium, Torrent, Spain

#### **Members:**

M. Gómez	University of Valencia, Spain
G. Sòria	University of Valencia, Spain
J. C. Jiménez-Muñoz	University of Valencia, Spain
M. Romaguera	University of Valencia, Spain
M. M. Zaragoza-Ivorra	University of Valencia, Spain
J. Cuenca	University of Valencia, Spain
Y. Julien	University of Valencia, Spain
J. El Kharraz	EMWIS T. U., France
M. Atitar	University of Valencia, Spain
A. Barella	University of Valencia, Spain
G. Sepulcre-Cantó	University of Valencia, Spain

## CONTENTS

<b>Preface</b>	iii
<hr/>	
<b>Optical-thermal canopy radiance directionality modelling by unified 4SAIL model</b> W. Verhoef, L. Jia and Z. Su	1
<b>Modelling of soil surface albedo variation in its season and latitude context</b> J. Cieriewski and T. Gdala	7
<b>Roughness effects on sub-pixel radiative temperatures in kinetically isothermal surfaces</b> I. Danilina, A. Mushkin, A. R. Gillespie, M. A. O'Neal, L. S. Pietro and L. K. Balick	13
<b>Development of broadband BRDFs from TOA CERES radiances corresponding to large footprints at a global scale</b> C. Doménech and E. López-Baeza	19
<b>Radiosity-Graphics Combined Model Extended for TIR Emission Directionality of Crop Canopy</b> Q. Liu, H. Huang, K. Fu, W. Qin, Q. Liu and X. Li	25
<b>Study of the Soil moisture effect on the emissivity in Thermal Infrared region</b> M. Mira, E. Valor, R. Boluda V. Caselles, C. Coll, R. Niclòs, J. M. Sánchez and J. M. Galve	30
<b>Uncertainty and Sensitivity Ratio of Parameters in Estimating and Promoting Retrieval Accuracy</b> X. Mu, G. Yan, and Z. L. Li	36
<b>Monitoring root zone soil moisture using a 1D-SVAT model calibrated with METEOSAT8 thermal infrared data and forced with RADAR precipitation data</b> C. Ottié, B. Couder, B. Boudevillain, B. de Solan, D. Boisgontier, O. Deudon, J. Testud, E. Moreau, E. Lebouar, R. Ney and H. Poulima	42
<b>Assessment of time-dependent biases in the MODIS land surface temperature (MOD11_L2) product</b> N. Pacheco, J. Privette, A. Pinheiro, Y. Yu and J. Seixas	48
<b>Relationship between observed land surface temperature and hemispherical thermal emission (LWUP)</b> A. J. Rocha, A. Pinheiro, J. Privette, Y. Yu and J. Seixas	53
<b>Variability of in-situ and MODIS albedo in the Sahel: Contribution to the Amma project</b> O. Samain, P. Hieraux, E. Mougin, F. Timouk, F. Lavenu, F. Guichard and L. Kerfoot	59
<b>A Physics-based algorithm for retrieving land surface bi-directional reflectivity in mid-infrared channels from MODIS data</b> B. Tang and Z. L. Li	65
<b>A priori knowledge construction strategy in BRDF model based LAI inversion</b> G. Yan, X. Mu and Z. L. Li	71
<b>An improved correction of atmospheric absorption by split window surface temperature algorithms</b> Y. Yu, J. L. Privette and A. C. Pinheiro	77
<b>A neural network inversion of the DART model to retrieve Norway Spruce LAI at a very high spatial resolution</b> R. Zurita-Milla, Z. Malenovsky, L. Homolova, M. E. Schaepman, E. Martín, J. P. Gastellu-Etchegorry, J. G. P. W. Clevers and P. Cudlin	84
<b>Cloud masking in remotely sensed hyperspectral images using linear and nonlinear spectral mixture analysis</b> J. Amorós-López, L. Gómez-Chova, A. Plaza, J. Plaza, J. Calpe, L. Alonso and J. Moreno	90

<b>Multispectral and multiangular measurement and modeling of leaf Reflectance and Transmittance</b>	<b>96</b>
L. Bousquet, T. Lavergne, T. Deroin, J.-L. Widlowski, I. Moya and S. Jacquemoud	
<b>Irrigated Maize Yield Estimation Using fAPAR Index, area sampling frame and field data in Northern of Sinaloa, Mexico</b>	<b>102</b>
V. M. Rodríguez Moreno, J. Macias Cervantes and A. D. Báez González	
<b>Estimation of errors in biophysical parameters maps derived from remote sensing data: The SPARC experiment</b>	<b>108</b>
G. Fernandez and J. Moreno	
<b>Late-season weed patches mapping through high resolution remote sensing</b>	<b>114</b>
L. García-Torres, F. López-Granados, M. Jurado-Expósito, M. T. Gómez-Casero, J. M. Peña-Barragán and A. Gelan-Begna	
<b>Multitemporal validation of an unmixing-based MERIS cloud screening algorithm</b>	<b>119</b>
L. Gómez-Chova, R. Zurita-Milla, G. Camps-Valls, L. Guanter, J. Clevers, J. Calpe, M. E. Schaepman and J. Moreno	
<b>Comparison of Fire Severity and Fire Parameters using Remote Sensing Images</b>	<b>125</b>
F. González-Alonso, A. Calle, and A. Roldán-Zamarrón	
<b>Use of information content of hyperspectral imagery for retrieval of biophysical vegetation parameters indicating drought stress of durum wheat</b>	<b>131</b>
K. Huber, P. Rischbeck, J. Eitzinger, W. Schneider, F. Suppan and P. Weihs	
<b>Land Surface Temperature and Emissivity Retrieval from ASTER Data over Agricultural Areas: Standard Products and Alternative Methods</b>	<b>137</b>
J. C. Jiménez-Muñoz, J. A. Sobrino, A. Gillespie, D. Sabol, W. T. Gustafson, L. Balick and J. J. Pasapera-Gonzales	
<b>Thermal remote sensing in the framework of the SEN2FLEX Project: Field measurements, airborne data and applications</b>	<b>142</b>
J. A. Sobrino, J. Cuenca, G. Sòria, J. C. Jiménez-Muñoz, M. Gómez, M. Zaragoza, M. Romaguera, Y. Julien, Q. Shen, A. Barella-Ortiz, L. Morales, A. Gillespie, L. Balick, L. Peres, R. Libonati, F. Nerry and M. Fortier	
<b>Evaluation of Hyperspectral Remote Sensing Relevance to estimate Oil Palm Trees Nutrition Status</b>	<b>147</b>
C. Lelong, M. Lanore and J. P. Caliman	
<b>A PSP Method to Extract Field Patch Average Parameter from Low Resolution MODIS Data</b>	<b>153</b>
J. Li, Q. Liu and Q. Liu	
<b>Vineyard LAI mapping from empirical relations between vegetation indices derived from Quickbird imagery and field measurements</b>	<b>160</b>
R. López-Lozano and M. A. Casterad	
<b>Hyperspectral data acquisition and analysis for the discrimination of Grassweeds in winter cereal crops</b>	<b>165</b>
P. Martín, L. Barreto and C. Fernández-Quintanilla	
<b>Atmospheric correction algorithm applied to CASI multi-height hyperspectral Imagery</b>	<b>170</b>
L. Martínez, V. Palà, R. Arbiol, F. Pérez and A. Tardà	
<b>Automated mangrove stand recognition and species mapping using QuickBird satellite imagery</b>	<b>174</b>
G. Neukermans, F. Dahdouh-Guebas, J. G. Kairo and N. Koedam	
<b>Using ground spectral measurements and multivariate data analysis for monitoring stresses in dryland agriculture</b>	<b>182</b>
A. Pimstein, A. Karnieli and D. J. Bonfil	
<b>Satellite estimation of biophysical parameters for ecological models: a sensitivity study over the boreal forest</b>	<b>188</b>
A. Prieto-Blanco, P. R. J. North, N. Fox and M. J. Barnsley	

<b>Differential Thermal Inertia of Geological Surfaces</b>	<b>193</b>
D. E. Sabol, A. R. Gillespie, E. McDonald and I. Daniilina	
<b>Low cost pushbroom hyperspectral sensor calibration system</b>	<b>199</b>
D. Valencia, R. Paniagua, M. C. Cantero, P. J. Martinez and L. M. del Rio	
<b>Vegetation spectral reflectance inversion considering the temporal variation of biophysical parameters</b>	<b>204</b>
A. J. Berjón, V. E. Cachorro, P. J. Zarco-Tejada, A. M. Frutos and C. Toledo	
<b>Automatic temporal analysis software package for satellite remote sensing ATA-SRS</b>	<b>210</b>
N. Ben Achhab, N. Raissouni, J. A. Sobrino, A. Azyat, M. Lahraoua, A. Chahboun and M. Atitar	
<b>Simulation of the surface temperature heterogeneity prior to RS data assimilation: the Saada2/SudMed experiment</b>	<b>216</b>
G. Boulet, S. Khabba, B. Duchemin and A. Chehbouni	
<b>Ad-Hoc deployment wireless network for land surface temperature in-situ measurements</b>	<b>221</b>
A. Chahboun, N. Raissouni, J. A. Sobrino, N. Ben Achhab, A. Azyat and M. Lahraoua	
<b>Characterization of the atmosphere during SEN2FLEX 2005 campaign</b>	<b>227</b>
V. Estelles, F. Molero, J. L. Gomez-Amo, J. C. Fortea, R. Pedrós, M. P. Utrillas, M. Pujadas and J. A. Martinez-Lozano	
<b>Column aerosol characterization in a semiarid region around Marrakech during WTERMED 2003 campaign</b>	<b>233</b>
J. L. Gómez-Amo, V. Estellés, R. Pedrós, M. P. Utrillas, J. A. Martínez-Lozano and J. A. Sobrino	
<b>Error analysis for a temperature and emissivity retrieval algorithm for hyperspectral imaging data</b>	<b>239</b>
C. Borel	
<b>Forward modelling of linear mixing in thermal IR temperature retrieval</b>	<b>247</b>
L. K. Balick, A. R. Gillespie, M. F. McCabe, J. Theiler and A. Mushkin	
<b>Using sub-pixel roughness estimates from ASTER stereo images to compensate for roughness effects in the thermal infrared</b>	<b>255</b>
A. Mushkin, A. R. Gillespie, I. Daniilina, M. A. O'Neal, L. S. Pietro, E. A. Abbott and L. K. Balick	
<b>Emissivity retrieval from combined MID-infrared and thermal infrared data from MSG-SEVIRI sensor. Study of seasonal variations</b>	<b>261</b>
F. Nerry, G.-M. Jiang and Z.-L. Li	
<b>Retrieval of Leaf Area Index from remote sensing data: How much do you pay for what you get?</b>	<b>266</b>
F. Vuolo, L. Dini and G. D'Urso	
<b>Seasonal reflectance course of some forest types in Estonia as determined from a series of LANDSAT TM and SPOT images and via simulation</b>	<b>272</b>
T. Nilson, S. Suviste, T. Lükk and A. Eenmäe	
<b>Application of the canopy reflectance model SLC for parameter retrieval of wheat based on CHRIS and AVIS data</b>	<b>278</b>
H. Bach, S. Begiebing and W. Verhoef	
<b>Wetland feature extraction and change detection study of a Playa Lake environment in NE Spain using hyperspectral and multispectral images</b>	<b>284</b>
M. Koch, T. Schmid, J. Gumuzzio and P. M. Mather	
<b>Chlorophyll retrieval from canopy reflectance over Orchards using Hyperspectral techniques</b>	<b>289</b>
P. Kempeneers, S. De Backer, P. Zarco-Tejada, S. Delalieux, G. Sepulcre-Cantó, F. Morales, R. Sagardoy, J.A.N. van Aardt , P. Coppin and P. Scheunders	
<b>Developing a multi-decadal climate data record of land surface temperature: A research agenda</b>	<b>295</b>
J. L. Privette, A. C. Pinheiro and Y. Yu	

<b>Experimental Characterization of Directional anisotropy of Thermal infrared measurements over a Urban area in nighttime conditions</b>	<b>302</b>
J. P. Lagouarde, M. Irvine, P. Moreau , B. Kurz , G. Pigeon and V. Masson	
<b>Validation of POLDER surface BRDF and albedo products based on a review of other satellites and climate databases</b>	<b>308</b>
O. Hautecoeur and J. L. Roujean	
<b>Canopy Biochemistry Estimation Using Spectrodirectional CHRIS Data</b>	<b>314</b>
S. Huber, M. Kneubühler, B. Koetz, J. T. Schopfer, N. E. Zimmermann and K. I. Itten	
<b>Modelling directional anisotropy of thermal infrared measurements over a pine forest canopy</b>	<b>320</b>
B. Kurz, J. P. Lagouarde, P. Moreau, D. Guyon, I. Champion, J. Ogée, F. Boudon, Y. Caraglio, C. Godin and C. Pradal	
<b>Analysis of the urban heat island from TIR airborne data: first results obtained during the Capitoul experiment over the city of Toulouse</b>	<b>326</b>
J. P. Lagouarde, G. Pigeon, M. Irvine and V. Masson	
<b>Using 21 years of AVHRR data to assess the impact of the North Atlantic oscillation on European vegetation dynamics</b>	<b>331</b>
R. Libonati, L. Peres, C. Gouveia, R. M. Trigo and C. Da Camara	
<b>A simple parametrization to determine Sea Surface Emissivity. Implementation in Sea Surface Temperature algorithms</b>	<b>337</b>
R. Niclós, V. Caselles, E. Valor, C. Coll, J. M. Sánchez, J. M. Galve and M. Mira	
<b>Sun/star photometry to derive the aerosol optical depth</b>	<b>343</b>
B. Ruiz, D. Pérez-Ramírez, J. Aceituno, F. J. Olmo and L. Alados-Arboledas	
<b>Fusion of MERIS, VEGETATION and AVHRR datasets using a Kalman filter for the determination of surface BRDF and albedo</b>	<b>349</b>
O. Samain, B. Geiger and J. L. Roujean	
<b>Using vegetation temperature condition index for time series drought occurrence monitoring</b>	<b>355</b>
W. Sun and P. X. Wang	
<b>Construction of database for separating component temperatures with AATSR data</b>	<b>360</b>
W. M. Wang and Z. L. Li	
<b>Modelling air temperature through the combination of Remote Sensing and GIS data</b>	<b>363</b>
J. Cristóbal, M. Ninyerola, X. Pons and M. Pla	
<b>Spatialization of sowing date and nitrogen supplies by combining remote sensed leaf area index and a crop simulation model. The case of durum wheat in the Alpilles test area (South-east of France)</b>	<b>369</b>
R. Hadria, A. Olioso, B. Duchemin, F. Ruget, M. Weiss, V. Rivalland, M. Guérif, A. Lahrouni, A. Chehbouni and P. Lecharpentier	
<b>Comparison of sensitivity analysis methods for data assimilation in a sugar cane model</b>	<b>375</b>
V. Houlès, J. F. Martiné and A. Bégué	
<b>Spatial-spectral unmixing of MODIS data based on higher resolution multispectral data and/or GIS data</b>	<b>381</b>
G. Kaiser, P. Chaudhry, W. Schneider and F. Suppan	
<b>A framework for estimating unresolved spectral shade</b>	<b>385</b>
A. R. Gillespie, L. Gilson, M. A. O'Neal and V. R. Kane	
<b>Integration of multiple feature extraction and object oriented classification of aerial images for map updating</b>	<b>391</b>
J. A. Recio, L. A. Ruiz, A. Fernández-Sarría and T. Hermosilla	

<b>Multiresolution caracterisation of the vegetation water stress on the basis of ShortWave Vegetation Indices</b>	<b>397</b>
P. Maisongrande, A. Lobo, P. Lattes, B. Duchemin, P. Gouaux, P. de Rosnay, E. de Rosnay and G. Dedieu	
<b>Investigation of scaling effects on image texture in urban areas</b>	<b>402</b>
C. Thiel, T. Riedel and C. Schmullius	
<b>Optimization of the compositing parameters through a decision support tool</b>	<b>408</b>
C. Vancutsem and P. Defourny	
<b>Up-Scaling and its error transferring for surface parameters in quantitative remote sensing</b>	<b>415</b>
R. H. Zhang, J. Tian, Z. L. Li and X. M. Sun	
<b>On the use of the surface temperature in potential conditions to monitor water stress together with TIR data</b>	<b>421</b>
G. Boulet, A. Chehbouni, and P. Gentine	
<b>Multiobjective calibration of the SEtHyS SVAT model based on diurnal cycle radiative surface temperature measurements</b>	<b>426</b>
B. Coudert and C. Ottlé	
<b>Driven FAO-56 dual crop coefficient approach with remotely-sensed data for estimating water consumptions of wheat crops in a semi-arid region</b>	<b>431</b>
S. Er-Raki, A. Chehbouni, N. Guemouria, B. Duchemin, J. Ezzahar, R. Hadria and I. BenHadj	
<b>Water content estimation in vegetation and soil with AHS data and modelling techniques: the SEN2FLEX experiment</b>	<b>437</b>
G. Fernandez, M. Palladino G. D'Urso and J. Moreno	
<b>Daily evapotraspiration retrieval from AHS and ASTER data</b>	<b>444</b>
M. Gómez, J. A. Sobrino, J. C. Jiménez-Muñoz and A. Olioso	
<b>Monitoring and mapping the phenology of the maritime pine forest of south-western France from VEGETATION time-series</b>	<b>450</b>
D. Guyon, H. Cardot, S. Hamel and O. Hagolle	
<b>Relationship of reflectance spectra with light use efficiency and canopy CO<sub>2</sub> flux at canopy scale in irrigated rice</b>	<b>455</b>
Y. Inoue, J. Peñuelas, A. Miyata and M. Mano	
<b>A methodology to validate natural carbon fluxes from global models</b>	<b>461</b>
C. M. J. Jacobs, A. J. W. De Wit, L. Jia, B. Kruijt and E. J. Moors	
<b>Joint analysis of above-ground biomass and root zone soil moisture into the ISBA-A-gs model using satellite products. Application to south France</b>	<b>467</b>
L. Jarlan, J. C. Calvet, G. Balsamo, P. Lemaigne, J. Muñoz-Sabater, A. Brut, S. Lafont, F. Bouyssel and A. Beljaars	
<b>Comparison of C-TESSEL CO<sub>2</sub> fluxes with TransCom CO<sub>2</sub> fluxes</b>	<b>474</b>
S. Lafont, A. Beljaars, M. Voogt, L. Jarlan, P. Viterbo, B. van Hurk and J. C. Calvet	
<b>The Use of Remotely Sensed data for Integrated Hydrological Modeling in Arid and Semi-Arid Regions: the SUDMED Program</b>	<b>478</b>
A. Chehbouni, R. Escadafal, G. Boulet, B. Duchemin, V. Simmonaux, G. Dedieu, B. Mougenot, S. Khabba, H. Kharrou, O. Merlin, A. Chaponnier, J. Ezzahar, S. Erraki, J. Hoedjes, R. Hadria, H. Abourida, A. Cheggour, F. Raibi, L. Hanich, N. Guemouria, Ah Chehbouni, A. Olioso, F. Jacob and J. Sobrino	
<b>Land-Atmosphere exchanges of water, energy and carbon dioxide in space and time over the heterogeneous Barax site during SPARC 2004 and SEN2FLEX 2005</b>	<b>484</b>
Z. Su, A. Gieske, W. Timmermans, J. Timmermans, R. van der Velde, L. Jia, J. Elbers, X. Jin, H. van der Kwast, A. Olioso, J. A. Sobrino, J. Moreno, F. Nerry, D. Sabol and R. Bianchi	

<b>Tropical rainforest phenology observations with MODIS EVI and flux tower data</b>	<b>492</b>
A. R. Huete, P. Ratana, S. Saleska, K. Didan and R. Nemani	
<b>Towards near-operational global and regional monitoring of carbon fluxes over land using EO data</b>	<b>497</b>
J. C. Calvet, A. L. Gribelin, J. Muñoz-Sabater, C. Rüdiger, A. Brut, J.-L. Roujeau, A. Beljaars, S. Lafont, L. Jarlan, A. Friend, J. Demarty, B. van den Hurk, M. Voogt, E. J. Moors and C. Jacobs	
<b>Ability of EO products to validate and constrain and terrestrial biosphere model</b>	<b>503</b>
J. Demarty, A. D. Friend, F. Chevallier, N. Viovy, C. Bacour, P. Ciais, J. C. Calvet, A. Beljaars, B. van den Hurk and E. J. Moors	
<b>The ESA EarthCARE Mission. Development of 3 along-track views angular dependence models for improved radiance to flux conversion</b>	<b>509</b>
E. López-Baeza, C. Domenech, H. W. Barker, M. Bouvet, D. Donovan and A. Velázquez	
<b>VENuS: A joint French – Israel Earth Observation scientific mission with High spatial and temporal resolution capabilities</b>	<b>517</b>
G. Dedieu, A. Karniel, O. Hagolle, H. Jeanjean, F. Cabot, P. Ferrier and Y. Yaniv	
<b>A Comparison of Measurements and FluorMOD Simulations for Solar Induced Chlorophyll Fluorescence and Reflectance of a Corn Crop under Nitrogen Treatments</b>	<b>522</b>
E. M. Middleton, L. A. Corp and P. K. E. Campbell	
<b>Do vegetation indices reliably assess vegetation state and dynamics?</b>	<b>528</b>
A. Karniel , Y. Bayarjargal , M. Bayasgalan , B. Mandakh and J. Burgheimer	
<b>Searching for trends of change through exploratory data analysis of time series of remotely-sensed images of SW Europe</b>	<b>534</b>
A. Lobo and Philippe Maisongrande	
<b>GLOBCOVER: A 300 m global land cover product for 2005 using ENVISAT MERIS time series</b>	<b>538</b>
P. Bicheron, M. Leroy, C. Brockmann, U. Krämer, B. Miras, M. Huc, F. Ninô, P. Defourny, C. Vancutsem, O. Arino, F. Ranéra, D. Petit, V. Amberg, B. Berthelot and D. Gross	
<b>The climatological record of clear-sky longwave radiation at the Earth's surface-evidence for water vapour feedback?</b>	<b>543</b>
F. Prata	
<b>Developing a photosynthetic prediction model for rice yield using remotely sensed and meteorological data</b>	<b>549</b>
D. Kaneko	
<b>Application of remote sensing techniques and water balance models to estimate irrigation water requirements</b>	<b>555</b>
I. J. Lorite, R. G. Allen, M. Tasumi, P. Gavilán, C. Santos and E. Fereres	
<b>Combining LANDSAT-7 ETM data with atmospheric boundary layer observations for regional land surface heat fluxes over heterogeneous landscape</b>	<b>561</b>
Y. Ma, M. Menenti, R. A. Feddes, J.M.Wang, Z. Su, L. Jia and H. Ishikawa	
<b>Neural net techniques used to estimate temporal and high resolution canopy biophysical variables from 3 remote sensing data sources</b>	<b>567</b>
V. Rivalland, A. Olioso, M. Claverie, M. Weiss and F. Baret	
<b>Use of evaporative fraction to estimate daily evapotranspiration for several irrigated crops in northwest Mexico</b>	<b>573</b>
J. C. Rodríguez, C. J. Watts, A. Chehbouni, J. Grageda and J. Garatuza	
<b>Seasonal adaptation of leaf photosynthesis in Pinus pinaster</b>	<b>579</b>
E. Rubio, F. R. López-Serrano, M. A. Fernández-Toledo, M. Andrés, A. Calera, A. del Cerro, A. García-de-Vicuña, J. González-Piqueras, C. Martínez-Beltran, J. F. Mateo-Fernández, F. A. García-Morote and E. A. Torres	

<b>Monitoring surface energy fluxes at different spatial resolutions. Effects on fluxes variability in the Basilicata Italian region</b>	<b>585</b>
J. M. Sánchez, V. Caselles, E. Valor, C. Coll, R. Niclós, J. M. Galve and M. Mira	
<b>Effects of contrasting leaf structure on reflectance estimates of chlorophyll content</b>	<b>591</b>
L. Serrano	
<b>« SAMIR », a tool for evapotranspiration assessment using remote sensing</b>	<b>597</b>
V. Simonneaux, B. Duchemin, G. Chehbouni, M. Cherkaoui and H. Kharrou	
<b>Accounting for ABL variability on flux estimation using remote sensing data</b>	<b>602</b>
W. J. Timmermans, J. D. Albertson, G. Bertoldi, A. Olioso, Z. Su and A. S. M. Gieske	
<b>Determination of the CO<sub>2</sub> Fluxes by means NOAA/AVHRR-1 Km imagery in the natural park of La Albufera</b>	<b>608</b>
M. M. Zaragoza-Ivorra, J. A. Sobrino, M. J. Sanz and J. V. Chordá	
<b>Fcover derivation based on SAIL–Isoline Parametrization</b>	<b>614</b>
A. Kallel, S. Le Hégarat, C. Ottlé and L. Hubert-Moy	
<b>Monitoring Vegetation using QuickBrid data with a vegetation index through Radiative Transfer Simulation</b>	<b>620</b>
A. J. Berjón, V. E. Cachorro, P. J. Zarco-Tejada, A. M. Frutos and S. Mogo	
<b>Land cover in semi-arid areas derived from NDVI images at high and low spatial resolutions</b>	<b>626</b>
I. Benhadj, B. Duchemin, P. Maisongrande, S. Khabba, H. Cardot and V. Simonneaux	
<b>Analysis of the MSG-SEVIRI sensor for the obtaining of fire parameters</b>	<b>634</b>
A. Calle, J. L. Casanova, A. Romo and D. de la Fuente	
<b>Estimation of the physical parameters of olive trees from high resolution satellite images</b>	<b>640</b>
I. L. Castillejo-González, A. García-Ferrer Porras, M. Sánchez de la Orden, F. López-Granados, M. Jurado-Expósito and L. García-Torres	
<b>Agrometeorological study of semi-arid areas: an experiment for analysing the potential of FORMOSAT-2 time series of images in the Marrakech plain</b>	<b>646</b>
B. Duchemin, V. Simonneaux, B. Mougenot, S. Khabba, R. Hadria, I. Benhadj, J. Ezzahar, J. Hoedjes, O. Hagolle, H. Tromp, S. Er-Raki, M.H. Kharrou, A. Chehbouni, N. Guemouria, L. Hanich, G. Dedieu, G. Boulet, P. Maisongrande, R. Escadafal, L. Ouzine and A.G. Chehbouni	
<b>Image feature extraction from the experimental semivariogram and its application to texture Classification</b>	<b>654</b>
M. Durrieu, L. A. Ruiz and A. Balaguer	
<b>Cover fraction estimation from high resolution SPOT-HRV&amp;HRG and medium resolution SPOT-VEGETATION sensors. Validation and comparison over South-West France</b>	<b>659</b>
E. Fillol, F. Baret, M. Weiss, G. Dedieu, V. Demarez, P. Gouaux and D. Ducrot.	
<b>Estimating evapotranspiration from TVDI: Towards a land degradation indicator for regional analysis</b>	<b>664</b>
M. García, A. Palacios-Orueta, J. Puigdefábregas, S. Contreras, G. Del Barrio, F. J. Fernández and M. T. Moreno	
<b>Evaluation of multi-temporal methods for crop classification using ASTER images</b>	<b>670</b>
B. Hoyos, A. Vidal-Pantaleoni and M. Hidalgo	
<b>A new approach to estimate tropical deforestation at sub-continental scale by object-oriented unsupervised classifications of landsat imagery</b>	<b>676</b>
G. Duveiller, P. Defourny, B. Desclée and P. Mayaux	
<b>Design of a country scale livestock insurance in grasslands using AVHRR sensor</b>	<b>683</b>
F. Paz, E. Palacios, M. Bolaños, A. Cano, A. Zarco, F. Pascual, L. A. Palacios and M. Martínez	

<b>Accuracy assessment of high resolution FVC retrievals from different methods over a cropland Landscape</b>	<b>686</b>
A. Verger, B. Martínez, F. Camacho-de-Coca and J. García-Haro	
<b>Analyzing the vegetation cover variation of China from AVHRR-NDVI data</b>	<b>692</b>
J. Xiaoguang, W. Dan, T. Lingli, H. Jian and X. Xiaohuan	
<b>MODIS-based remote sensing monitoring upon the grass production in China</b>	<b>698</b>
B. Xu, Y. Xiuchun, T. Weiguo, B. Yuyun, Q. Zhihao, L. Haiqi and M. Jianming	
<b>Vegetation growth monitoring in the grassland of China using MODIS remote sensing data</b>	<b>704</b>
B. Xu, T. Weiguo, Y. Xiuchun, Q. Zhihao, L. Haiqi, M. Jianming and B. Yuyun	
<b>Aerosol characteristics estimation from MERIS observations</b>	<b>710</b>
D. Béal, F. Baret, E. Vermote and C. Bacour	
<b>Development of an optimal estimation method for calibration of infrared radiometers</b>	<b>716</b>
G. Brogniez, B. Bonnel, B. Damiri, M. Legrand, J. P. Buis and N. Buis	
<b>Prototyping fCover product over Africa based on existing cyclopes and JRC products for VGT4Africa</b>	<b>724</b>
F. Camacho-de Coca, J. C. Jiménez-Muñoz, B. Martínez, P. Bicheron, R. Lacaze and M. Leroy	
<b>Development of an all-sky imager for cloud classification</b>	<b>728</b>
A. Cazorla, F. J. Olmo and L. Alados-Arboledas	
<b>Validation of ASTER Thermal infrared data in the Valencia test site</b>	<b>734</b>
C. Coll, R. Niclós, A. Barreto, V. Caselles, E. Valor, J. M. Sánchez, J. M. Galve and M. Mira	
<b>Estimation of green vegetation cover in the context of SEN2FLEX campaigns: comparison of methodologies and validation</b>	<b>740</b>
M. A. Fernández, E. Rubio, J. González-Piqueras, L. González, A. Calera and M. Belmonte	
<b>Validation of Land Surface Temperatures (LSTs) derived from MSG/SEVIRI with the Evora, Portugal ground-truth station measurements</b>	<b>746</b>
E. Gajewska, F. Olesen and F. Prata	
<b>Simulation and validation of land surface temperature algorithms for MODIS and AATSR data</b>	<b>752</b>
J. M. Galve, C. Coll, V. Caselles, E. Valor, R. Niclós, J. M. Sánchez and M. Mira	
<b>Algorithm development and current status the SEVIRI/MSG LAI and FVC products</b>	<b>758</b>
F. J. García-Haro, F. Camacho-de-Coca and J. Meliá	
<b>Operational derivation of surface albedo and down-welling short-wave radiation in the Satellite application facility for land surface analysis</b>	<b>764</b>
B. Geiger, D. Carrer, C. Meurey and J. L. Roujean	
<b>Revisions to the ASTER temperature/emissivity separation algorithm</b>	<b>770</b>
W. T. Gustafson, A. R. Gillespie and G. Yamada	
<b>Atmospheric correction of multi-temporal mono-directional images: Venus level 2 algorithms applied to FORMOSAT-2 images</b>	<b>776</b>
O. Hagolle, H. Tromp, G. Dedieu, B. Mougenot, V. Simonneaux, B. Duchemin and I. Benhadj	
<b>Land surface temperature (LST) retrieval from MSG-SEVIRI data and comparisons with LST retrieved from AATSR and MODIS data</b>	<b>782</b>
G. Jiang and Z. L. Li	
<b>The CYCLOPES LAI,fAPAR,fCOVER land products version 3 derived from vegetation: principles and evaluation using ground measurements and intercomparison with other products</b>	<b>788</b>
F. Baret, M. Weiss, O. Hagolle, P. Bicheron, B. Geiger, B. Berthelot, P. Rossello, R. Lacaze, S. Garrigues, M. Leroy, J. L. Roujean, O. Samain, F. Nino, M. Huc and B. Miras	

<b>Assessment of the consistency among SEVIRI (Land-SAF), MODIS and PARASOL vegetation products</b>	<b>798</b>
F. Camacho-de-Coca, F. J. García-Haro, B. Geiger, R. Lacaze, M. Leroy, B. Martínez, J. Meliá, J. L. Roujean and A. Verger	
<b>On-orbit calibration and inter-comparison of TERRA and AQUA MODIS surface temperature spectral Bands</b>	<b>804</b>
J. Xiong, A. Wu and C. Cao	
<b>Local-scale monitoring of land degradation processes in Mediterranean rangelands</b>	<b>810</b>
A. Röder, J. Hill, T. Udelhoven, B. Duguy, R. Vallejo, G. del Barrio, V. Papanastasis and G. Tsiorliris	
<b>Range resolved measurements of CO<sub>2</sub> within the planetary boundary layer</b>	<b>816</b>
J. Burris, A. Andrews, H. Riris, M. Krainak, J. Abshire, X. Sun and A. Colarco	
<b>First airborne multiwavelength passive chlorophyll fluorescence measurements over La Mancha (Spain) Fields</b>	<b>820</b>
I. Moya, F. Daumard, N. Moise, A. Ounis and Y. Goulas	
<b>Estimation of solar-induced vegetation fluorescence from remote sensing data acquired during the SEN2FLEX campaign</b>	<b>826</b>
L. Guanter, L. Gómez-Chova, L. Alonso, J. Amorós, J. Vila and J. Moreno	
<b>Fluorescence Explorer (FLEX): mapping vegetation photosynthesis from space</b>	<b>832</b>
J. F. Moreno and FLEX proposal team	
<b>Soil moisture mapping based on ASAR/ENVISAT radar data over a Sahelian region</b>	<b>838</b>
M. Zribi, S. Saux-Picard, C. André, L. Descroix and C. Ottlé	
<b>Effects of vegetation structure on wetlands flood monitoring using SAR instruments</b>	<b>844</b>
F. Grings, P. Ferrazzoli, H. Karszenbaum, M. Salvia, P. Kandus, J. Jacobo Berlles and P. Perna	
<b>SAR wind mapping</b>	<b>850</b>
C. B. Hasager, M. B. Christiansen, M. Nielsen and P. Astrup	
<b>An algorithm to retrieve Sea surface salinity from SMOS L-Band radiometric measurements</b>	<b>854</b>
J. Font, J. Boutin, N. Reul, P. Waldteufel, C. Gabarró, S. Zine, J. Tenerelli, J. Petitcolin, J. L. Vergely and M. Talone	
<b>Recent advances in modelling the land surface emission at L-band – Application to L-MEB in the operational SMOS algorithm</b>	<b>860</b>
J. P. Wigneron, Y. Kerr, P. Waldteufel, P. Ferrazzoli, P. Richaume, K. Saleh, J. C. Calvet, A. Chanzy, F. Demontoux, P. de Rosnay, M. J. Escorihuela, A. Cano, J. P. Grant, R. Gurney, B. Hornbuckle, A. Kruszewski, E. López-Baeza, C. Mätzler, T. Pellarin, G. Ruffié, M. Schwank, A. van de Griend, A. Mahmoodi and S. Delwart	
<b>A new method for NOAA orbital drift correction on land surface temperature estimation</b>	<b>866</b>
Y. Julien and J. A. Sobrino	
<b>Atmospheric Sounding COmpilation ASCO: A new radiosonde database for South America</b>	<b>872</b>
L. Morales, C. Mattar, R. Orrego and J. B. Gady	
<b>Absolute and relative atmospheric correction techniques</b>	<b>877</b>
L. A. Palacios and F. Paz	
<b>Validation of a temperature emissivity separation hybrid method from airborne hyperspectral scanner data and ground measurements in the SEN2FLEX field campaigns</b>	<b>881</b>
L. F. Peres, J. A. Sobrino, R. Libonati, J. C. Jiménez-Muñoz, M. Romaguera and C. C. Da Camara	
<b>Empirical estimation of the water vapor for Asturias (North of Spain) from MODIS data: First results</b>	<b>887</b>
C. Recondo and S. Moreno	
<b>MODIS-ETM+ Spectral intercalibration for Production of LAI Maps</b>	<b>892</b>
N. Rochdi and R. Fernandes	

<b>Comparison of retrieved AATSR land surface temperature and operational products over a heterogeneous site</b>	<b>897</b>
G. Sòria and J. A. Sobrino	
<b>Use of CERES dedicated observations to assess the Valencia Anchor Station capabilities for the validation of low-spatial resolution remote sensing data</b>	<b>903</b>
A. Velázquez-Blázquez, S. Alonso, C. Domenech, J. Gimeno, J. Jorge-Sánchez, A. Labajo, N. G. Loeb, D. Pino, T. Rius, A. Sanchis, G. L. Smith, Z. P. Szewczyk, R. Tarruella, J. Torrobell and E. López-Baeza	
<b>Inter-comparison of algorithms for retrieving operationally vegetation parameters at global scale: assessment over Europe along 2003</b>	<b>909</b>
A. Verger, F. Camacho-de-Coca and J. Meliá	
<b>Radiance-based validation of the V5 MODIS land-surface temperature Product</b>	<b>915</b>
Z. Wan, Y. Zhang and Z. L. Li	
<b>Effective versus measured correlation length for radar based surface soil moisture retrieval</b>	<b>920</b>
J. Álvarez-Mozos, M. González-Audicana and J. Casalí	
<b>A large scale approach to estimate L band emission from forest covered surfaces</b>	<b>925</b>
A. Della Vecchia, P. Ferrazzoli, F. Giorgio and L. Guerriero	
<b>L-band radiometric behaviour of pine forests for a variety of surface moisture conditions</b>	<b>931</b>
J. P. Grant, J. P. Wigneron, A. van de Griend, F. Demontoux, G. Ruffié, A. Della Vecchia, N. Skou and B. Le Crom	
<b>Land-surface emissivity model and its application for AMSR-E</b>	<b>937</b>
Y. Jia and Z. L. Li	
<b>The estimation of snow water equivalence using the Polarimetric scanning radiometer from the cold land processes experiments (CLPX02-03)</b>	<b>943</b>
L. Jiang, J. Shi, S. Tjuajua, K. S. Chen and L. X. Zhang	
<b>Leaf level detection of steady state fluorescence and PRI for early ozone injury assessments</b>	<b>948</b>
M. Meroni, S. Cogliati, V. Picchi, M. Rossini, C. Panigada, C. Nali, G. Lorenzini, C. M. Marino and R. Colombo	
<b>Field experiments to improve the soil emission models at L-Band: contribution of the UPC to the ESA SMOS Mission</b>	<b>953</b>
A. Monerris, M. Vall-llosera, A. Camps, R. Sabia, A. Martínez-Vázquez, I. Ledesma and M. Piles	
<b>Study of the SAR images possibilities for obtaining a model of soil roughness in mountain humid areas (Asturias, north of Spain)</b>	<b>959</b>
C. Recondo, E. Wozniak, R. Menéndez-Duarte and J. Marquínez	
<b>An Object-Based and Automated Classification Procedure for the Derivation of Broad Land Cover Classes Using Multitemporal C-Band SAR Data</b>	<b>965</b>
T. Riedel, C. Thiel and C. Schmullius	
<b>The sensitivity of the land use classification accuracy on the parameters of ENVISAT imageacquisition</b>	<b>971</b>
K. Stankiewicz and E. Wisniewska	
<b>METLook A Multi-Functional Tool for METEOSAT</b>	<b>977</b>
L. Gonzalez, F. Thieuleux, C. Deroo, J. Pelon, I. Chiapello and M. Legrand	
<b>Studying flooded grassland in the Waza-Logone Region of Northern Cameroon using ENVISAT ASAR Alternating Polarization images</b>	<b>979</b>
T. Westra, S. Crabbe and R. R. De Wulf	
<b>Vegetation's fluorescence spectrum and kautsky effect measurements under natural solar illumination</b>	<b>985</b>
J. Vila-Francés, J. Amorós-López, L. Alonso, L. Gómez-Chova, J. Calpe, S. del Valle-Tascón and J. Moreno	
<b>Raman-LIDAR measurements at the Andalusian Center for Environmental Studies (CEAMA)</b>	<b>991</b>
J. L. Guerrero-Rascado, B. Ruiz, G. Choudakis, G. Georgoussis and L. Alados-Arboledas	

<b>Review and validation of CREPAD products</b> C. Robles and A. Fernández-Renau	<b>997</b>
<b>LIDAR application in forest hydrology and fluvial management</b> S. Merino de Miguel, R. Martínez Romero and F. Magdaleno Mas	<b>1002</b>
<b>The POSTEL land surface thematic center</b> M. Leroy, P. Bicheron, R. Lacaze and F. Niño	<b>1008</b>
<b>Ecological water quality in Mediterranean reservoirs using MERIS and CHRIS imagery</b> R. Peña-Martínez and J. A. Domínguez-Gómez	<b>1014</b>
<b>The Atmosphere-Space Interactions Monitor (ASIM)</b> A. Russu, J.M. Rodrigo, P.H. Connell and V. Reglero	<b>1018</b>
<b>Estimation of Soil Moisture with the combined L-band Radar and Radiometer Measurements</b> J. Shi, E. Njoku, T. Jackson and P. O'Neill	<b>1023</b>
<b>AUTHOR INDEX</b>	<b>1029</b>
<b>FIGURES IN COLOUR</b>	<b>1039</b>

