

CONTENTS

Introduction	v
---------------------------	---

Working Group Reports	vii
------------------------------------	-----

SESSION 1: LAND SURFACE MODELLING AND APPLICATIONS

<i>G. Balsamo, E. Dutra, S. Boussetta, A. Beljaars, P. Viterbo and B. van den Hurk</i> Recent advances in land surface modelling at ECMWF	1
--	---

<i>Aaron Boone</i> The ALMIP experience: implications for land-atmosphere coupled systems	11
--	----

<i>Richard Essery</i> SNOW-MIP2: implications for NWP snow schemes	19
---	----

<i>Florian Pappenberger</i> River routing models to support NWP evaluation	27
---	----

<i>D. Gochis and W. Yu</i> The role of terrestrial routing processes and shallow groundwater in land-atmosphere coupling	35
---	----

<i>C.S.B. Grimmond, M. Blackett, M.J. Best, J-J. Baik, S.E. Belcher, S.I. Bohnenstengel, I. Calmet, F. Chen, A. Dandou, K. Fortuniak, M.L. Gouvea, R. Hamdi, M. Hendry, M. Kanda, T. Kawai, Y. Kawamoto, H. Kondo, S. Krayenhoff, S-H. Lee, T. Loridan, A. Martilli, V. Masson, S. Miao, K. Oleson, G. Pigeon, A. Porson, Y-H. Ryu, F. Salamanca, L. Shashua-Bar, G-J. Steeneveld, M. Tombrou, J. Voogt, D. Young, N. Zhang</i> The PILPS-Urban experience: implications for introducing a urban tile in NWP models	43
--	----

SESSION 2: LAND SURFACE DATA ASSIMILATION

<i>Patricia de Rosnay, Matthias Drusch, Gianpaolo Balsamo, Anton Beljaars, Lars Isaksen, Drasko Vasiljevic, Clément Albergel and Klaus Scipal</i> Advances in land data assimilation at ECMWF	57
--	----

<i>Jean-François Mahfouf</i> Advances in land data assimilation at Météo-France	65
--	----

<i>Andrew G. Slater and Martyn P. Clark</i> Snow data assimilation	77
---	----

<i>R.H. Reichle</i> Advances in land data assimilation at NASA	83
---	----

<i>Stéphane Bélair, Marco L. Carrera, Bernard Bilodeau, Sheena J. Solomon, Natacha B. Bernier, Sylvie Leroyer, Linying Tong, Chris Derksen, Libo Wang and Douglas Chan</i> Advances in land data assimilation at Environment Canada.....	93
---	----

<i>Souhail Boussetta and Toshio Koike</i> Overview on the development of LDAS coupled with atmospheric model for better hydro-meteorological predictions and validation by CEOP	101
--	-----

SESSION 3: OBSERVATIONS FOR TERRESTRIAL SURFACES

<i>Y.H. Kerr, F. Cabot, P. Richaume, P. Waldteufel, J.P. Wigneron, A. Hahne and S. Mecklenburg</i> SMOS: first in flight results	107
---	-----

<i>Debbie Clifford</i> Snow products for assimilation and verification	115
---	-----

<i>Carlos Jimenez, Catherine Prigent, Matthew McCabe, Sonia Seneviratne, Brigitte Mueller and William Rossow</i> The LandFLUX project.....	123
---	-----

SESSION 4: CONTRIBUTION OF LAND SURFACE TO PREDICTABILITY

<i>Antje Weisheimer</i> The contribution of the land surface to predictability in the ECMWF seasonal prediction system: The European summer 2003 case	125
--	-----

<i>Randal D. Koster</i> The GLACE-2 experiment	139
---	-----

<i>Bart van den Hurk, Emanuel Dutra, Ben Smith, Martijn Brandt, Martina Weiss, Rein Haarsma, Wilco Hazeleger, Gianpaolo Balsamo and Michiel van der Molen</i> The EC-Earth modelling challenges.....	147
---	-----

<i>Eric Jäger and Sonia I. Seneviratne</i> Land surface predictability in Europe: Extremes and trends.....	155
---	-----

<i>H. Douville, Y. Peings, B. Decharme and R. Alkama</i> Importance of snow initial condition in seasonal forecasting	167
--	-----

<i>Yvan J. Orsolini and Nils G. Kvamstø</i> Impact of Eurasian snow cover on the northern hemisphere winter circulation	177
--	-----

POSTER SESSION I: MODELLING

<i>Eleanor Blyth, Douglas Clark, Richard Ellis, Chris Huntingford, Sietse Los, Matt Pryor, Martin Best and Stephen Sitch</i> A set of benchmarks tests for JULES.....	185
<i>Imtiaz Dharssi, Pier Luigi Vidale, Anne Verhoef, Bruce Macpherson, Clive Jones and Martin Best</i> New soil physical properties implemented in the Unified Model.....	191
<i>E. Dutra, G. Balsamo, P. Viterbo, P.M.A. Miranda, A. Beljaars, C. Schär and K. Elder</i> Snow in EC-EARTH.....	199
<i>Michael Ek, Jesse Meng, Rongqian Yang, Helin Wei, Vince Wong, Youlong Xia, Yihua Wu, Weizhong Zheng, Jiarui Dong and Sid Katz</i> Land-hydrology modeling at NCEP.....	207
<i>Young-Hee Lee, Hee-Jeong Lim, Hyojung Kwon and Myoung-Seok Suh</i> Improvement of the phenology module for summer green tree in Community Land Model 3.5-Dynamic Global Vegetation Model (CLM3.5-DGVM) using MODIS LAI.....	215
<i>Aude Lemonsu</i> TEB : an urban canopy model for meteorological applications and weather forecasting.....	221
<i>Nicola Loggisci, Riccardo Bonanno, Silvia Cavalletto and Claudio Cassardo</i> Soil freezing in a LSPM SVAT scheme.....	223
<i>Gabriel G. Rooney and Ian D. Jones</i> Coupling the lake model FLake to the JULES land-surface scheme.....	233
<i>P.L. Vidale, A. Verhoef, M.E. Demory and M.Roberts</i> Land surface - atmosphere coupling strength in the Hadley Centre GCM: the impact of soil physics.....	241

POSTER SESSION II – DATA ASSIMILATION AND SYSTEMS

<i>Rasmus Houborg, Matthew Rodell, Hiroko Beaudoin and Benjamin F. Zaitchik</i> Highlights of the Global Land Data Assimilation System.....	249
<i>Carlos Jiménez, Catherine Prigent, Pan Liang and Jean-Luc Moncet</i> A comparison of satellite, modeled, and in situ land surface temperatures: global analysis for selected months in 2003.....	255

<i>Sujay Kumar, Joseph Santanello, Christa Peters-Lidard, Rolf Reichle, Ken Harrison and Soni Yatheendradas</i> Development of Optimization and posterior inference tools in NASA Land Information System (LIS)	259
<i>Joaquín Muñoz Sabater, Anne Fouilloux and Patricia de Rosnay</i> Implementation of SMOS data monitoring in the ECMWF Integrated Forecast System	263
<i>C. Bacour, P. Peylin, P. Rayner, F. Delage, M. Weiss, J. Demarty, F. Baret, F. Chevallier and P. Prunet</i> Coupled assimilation of in situ flux measurements and satellite fAPAR time series within the ORCHIDEE biosphere model: constraints and potentials.....	273
<i>S. Pullen, C. Jones and G. Rooney</i> Using satellite-derived snow cover data to implement a snow analysis in the Met Office global NWP model	279
<i>Joseph A. Santanello, Jr., Christa D. Peters-Lidard, S. V. Kumar, C. Alonge and Wei-Kuo Tao</i> A modeling and observational framework for diagnosing local land-atmosphere coupling on diurnal time scales	285

POSTER SESSION III – PREDICTABILITY AND CARBON

<i>J.-C. Calvet, G. Balsamo, M. Balzarolo, A. Barbu, A. Cescatti, F. Chevallier, N. Delbart, J. de Vries, A.-L. Gibelin, A. Horanyi, L. Kullmann, S. Lafont, J.-F. Mahfouf, F. Maignan, D. Papale, G. Seufert and H. The</i> Monitoring soil and vegetation fluxes of carbon and water at the global scale: the land carbon core information service of GEOLAND2	289
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INTRODUCTION

A workshop on modelling of land surface processes, land data assimilation and land related predictability was held at ECMWF from 9-12 November 2009. The workshop was organized in cooperation with the Global Land/Atmosphere System Study (GLASS), which is part of the WCRP/GEWEX (World Climate Research Project/ Global Energy and Water Cycle Experiment). The community is very active in this area of research so it was timely to review the latest results and to make plans for the future also in view of the new observing systems that are becoming available (e.g. for soil moisture).

Land surface processes and their initialization are of crucial importance to address the challenge of seamless (from weather to seasonal) Numerical Weather Prediction (NWP) systems. It is well established that good short and medium range forecasts of temperature and humidity over land require proper initialization of soil moisture and soil temperature. In the (intra-)seasonal time range, research efforts conducted under the GEWEX/GLASS framework suggest predictability associated with the land surface. In order to benefit from this potential predictability, three elements are important: (i) a model that has realistic feedbacks between land surface and atmosphere, (ii) observations that give information about the state of the land surface and (iii) a data assimilation system that extracts the information from the observations to provide a good initial condition. All these elements were addressed in the workshop.

The workshop had two and a half days of presentations and posters followed by one day of working group meetings and a plenary discussion. In the talks and posters, recent research was reviewed on land surface modelling, land data assimilation, new observations (e.g. SMOS), and on the role of soil moisture and snow in predictability in the sub-seasonal time range. Also the role of verification and benchmarking was discussed. It was clear that a wide range of processes are relevant e.g. soil hydrology, soil heat transfer, snow processes, lake evaporation, interaction with the water table, vegetation activity, carbon fluxes, terrain heterogeneity and interaction with the boundary layer.

Given the wider range of topics, the working groups were asked to make recommendations on priorities for future research at ECMWF and in the GLASS community. It was clear that a good integration is needed between the atmospheric modelling activities, work on land data assimilation and the use of new soil moisture related observations (e.g. SMOS). Summaries of most contributions (presentations, posters) are included in these proceedings. The working group reports are particularly important because they provide clear recommendations for future research and also indicate priorities.

We would like to thank all participants for their excellent contributions. The guidance given by the working group discussions and the recommendations will be extremely helpful for the planning of further work at ECMWF and in the entire GLASS community.

All the material related to the workshop is also available from the ECMWF website (http://www.ecmwf.int/newsevents/meetings/workshops/2009/Land_surface_modelling/index.html)