Surface processes within ALADIN - collaborations with HIRLAM

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Modelling activities

# HIRLAM-ALADIN collaboration on surface processes



Back to Toulouse from the 1st

13 July 1990



WMO symposium on data assimilation (Clermont-Ferrand)

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### Motivations for collaborations

- Common interest on shared tools : ISBA SURFEX -CANARI - FLAKE
- Complexity of surface processes => benefit from complementary expertise (e.g. HIRLAM on cold processes)
- Take advantage of European initiatives (EUMETSAT SAFs, EUMETNET SRNWP)
- Share national validation databases

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## Summary of recent initiatives

- ALADIN-HIRLAM SURFEX Workshop in Toulouse (December 2006) [Working groups]
- Training session on land data assimilation in Toulouse (November 2007)
- HAAA workshop on surface assimilation in Budapest (November 2007) [CANARI-SPAN intercomparison]
- Workshop on lake modelling and assimilation in Zelengorsk (September 2008)
- Working week on double surface energy balance in Toulouse (October 2008)
- SRNWP activities (ET on surface processes) workplan
  working day 12 June 2009
- SURFEX training course in Toulouse (14-16 October 2009)
- + discussions during HIRLAM/ALADIN workshops and EWGLAM/SRNWP meetings

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# SURFEX (1)

- The externalized surface module SURFEX is currently used in Meso-NH (French research mesoscale model) and in AROME (operational since december 2008)
- Main features of SURFEX within AROME 2.5 km :
  - ECOCLIMAP global database at 1 km resolution (Masson et al., 2003) for surface physiography (satellite NDVI + landcover maps)
  - FAO global database at 10 km resolution for soil textural properties
  - Land surface ISBA scheme 3-layer version (Boone et al., 1999)
  - Town Energy Budget (TEB) scheme (Masson, 2000)
  - CANOPY surface boundary layer scheme (Masson and Seity, 2009)

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# SURFEX (2)

#### Current developments for ALADIN

- Inclusion in SURFEX the ISBA version used in ALADIN and ARPEGE (2-layer scheme, same SBL)
- Creation of physiographic fields within SURFEX from current ALADIN/ARPEGE data bases (for soil and vegetation)
- Level of consistency acceptable allowing to separate technical issues from scientific ones (results from M. Jidane)

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# SURFEX (3)

#### Small remaining discrepancies

- Interception reservoir set to zero at initial time
- Precipitation not available (set to zero) in ISBA for the first time step

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- Snow albedo not included in historical variables
- Different soil water freezing formulation

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# SURFEX (4)

#### Further evaluations for ALADIN

- 3D-Var ALADIN assimilations using SURFEX
- Consistency issues partly solved : use of T2m, RH2m, and V10m from SURFEX for innovations in 3D-Var but Jacobians set to one (instead of an inconsistent vertical interpolation scheme in the SBL but with TL/AD) work in progress (L. Kullmann- HMS)
- Get closer to AROME configuration : use of ECOCLIMAP and FAO databases, use ISBA-3L (but not yet CANOPY and TEB)
- Evaluate the soil OI analysis within SURFEX (coded)
- ALADIN/SURFEX should be operational at Météo-France by the end of 2009

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# SURFEX (5)

#### Other developments

- Validation of Flake (collaboration with University of Ebora and Hungarian Met. Service)
- Availability of a 1D mixed layer ocean in SURFEX v4.8 (bathymetry data base)
- Ongoing developments for the inclusion of a double surface energy balance (collaborations with HIRLAM and CESBIO)
- Evaluation of the "carbon version" of ISBA (ISBA-Ags) over France (CO2 fluxes, biomass)
- Missing modelling component : sea-ice (but validations and modifications over Antarctica)

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## Surface analyses (1)

#### Current developments

- CANARI has been intercompared with SPAN
- CANARI has been adapted for ALADIN (SST, screen-level variables, soil variables) - configuration operational at Météo-France since February 2009
- OI SURFEX for soil analysis under evaluation : version 4.8 modified to read FA and LFI file formats
- Evaluations of the vertical interpolation operator for screen level observations (improved description of the Geleyn's formulation in very stable situations)

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## Surface analyses (2)

#### Current developments

- EKF SURFEX extended to include patches and the assimilation of LAI
- Assimilation of AMSR-E soil moisture products in EKF SURFEX (collaborations with University of Melbourne)
- Evaluation and use of ASCAT soil moisture products (collaborations with ZAMG)
- Development of an albedo analysis using LandSAF products (collaborations with LACE consortium) inclusion of interpolation procedures (projection of observations on the model grid) within SURFEX

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## Surface analyses (3)

#### Not started yet

- Extend the use of LandSAF products (vegetation cover, LAI, snow cover)
- Develop a snow analysis within CANARI (using SYNOP + satellite observations)
- Improve CANARI spatial interpolation over mountains (features from SAFRAN) - EURO4M FP7 european project (submitted)
- Lake surface temperature analysis
- Sea-ice analysis within CANARI (?)
- Use of ECOCLIMAP 2
- SRNWP activities : documentation + local validations (June meeting in Toulouse)

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