

Recent developments on SURFEX

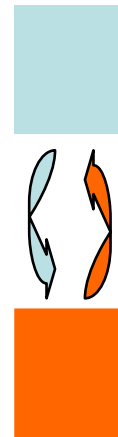
Jean-François Mahfouf

on behalf of
Patrick Le Moigne, Stéphanie Faroux
(CNRM/GMME)

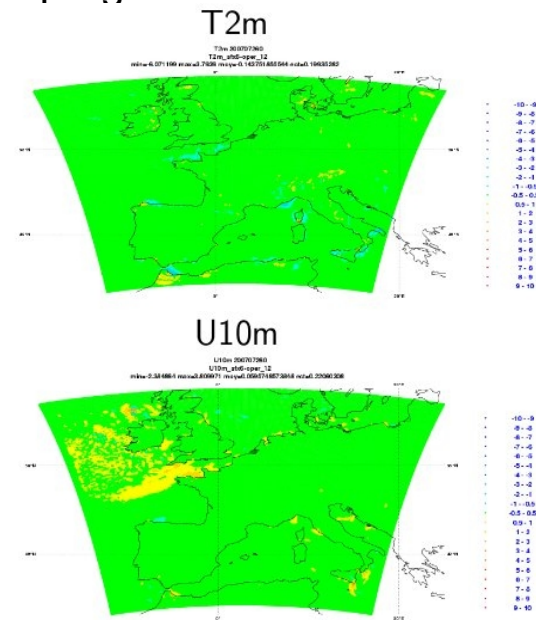
Main applications in 2008



- Surface analysis
- AMMA
- Carbon version of ISBA
- Hydrology (SIM)
- Climate
- Towns
- Belgium, Slovenia and Hungary
- Nilu: EnKF LDAS
- Hirlam: Training course for students



- Coupled to Meso-NH and Arome
- Coupling with Aladin in progress



- Coupling with Arpege in stand-by, Harmonie et Alaro available soon

Evolution of the various schemes

- Subgrid hydrology
 - Ksat exponential profile
 - Subgrid distribution of precipitation
 - Hortonian runoff from infiltration excess
- Desertic dust (DEAD model)
- 1D CLS prognostic scheme **CANOPY**
- Lake model **FLake** (Mironov, 2003)
- 1D Mixed Layer Ocean (MLO)
- New climatology database **ECOCLIMAP II**
- Adaptation of ISBA 2L over Antarctica

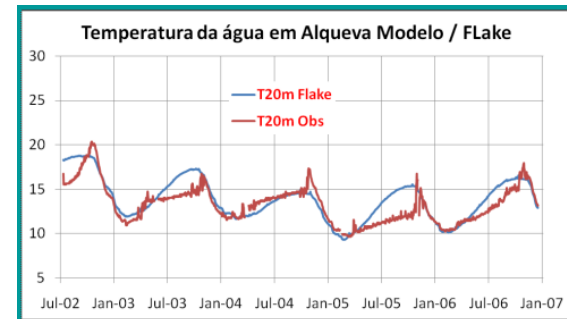
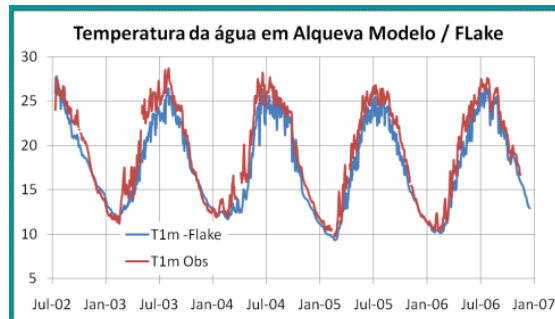
Planned developments for 2009

- Validation of ECOCLIMAP II :
 - Test over CarboEurope domain, CarboFrance project, SIM
- Evaluation of FLake in coupled mode with Meso-NH 3D
- Evaluation of CANOPY in 1D and 3D
- Evaluation of SURFEX over Antarctica (DomeC)
- SURFEX maintenance and user support :
 - Scientific documentation (started)
 - Development of a code management tool
 - First SURFEX training course
 - External web site (including ECOCLIMAP)
- SURFEX new features :
 - Double surface energy balance (snow/forest interactions) (HIRLAM /CESBIO)
 - EKF for Land Data Assimilation (ALADIN/LACE/HIRLAM)

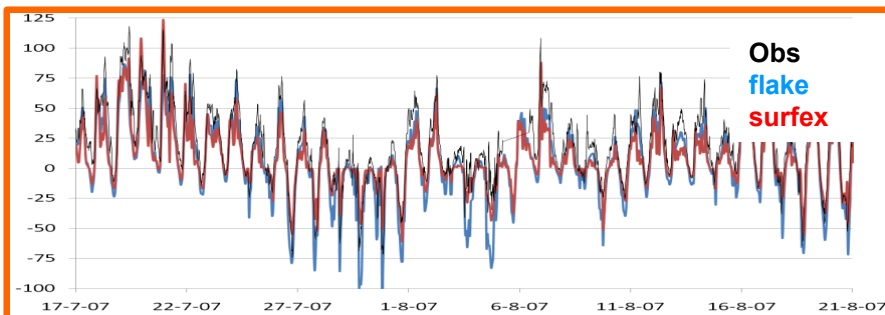
Offline evaluation of SURFEX



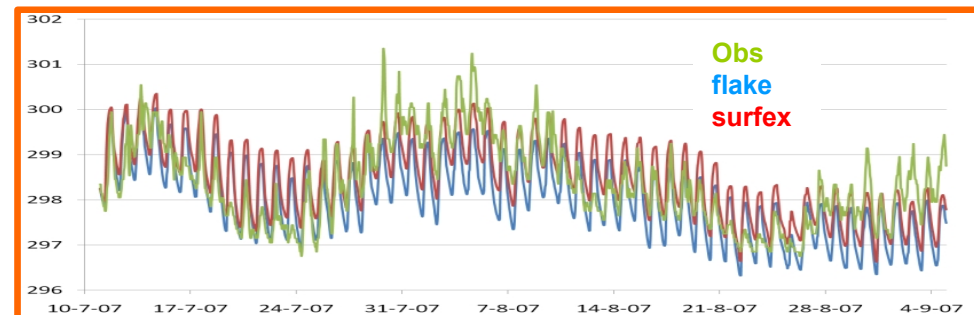
Measurements and validation of FLake over Alqueva lake



Integration of Flake within SURFEX



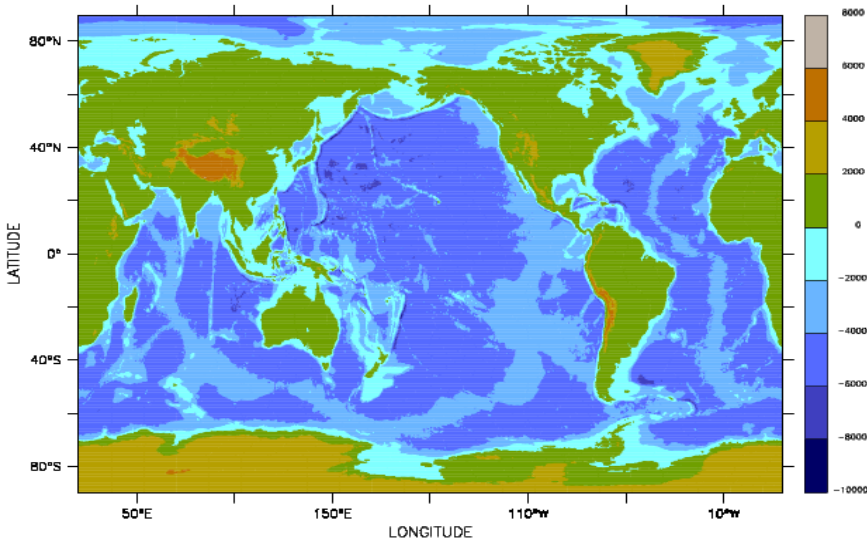
Sensible heat flux



Surface temperature

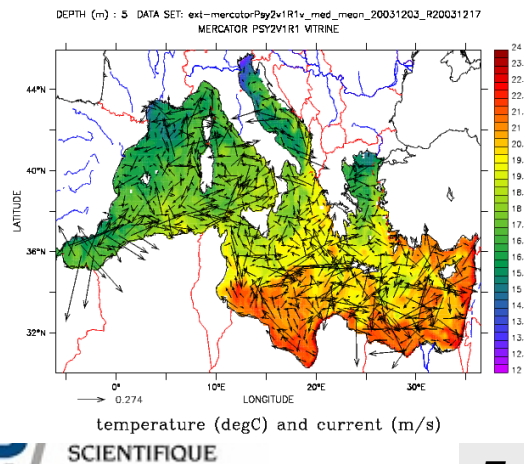
1D Mixed Layer Ocean

BATHYMETRY

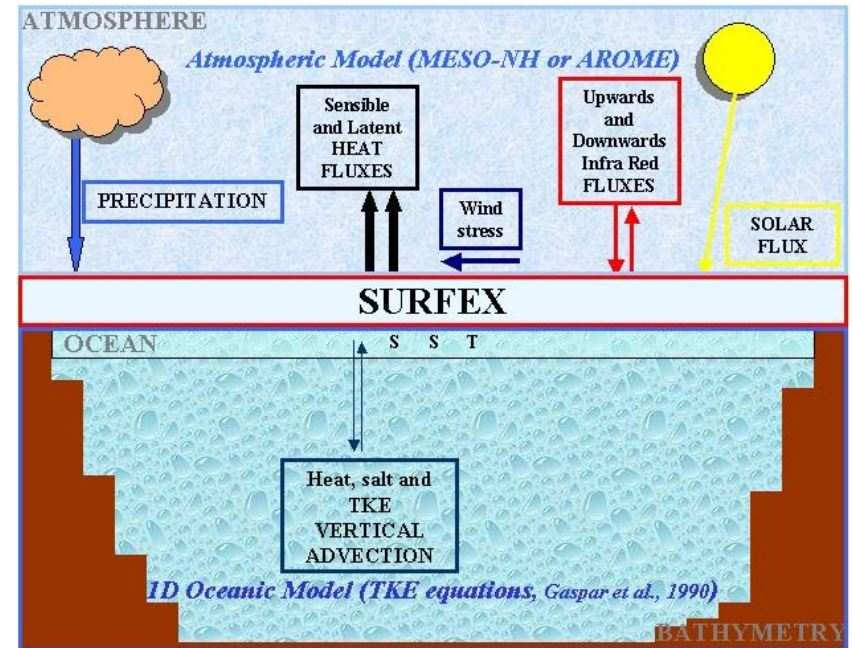


RELIEF OF THE SURFACE OF THE EARTH (METERS)

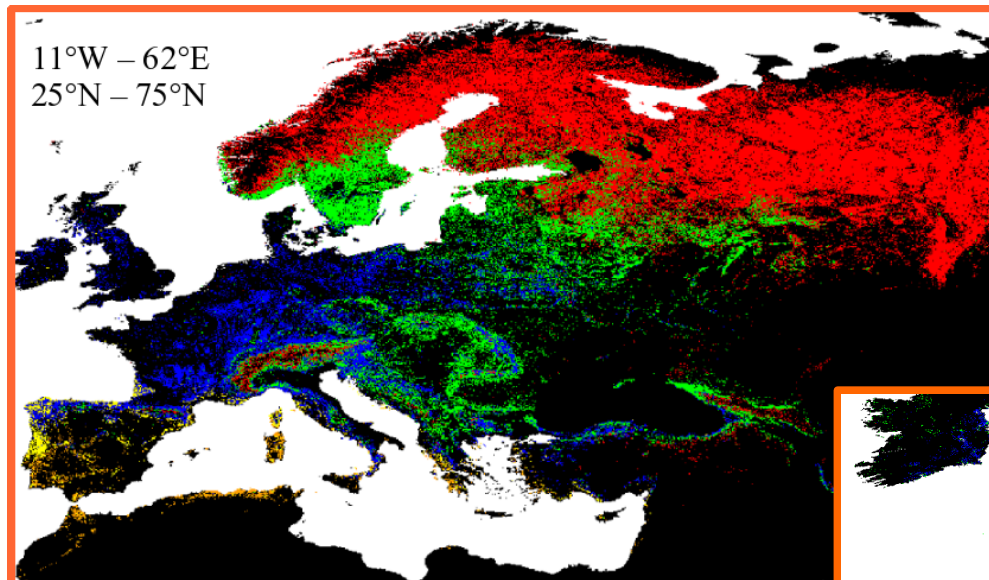
INITIAL CONDITIONS



MODEL STRUCTURE

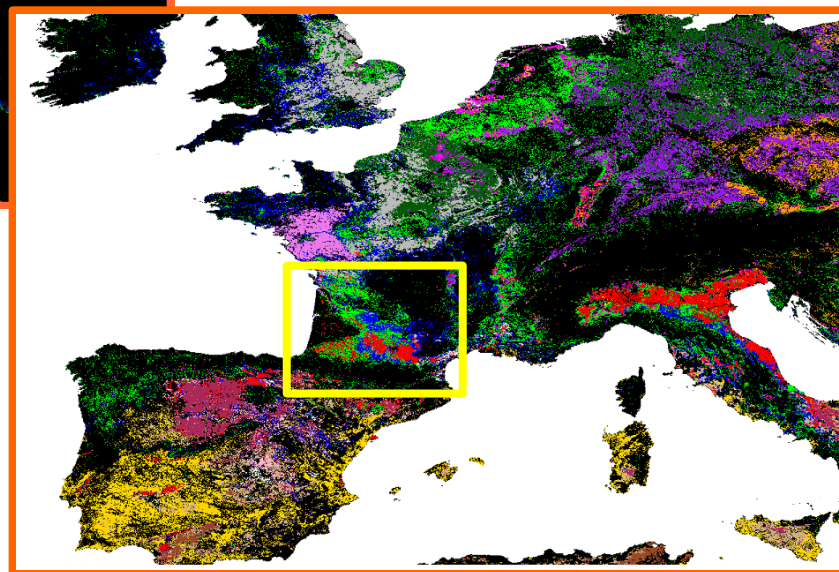


ECOCLIMAP II



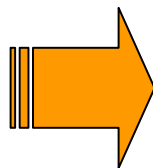
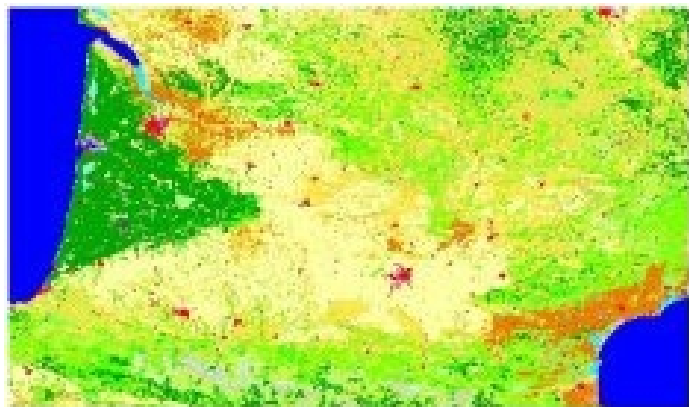
forests

crops

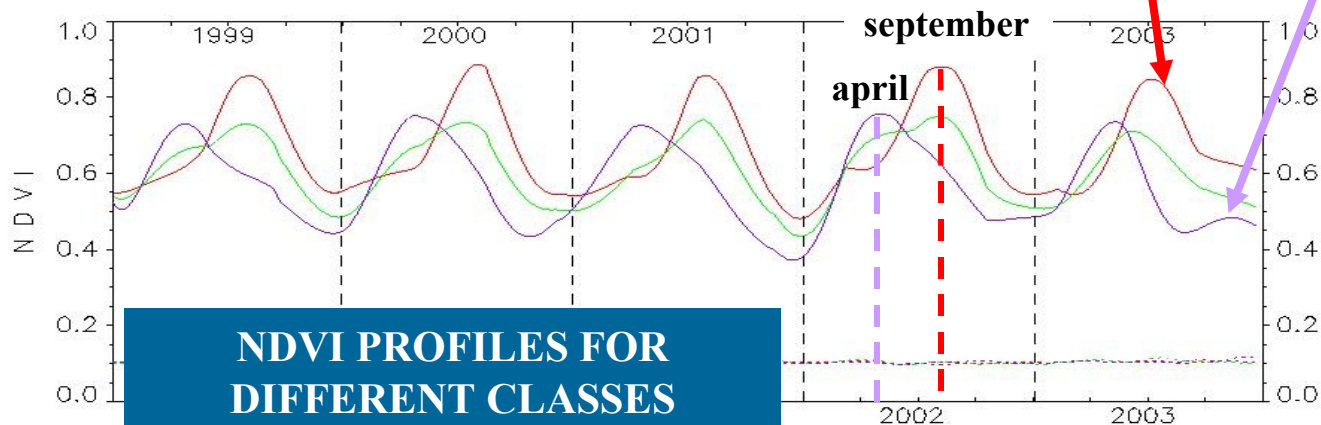
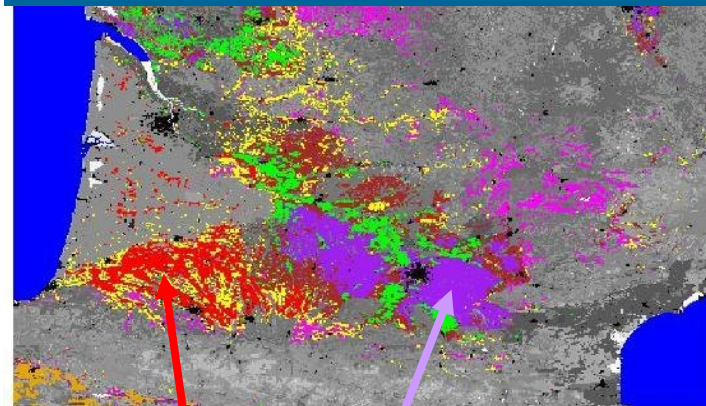


ECOCLIMAP II

Land cover of Corine 2000:
100 m resolution



7 classes for crops



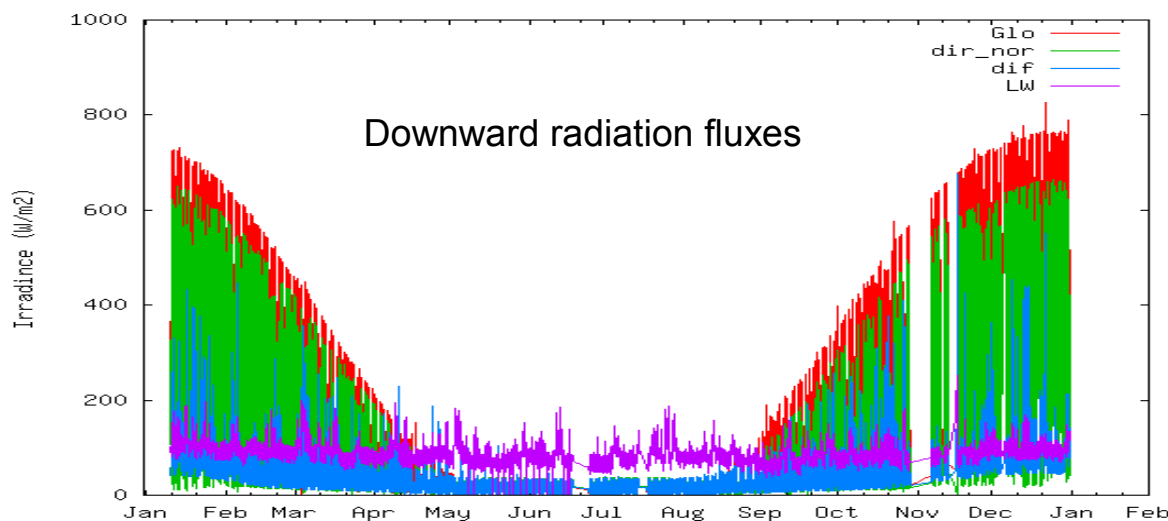
Summer crops (corn)

Winter crops (wheat)

mixed crops

Modelling over Antarctica

- Collaboration with Astrophysics Laboratory of Arcetri in Florence: E. Masciadri et F. Lascaux. Improved optical turbulence.
- Objectives:
 - At the start, user support on meso-NH regarding surface aspects
 - Improvements of the current system to better simulate Ts
 - Characterize the PBL in Antarctica et simulate improved surface fluxes

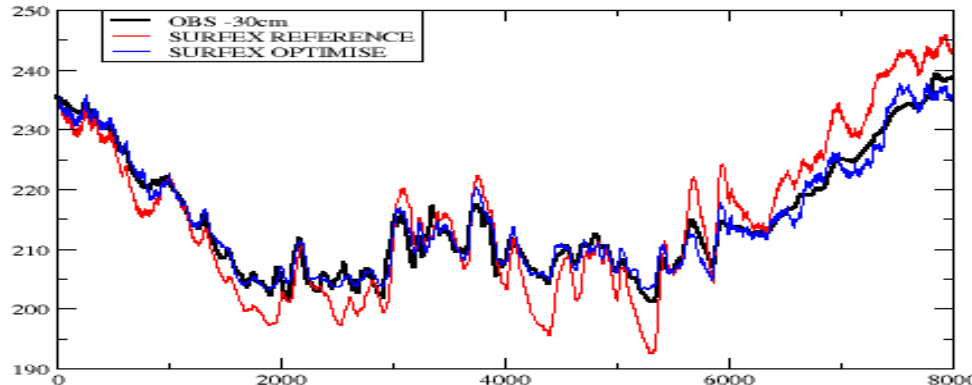


Modelling over Antarctica

■ Method:

- Simplified description of the surface at DomeC: isba-2L over frozen soil
 - No water exchanges
 - Modified thermal conductivity – low density ice
 - Include a restore term towards a climatological T_c in the deep soil temperature equation T_2
- Calibration of T_c of the time constant γ for improving T_2 :

$$\frac{\partial T_2}{\partial t} = \frac{1}{\tau}(T_s - T_2) + \frac{1}{\gamma\tau}(T_c - T_2)$$



T2 isba compared to obs at 30cm

Thank you for your attention !