



38th EWGLAM - 23rd SRNWP EUMETNET Meetings
October, 3rd - 6th, 2016 - Rome

Session: Surface Aspects

ALADIN Surface Overview

P. Le Moigne, Météo-France / CNRM

With information provided by P. Termonia & R. Hamdi

Outline

- ❖ Data Assimilation
- ❖ Physiography
- ❖ Model - System

Data Assimilation

❖ Austria

- ✓ Use of SODA software

❖ Belgium

- ✓ PhD of A. Duerinkx: combining Extended Kalman Filter for surface fields and 3DVAR-ALARO for upper air fields
- ✓ Tests of EKF and STAEKF



❖ Portugal

- ✓ Use of OI to improve screen level variables used as input for FWI fire index computation (H2020 project)

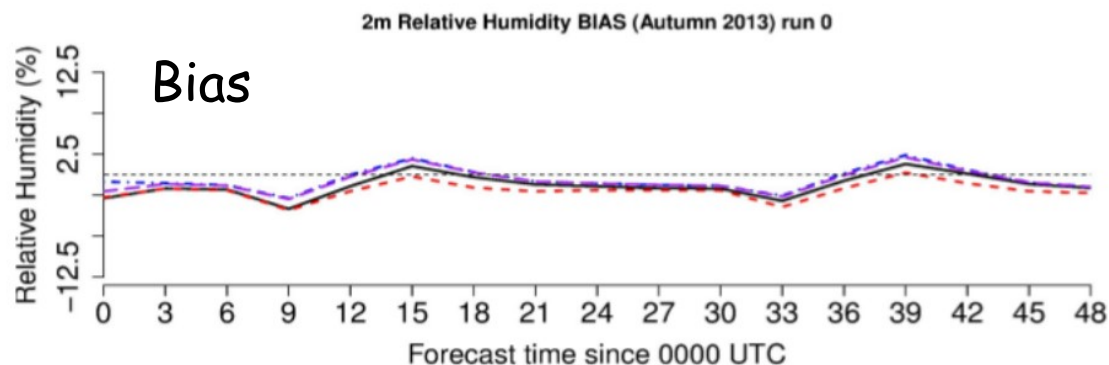
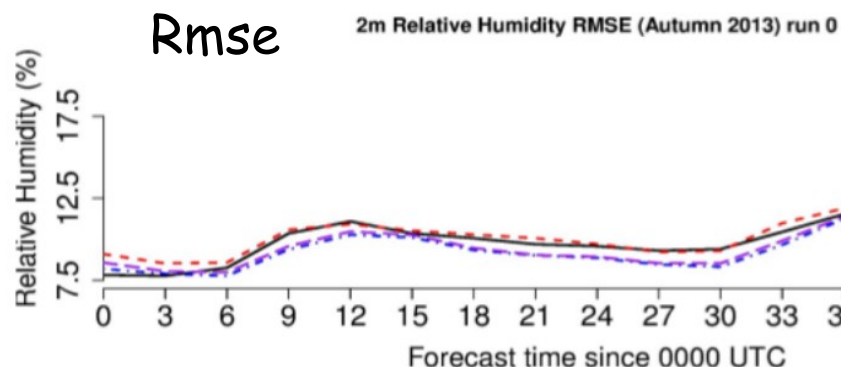
❖ France

- ✓ Global LDAS based on SODA using ISBA-DIF



Data Assimilation: Belgium

- ❖ Find the optimal setup for NWP applications at RMI



RH2M

	Initial Conditions	
	Atmosphere	Soil
Open Loop (OL)	ARPEGE analysis	ARPEGE analysis
Optimum Interpolation (OI)	ARPEGE analysis	OI
Extended Kalman Filter (EKF)	ARPEGE analysis	EKF
3dVar+OL	3dVar	ARPEGE analysis
3dVar+Free run	3dVar	6h fc. from prev. run
3dVar+OI	3dVar	OI
3dVar+EKF	3dVar	EKF
3dVar+OI/EKF	3dVar	OI(soil temp.) + EKF(soil moisture)

PhD A. Duerinkx, 2015

Data Assimilation: Belgium

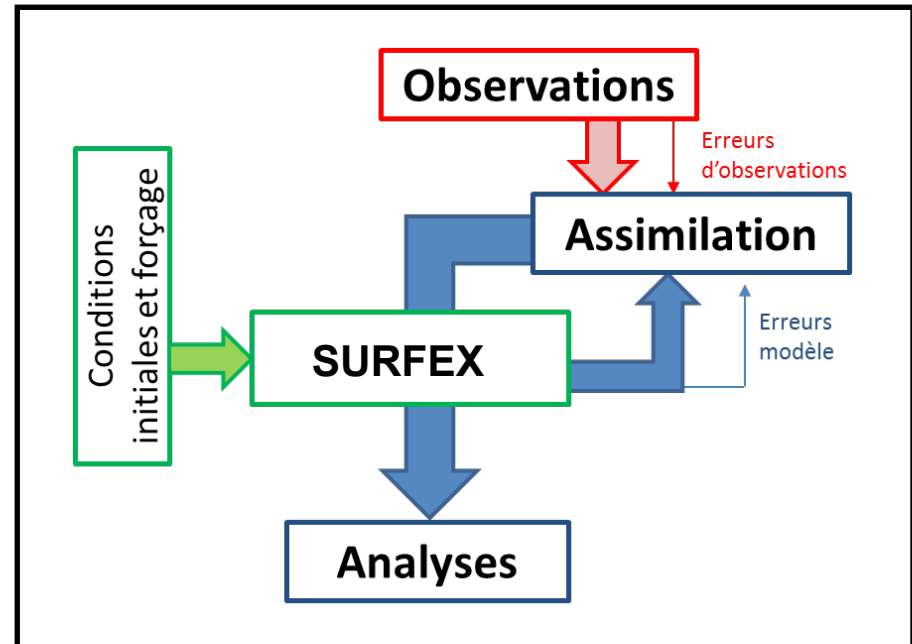
❖ Conclusions

- ✓ Surface DA using EKF compared to the current operational Open Loop configuration:
 - Improves humidity scores
 - Remains neutral for temperature
- ✓ The potential benefits of the combination of upper-air and surface DA is shown in the soil moisture and screen-level relative humidity verification
- ✓ As far as the RMI operational configuration is concerned:
 - Including a surface DA seems beneficial
 - Including a 3DVAR upper-air DA needs further investigation, particularly to evaluate the possibility to use satellite, GNSS and radar data

Data Assimilation: France

Clément Albergel, et al., MF

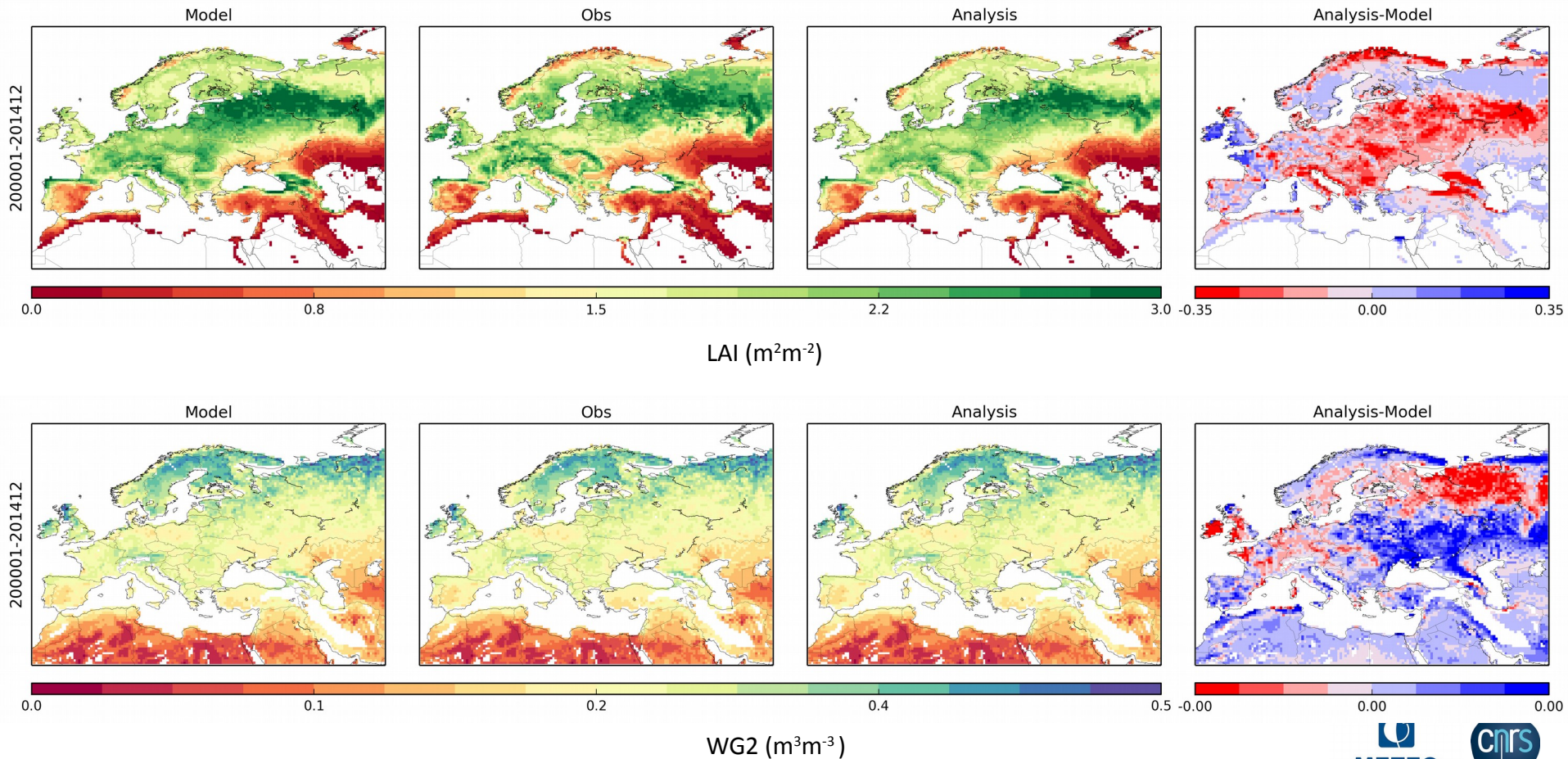
- ❖ LDAS: Land Data Assimilation System for surface variables
- ❖ A portable tool



Model	Domain	Atm. Forcing	DA Method	Obs.	Observation Operator	Control variable	Evaluation
ISBA-3L <i>ISBA-DF</i>	France (8km) <i>SAFRAN (8km)</i> <i>Selected zone (0.5°, 0.25°)</i> <i>Global (1°, 0.5°)</i>	SAFRAN <i>ERA-Interim</i> <i>Earth2Obs.</i>	SEKF <i>EnKF*</i>	SSM (ASCAT-SWI, <i>ESA-CCI</i>) LAI	WG1 (0-1cm) <i>WG2 (1-4cm)* *</i> LAI	WG2 <i>WG1, XX, 8***</i> LAI	FAPAR, SA, LST, <i>SIF</i> <i>MODCOU**</i> * <i>TRIP</i>

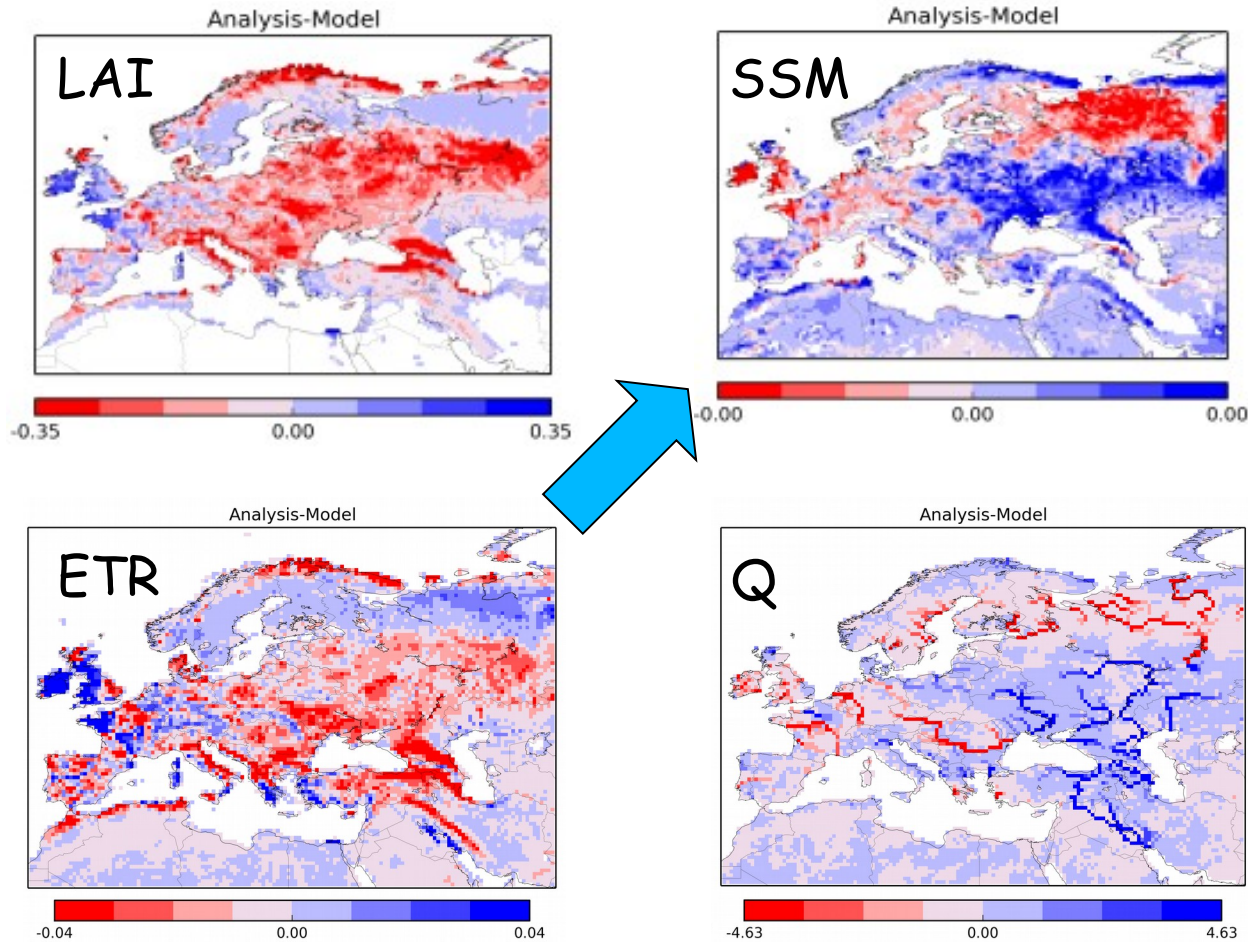
LDAS over Europe: SURFEX+TRIP

❖ Impact on LAI and SSM (2000-2014)



LDAS over Europe: SURFEX+TRIP

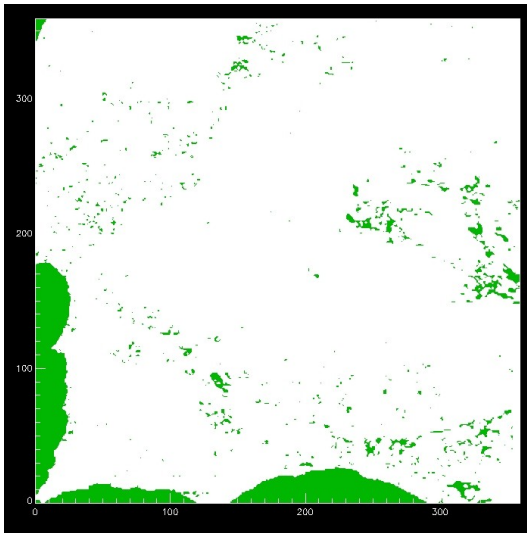
❖ Analysis - Model



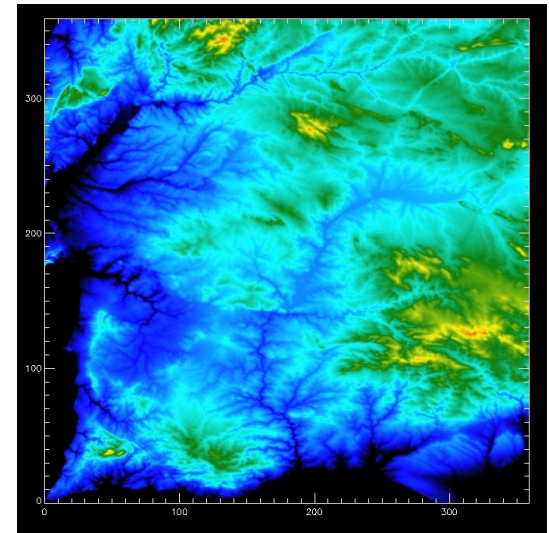
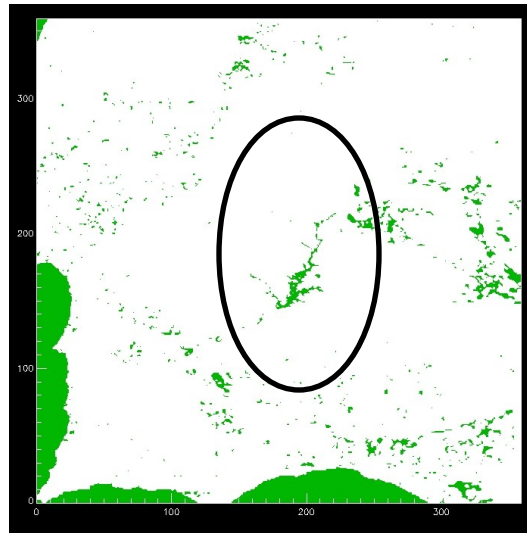
Physiography

❖ Portugal

- ✓ Add Alqueva reservoir into ECOCLIMAP / GMTED maps



Lake fraction



Elevation

- ✓ To be used in AROME Portugal operational suite
- ✓ To enable running lake model FLake

Physiography

❖ France

✓ ECOCLIMAP-SG

- Initiative to update current ECOCLIMAP 1km surface database with ESA-CCI 300m products
 - Higher resolution information
 - "Regular" update
 - Account for users regional maps
- Replace existing "covers" by PFTs
- Define PFTs classes from both ESA-CCI and ECOCLIMAP classifications (~35 classes)
- Define PFTs parameters for SURFEX

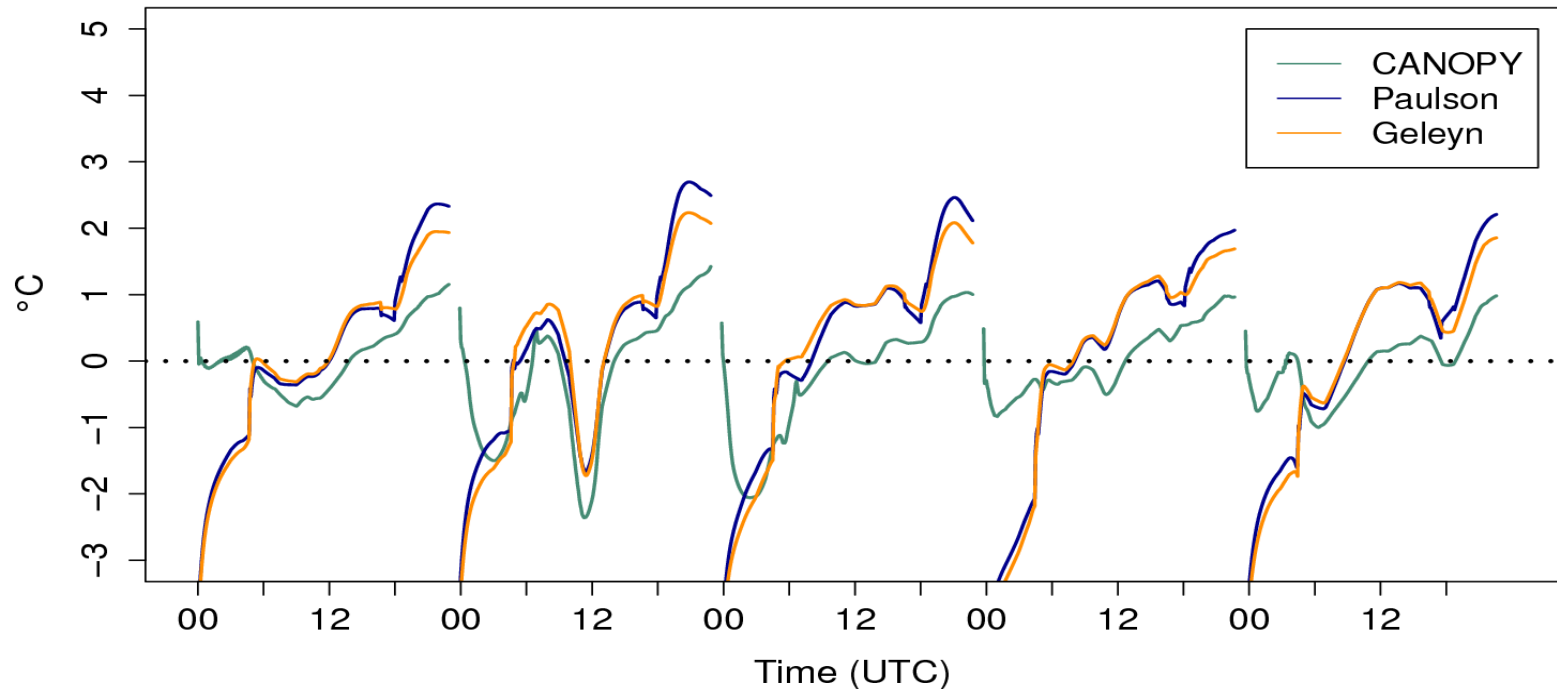
Model – System

- ❖ Coupling ALARO1 with TOUCANS to SURFEX
 - ✓ TOUCANS stability functions in SURFEX v7.2
 - ✓ Use of averaged drag exchange coefficients from SURFEX at initial step - To be tested in SURFEX v8
 - ✓ Bratislava working week Nov. 2015
 - ✓ Stay of R. Hamdi in Prague

- ❖ How to generate non-SURFEX initial conditions from an ARPEGE-SURFEX run ?
 - ✓ Bratislava working week
 - ✓ Already solved for climate simulation (CMIP5) with an other SURFEX version
 - ✓ MF provided e-suite ARPEGE-SURFEX files but procedure was not successful

Model: Urban Heat Island

- ❖ 24h ALARO-SURFEX-ISBA (no urban signature) used to drive TEB offline for SZEGED city

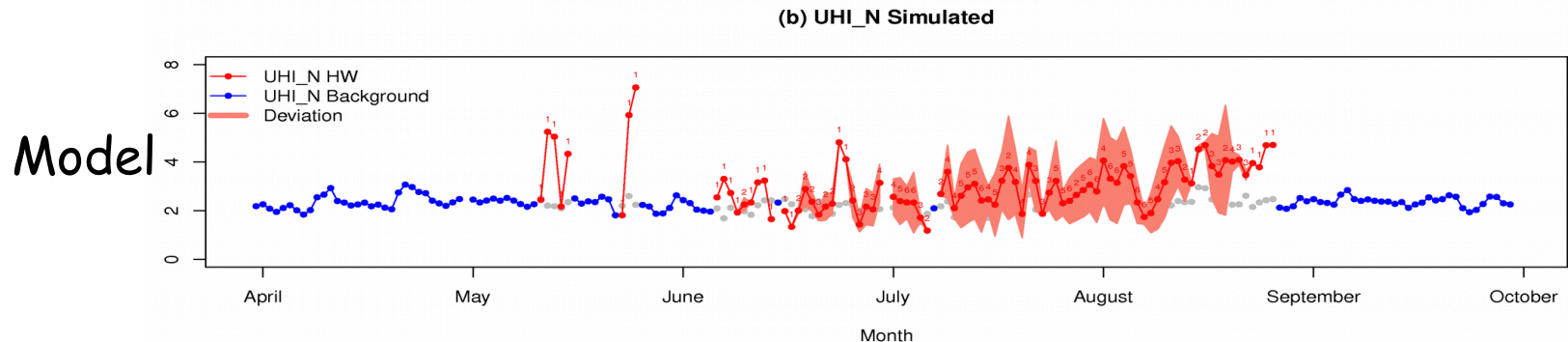
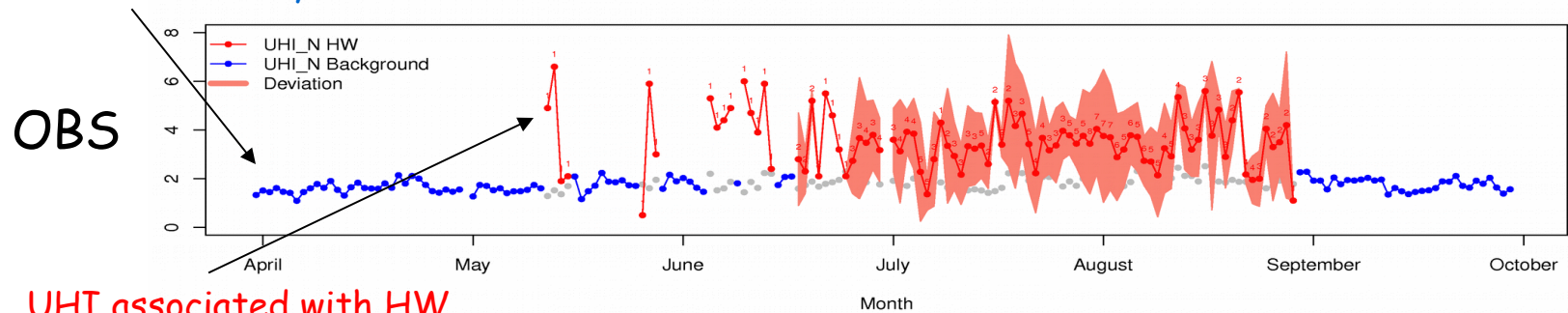


- ❖ A 6 hour spinup when SURFEX screen level diagnostic options are used
- ❖ No spinup with Canopy (quick adaptation)

Model: Urban Climate

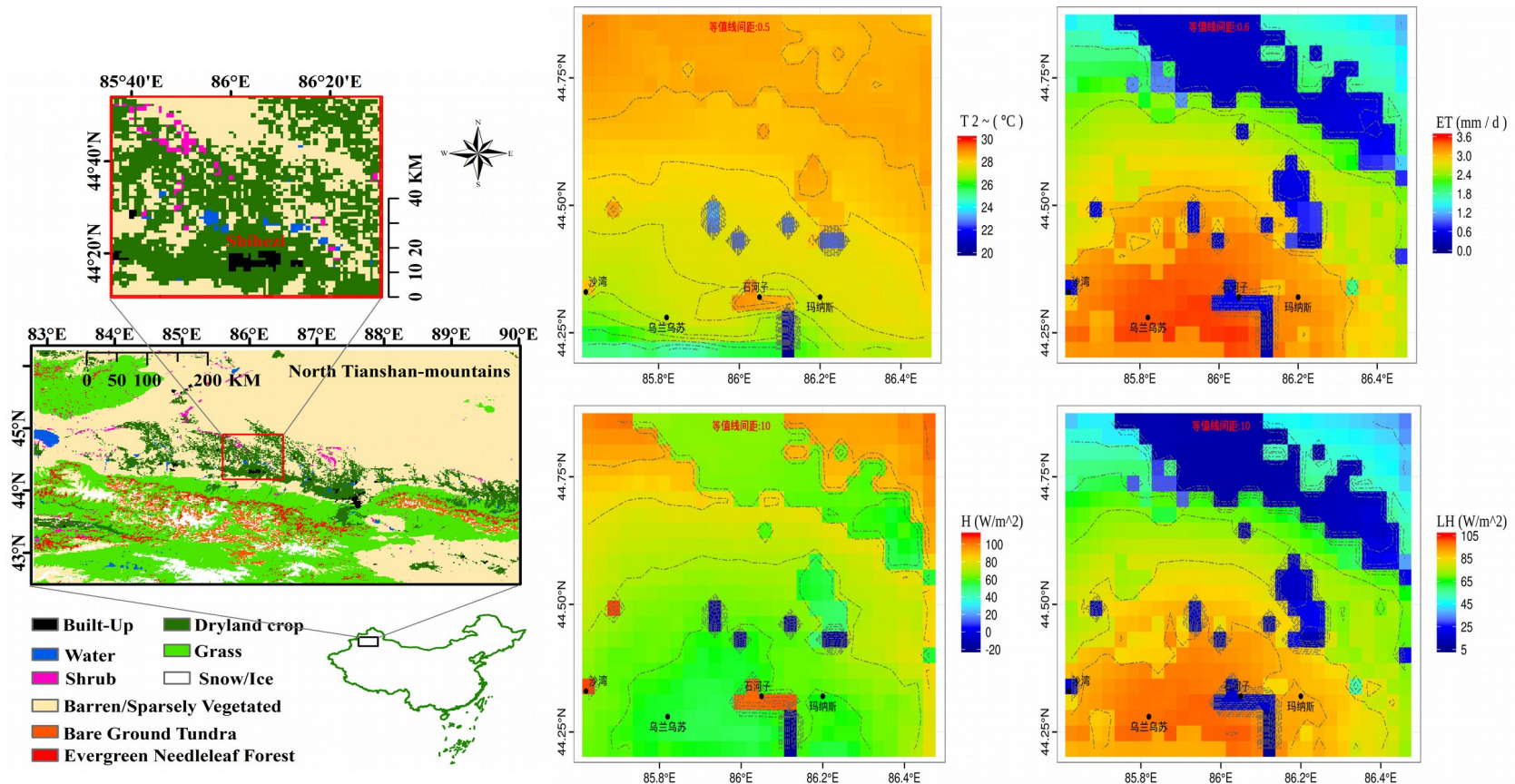
- ❖ Interaction between urban effects and extreme events: heat waves - Hamdi et al., 2016
- ❖ UHI between Brussels and Brussegem rural city
- ❖ 30-yr ALARO+SURFEX (ISBA+TEB) @ 4km over Benelux and north France driving 1km offline TEB

UHI over the 30-yr



Model: Urban Climate

- ❖ Collaboration with the Chinese Academy of Science:
 - ✓ Royal Meteorological Institute of Belgium,
 - ✓ Ghent University
 - ✓ The Xinjiang Institute of Ecology and Geography



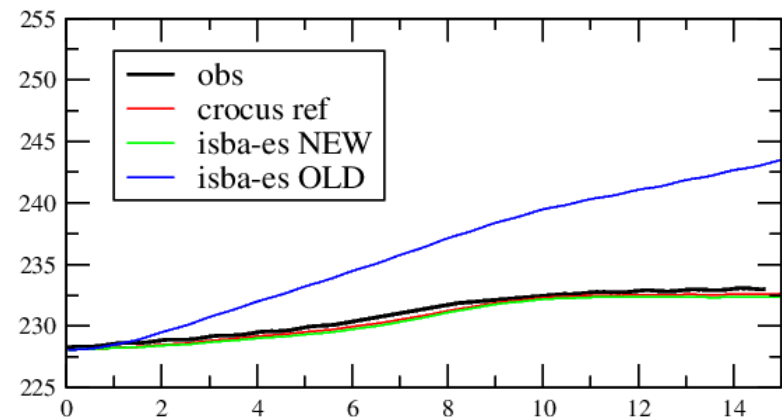
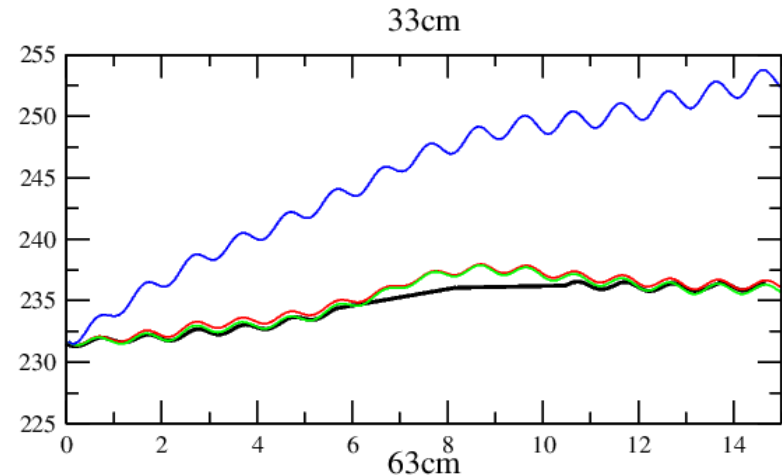
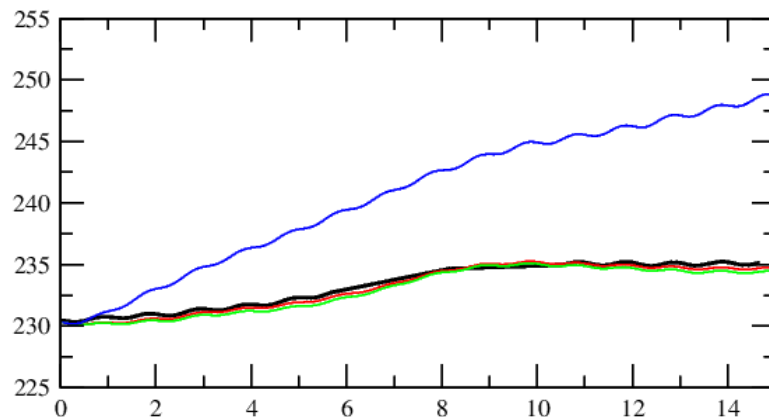
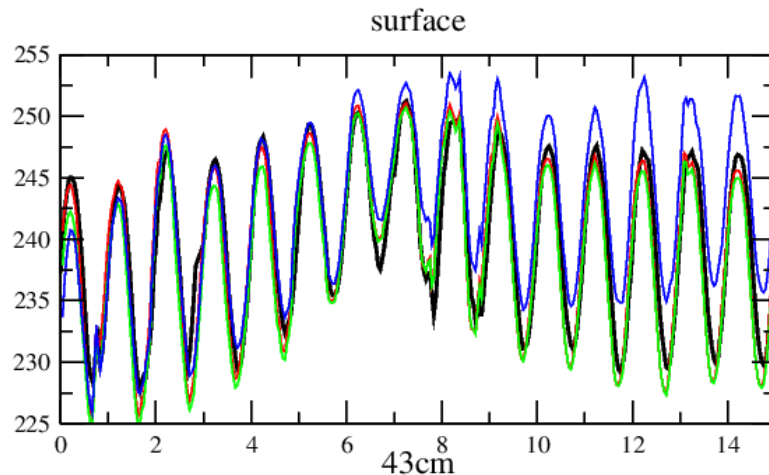
Model: Main SURFEX updates

❖ SURFEX v8 open source since May 2016

✓ Improvement in ES explicit snow scheme

→ Decharme et al., 2016

Snow temperatures at DomeC



Model: Main SURFEX updates

- ❖ SURFEX v8 open source since May 2016
 - ✓ Improvement in ES explicit snow scheme
 - Decharme et al., 2016
 - ✓ Coupling the global ARPEGE-climate model to SURFEX/FLake
 - Le Moigne et al., 2016
 - ✓ Improvement of the radiative transfer inside vegetation
 - Carrer et al., 2013
 - ✓ Development of ISBA-MEB model in collaboration with SMHI
 - ✓ Using soil DIF scheme, ES scheme - Forests
 - Boone et al., 2017
 - Napoly et al., 2017
 - Samuelsson et al., 2017 ... hopefully ;)

Conclusions and Plans

❖ Data Assimilation

- ✓ Growing activity around EKF (EnKF, STAEKF, etc.)→SODA
- ✓ Meeting in Lisbon on DA, April 2016
- ✓ Working days on surface DA end of October in Zagreb

❖ Physiography

- ✓ Development of new surface map at higher resolution
- ✓ Modification of ECOCLIMAP for operational purposes

❖ Model

- ✓ TEB: used for local and regional climate studies
- ✓ SURFEX V8 new promising options

❖ Coupling ALARO1 with SURFEX

- ✓ Solve TOUCANS interfacing to SURFEX issue

❖ Coupling ARPEGE with SURFEX

- ✓ Ongoing work at MF
- ✓ Impact on ALADIN users



Thanks for your attention !!