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Eidgenössisches Departement des Innern EDI
Bundesamt für Meteorologie und Klimatologie MeteoSchweiz

WG3b activities

Jean-Marie Bettems / MeteoSwiss

St Petersburg, COSMO GM, September 2018

WG3b activities

Core TERRA developments

- **TERRA developments at DWD**
- **PT TERRA Nova + MSc @ ETHZ** (validation)
- **PhD @ MCH / ETHZ** (hydrology…)
- **2x PhD @ Uni Giessen** (phenology, land use, vegetation albedo…)

Other activities

- **PP CALMO-MAX** (Automatic calibration)
- **PT AEVUS** (Urban parameterization)
- **PT SAINT** (Snow pack parameterization)
- **Mire parameterization** (→ v5.06)**, Snow analysis, SRNWP data pool**

Software

- **EXTPAR, SNOWE, TSA, CALMO MM**

WG3b activities

Summary of WG3b activities and links to related documents

http://www.cosmo-model.org/content/tasks/workGroups/wg3b/default.htm

Feedback welcome!

Recent developments at DWD

- **Unified** COSMO / ICON TERRA running in C-D2
  (COSMO configuration, v5.05) [better COSMO scores]
- Work on **canopy** features in TERRA
  (M. Raschendorfer, J.-P. Schulz, J. Helmert) [work in progress]
- Improved **snow evaporation** in forests
  (G. Zängl) [in ICON]
- Revised diurnal cycle of plant **evapotranspiration**
  (G. Zängl) [in ICON]
- Bug fix in **soil water budget**
  (L.Schlemmer, J. Helmert, G. Zängl) [done]

- **EXTPAR**: Merging with ETH, MPI; new DEM (DLR, Airbus)
  (K. Osterried, L. Kornblueh, J. Helmert) [work in progress]

Priority Task
Terra Nova
Status

Yiftach Ziv
R&D Department
Israel Meteorological Service

COSMO General Meeting
02-06 September 2018 St. Petersburg, Russia

PT Terra Nova

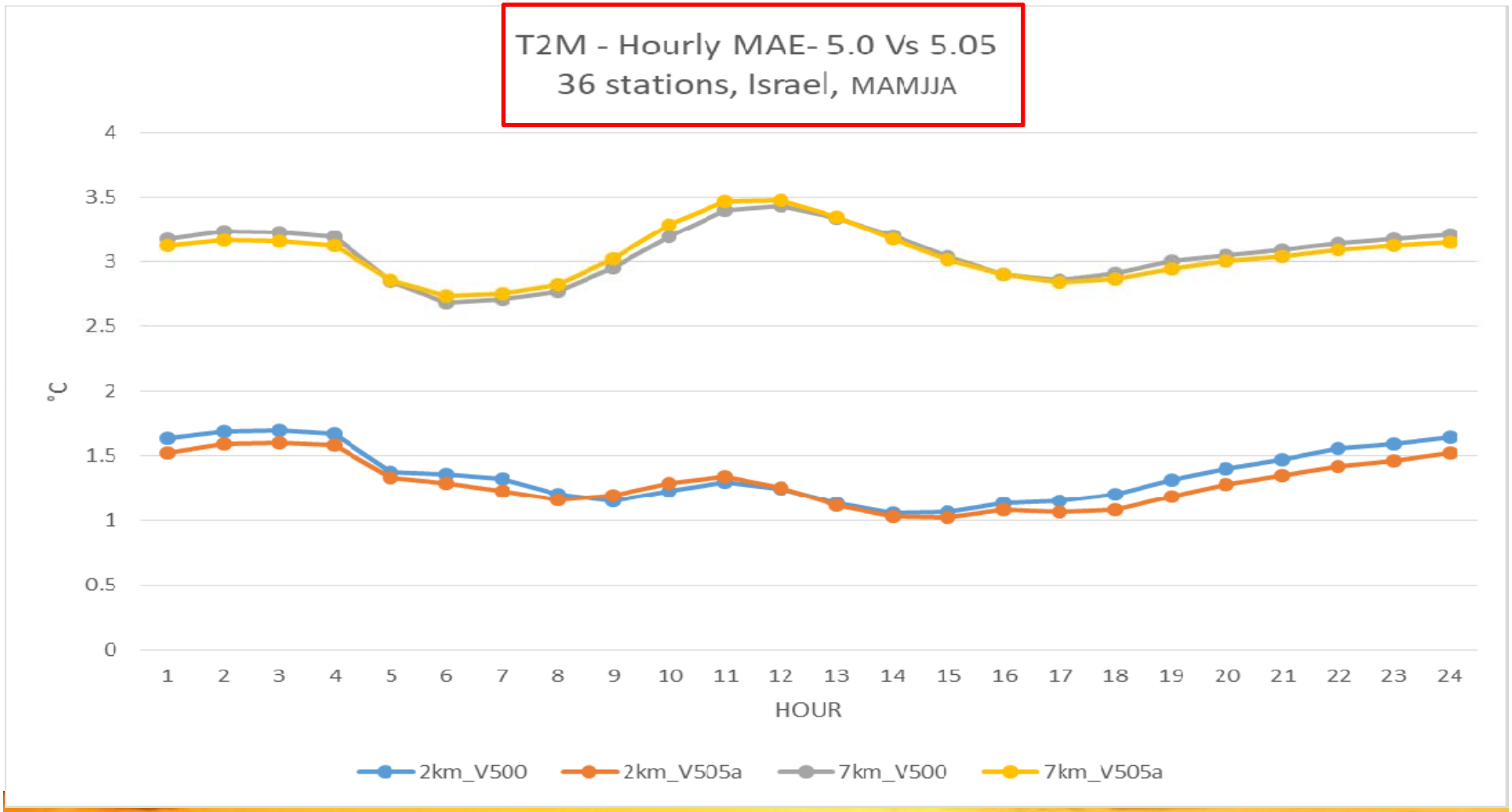
Objectives

→ **document** TERRA performance, compare with CLM performance
→ **hindcast** (6-9 months), for different periods of time
→ compare v5.0 / v5.05 conservative / v5.05 aggresive (/ CLM)
→ 3 target domains: central Europe, Eastern Mediteranean, North-Western Russia

Current Status

→ extension approved until end Feb. 2019
→ simulations of base version (5.00, 5.03) are completed
→ experiments with v5.05 started

PT Terra Nova

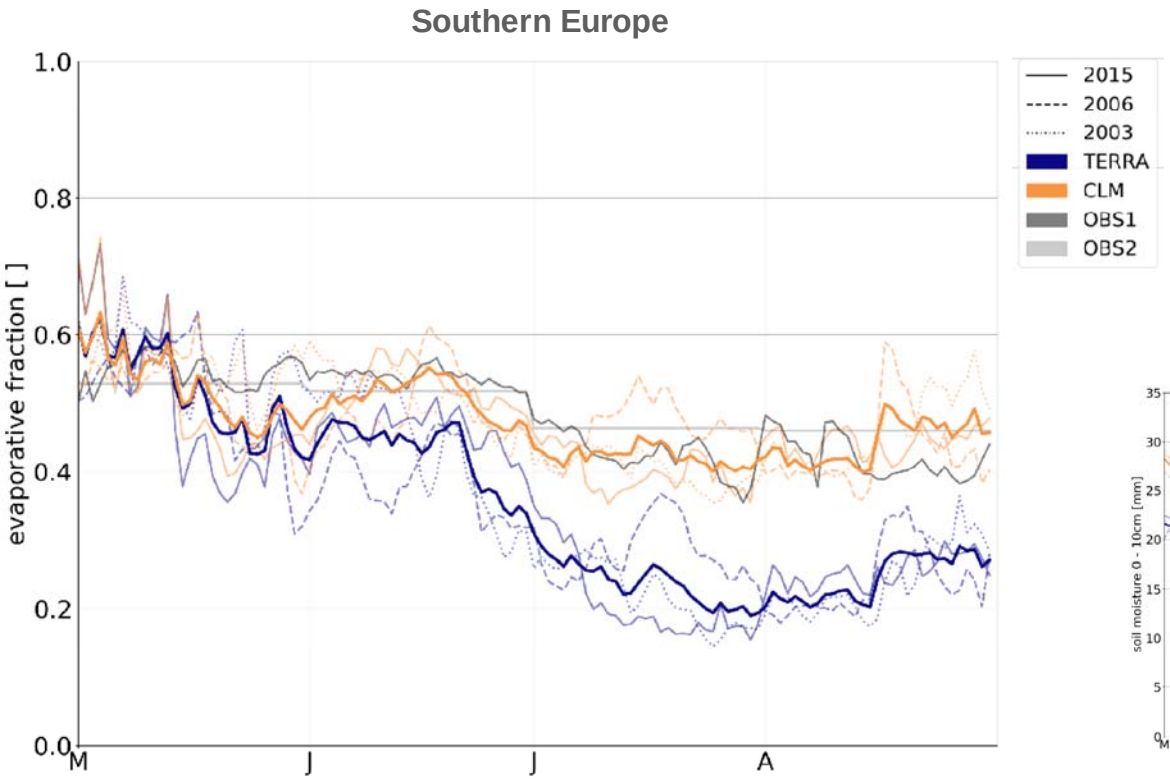


[VERIMIP] Comparison of COSMO-TERRA and COSMO-CLM in weather mode for summer heat extremes

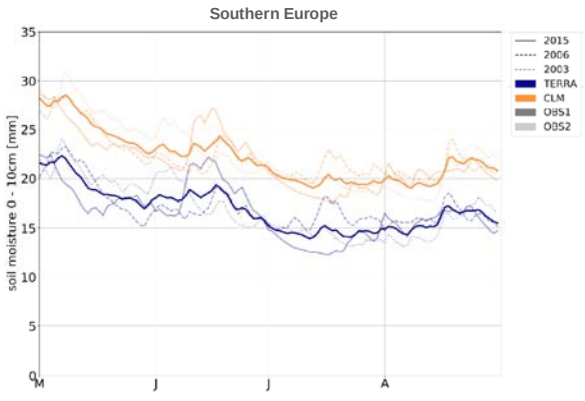
Verena Bessenbacher
Supervisors: Sonia Seneviratne, Edouard Davin, Jean-Marie Bettems (MCH)
Collaborators: Yiftach Ziv, IMS (TERRA simulations), Matthieu Leclair, ETH (CLM simulations), Oliver Fuhrer, MCH, Pirmin Kaufmann, MCH, Anke Duguay-Tezlaff, MCH, …
Submission date: June 1st, 2018

SW [W m^{-2}]					shortwave radiation [Wm^{-2}]	
Ground heat flux [W m^{-2}]						ground heat flux [Wm^{-2}]

Evaporative fraction



$$EF = \frac{LH}{LH + SH}$$

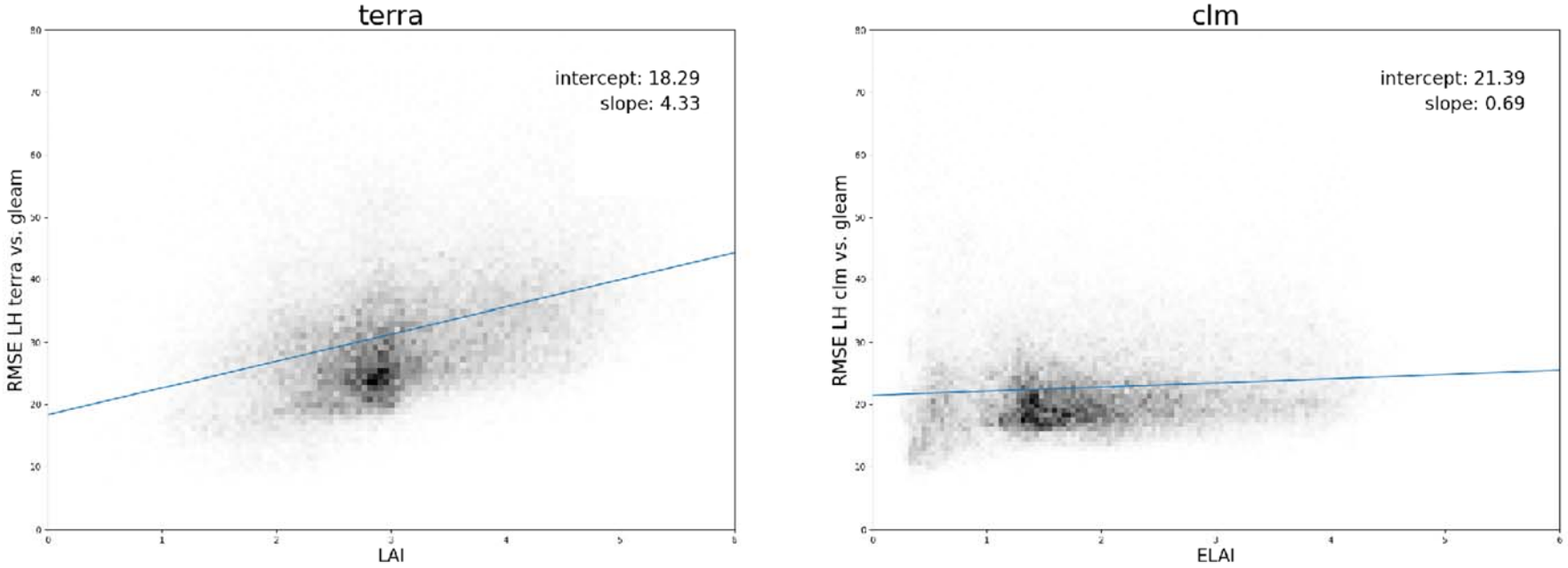


EF

W_SO, 0 – 10cm

Error dependency on LAI

JJA 2015



the more vegetation in COSMO-TERRA, the worse it performs in terms of latent heat

ETH zürich

The impact of land-surface scheme parametrization on numerical weather prediction forecasts and climate simulations

COSMO General Meeting 2018

Daniel Regenass

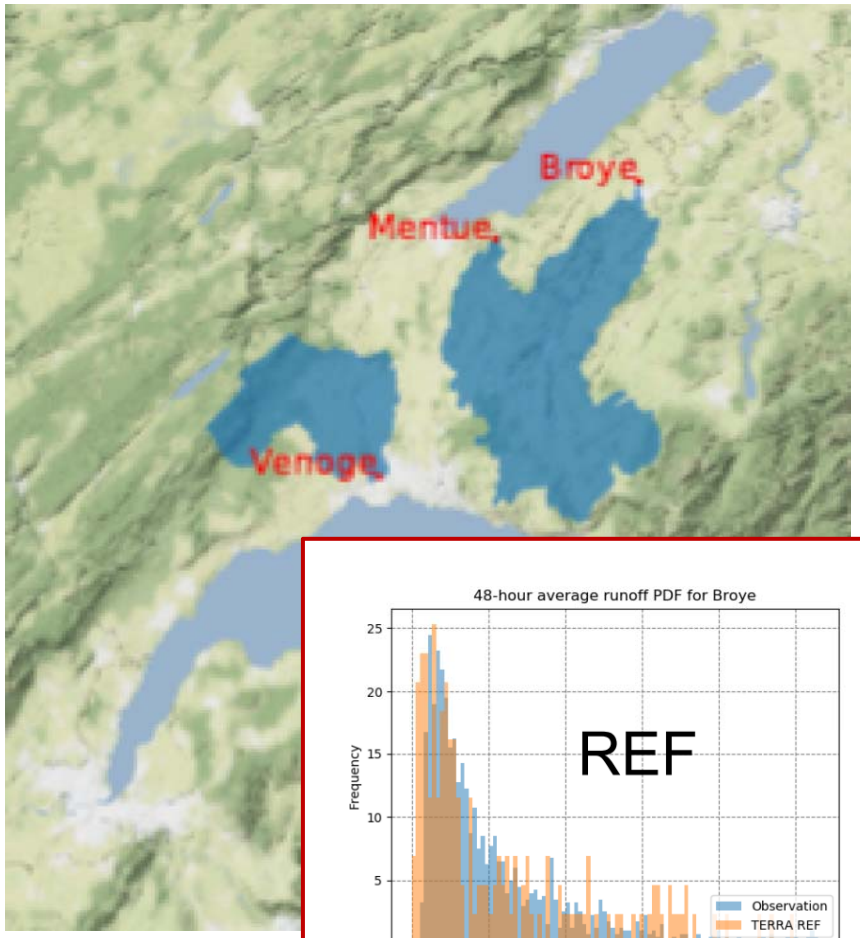
IAC Institute for Atmospheric and Climate Science

C2SM Center for Climate Systems Modeling

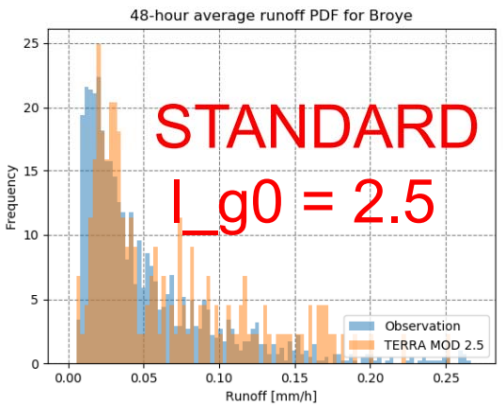
MeteoSwiss

$$Q \sim K(z)\, l\_g\, s\_oro$$

Catchment based runoff validation for km-scale simulations



- Data for direct validation of soil moisture and fluxes is sparse and highly scale dependent.
- Runoff estimate is critical to get terrestrial water storage right.
- Scaling parameter l_g (scaling runoff to sub-gridscale slope) is



REF: Reference simulation with old hydrology

STANDARD: New hydrology with standard value for l_g

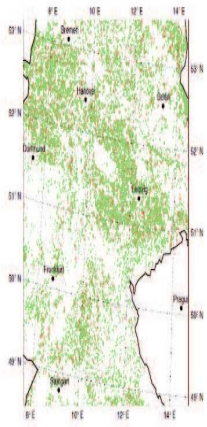
DFG, 2018

Project Proposal

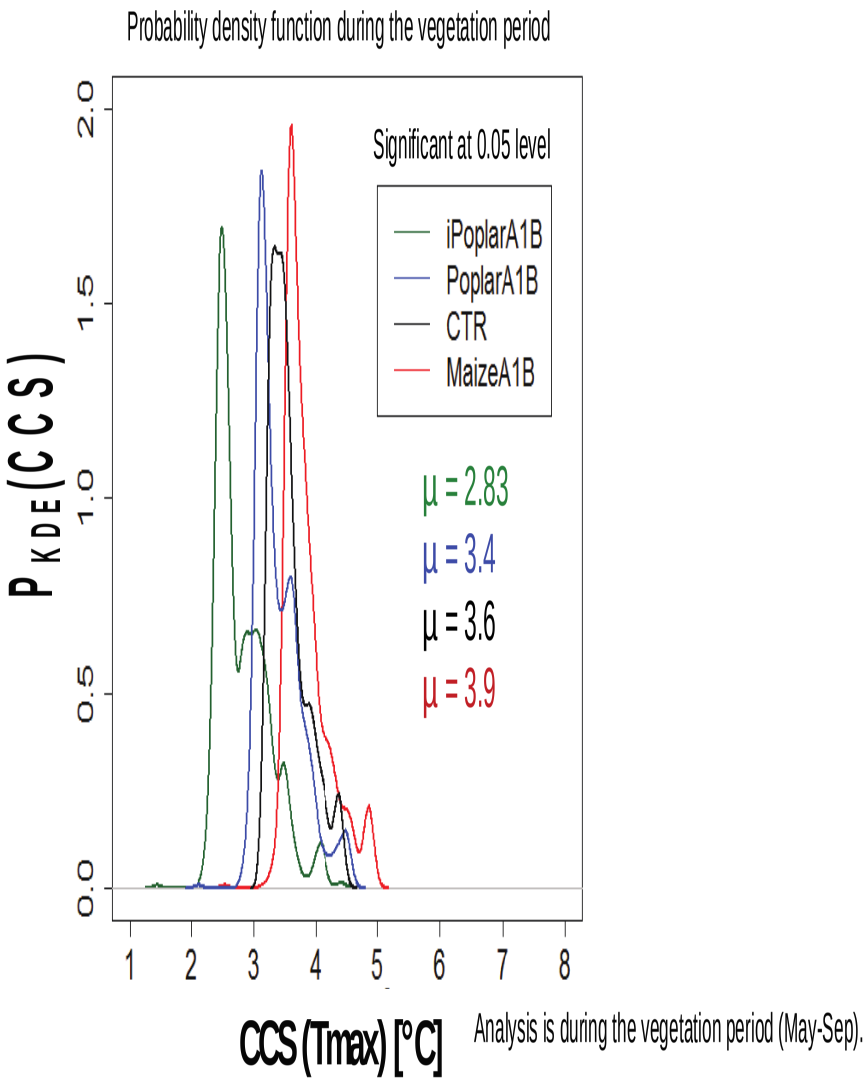
Reducing the uncertainty on regional and local climate induced by land-atmosphere feedbacks

Dr. Merja Tölle

Dept. of Geography, Merja.Toelle@geogr.uni-giessen.de



Land use change impact on future climate



Reduced climate change signal of Tmax due to increases in bioenergy regions.

Tölle et al. 2014

do

Status of PT AEVUS – Analysis and Evaluation of TERRA-URB scheme

Task Leader: Paola Mercogliano (CIRA)

04.2018 – 06.2019

Introduction

Goal: Testing the implementation of the **TERRA-URB scheme**

Institutions:

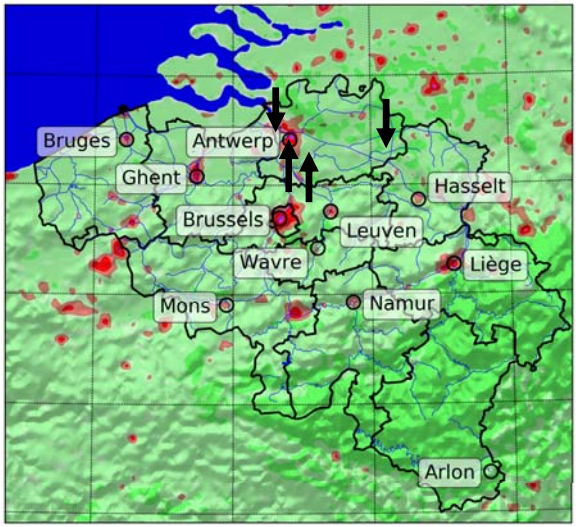
- CIRA - Italian Aerospace Research Center
- RHM – HydroMet Center of Russia
- KU Leuven - Belgium
- ARPA Piemonte - Italy

Researchers: P. Mercogliano (CIRA), E. Bucchignani (CIRA), E. Oberto (ARPA Piemonte), I. Rozinkina (RHM), D. Blinov (RHM), H. Wouters (KU Leuven), V. Garbero (ARPA Piemonte), G. Rivin (RHM), M. Varentsov (RHM), A. Kirsanov (RHM) .

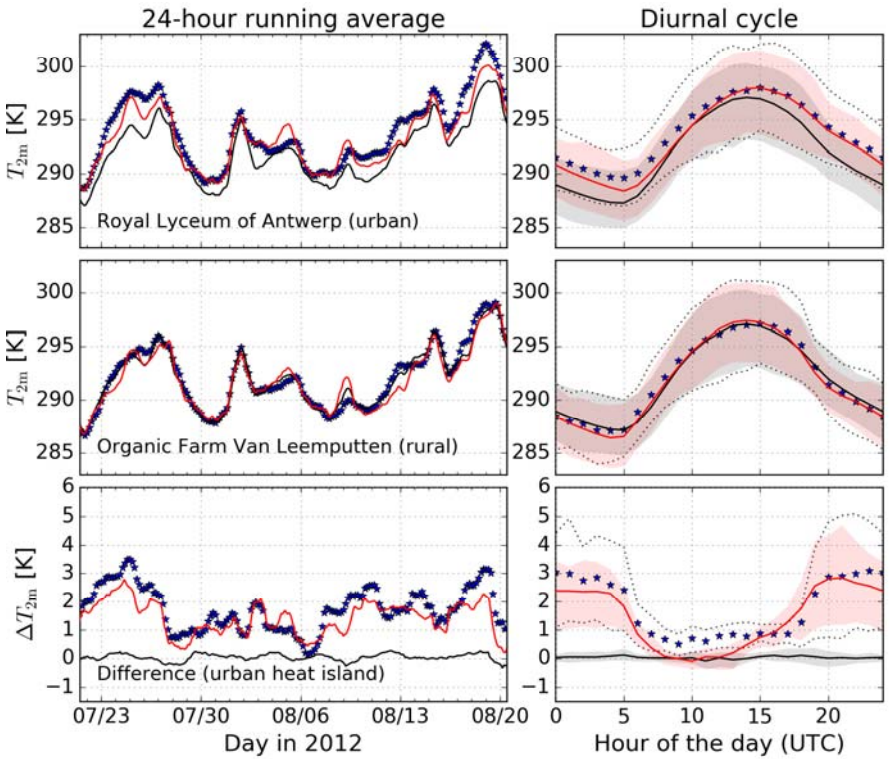
Advising and collaborations:
J.M. Bettems (MeteoSwiss), U. Blahak (DWD), M. Milelli (ARPA Piemonte), P. Khain (IMS).

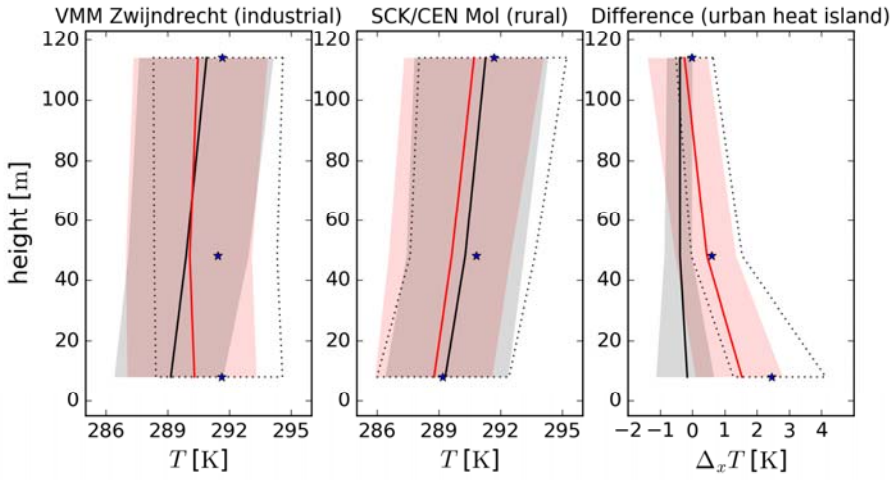
Evaluation of the urban heat island (by H. Wouters)

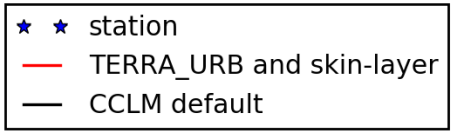
in-situ



tower







Слайд 22

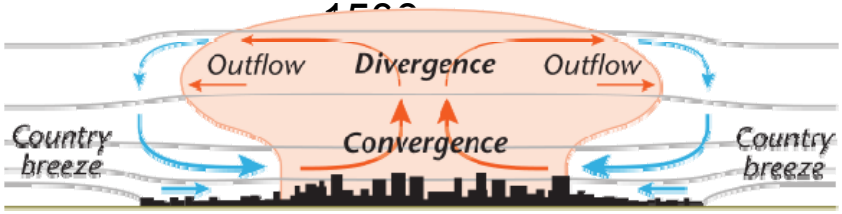
HW1 The downwards arrows indicate the locations of the towers, and the upwards arrows the locations of the in-situ stations.
Hendrik Wouters; 08.09.2017

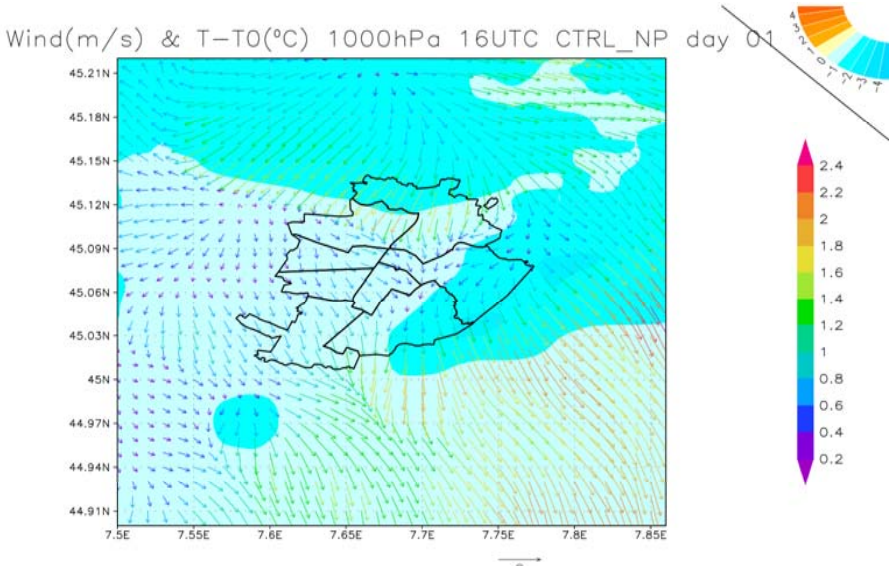
HW2 The ranges indicate the 16th and 84th percentiles for station observations (dots) TERRA_URB+SL (light red area) and CCLM default (grey) during the mid-summer period (2012/07/21 -> 2012/08/20)
Hendrik Wouters; 08.09.2017

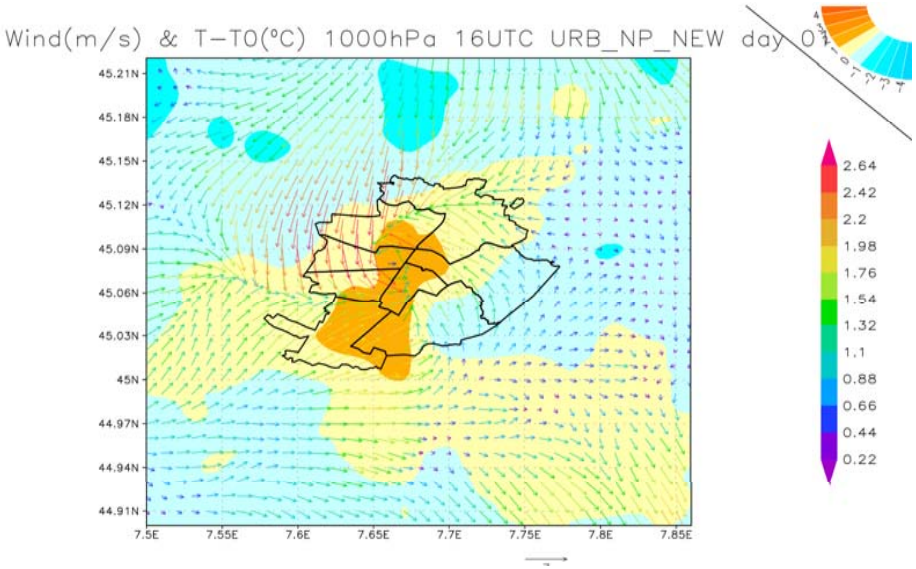
SubTask0: model evaluation

urban breeze effect

(Oke et al., 2017)







Status of PT AEVUS

The beginning of the activities has been **delayed** (with respect to the original plan) due to unavailability of the COSMO version including TERRA-URB.

In January 2018, the COSMO version 5.04g_urb1 has been implemented on the CIRA supercomputer and several bugs have been detected.

In April 2018, a SubTask0 has been established to inform DWD about the status and presence of bugs. An array of runs has been performed, modifying the model configuration by varying some keys parameters. **The debugging of the beta model version including TERRA-URB that was successfully achieved.**

In June 2018, **COSMO version 5.05 (including TERRA-URB)** has been officially released.

PT AEVUS – Sub tasks

Sub task 0: Debugging of the COSMO climate version COSMO5.0-CLM9 including TERRA-URB

Sub task 1: Selection of case studies
Different regions of **Italy**, **Moscow** (Russia), and urban areas of **Belgium** will be considered.

Sub task 2: Simulation set-up and runs.
After the installation of COSMO v5.6, a simulation setup must be provided

Sub task 3: Calibration of the TERRA-URB scheme
SURY needs several input **urban parameter fields**. For this reason, it is necessary to investigate the model sensitivity performing a series of experiments.

Sub task 4: Evaluation and verification of the case studies
The **verification** is the key point of the work.

Sub task 5: Writing of the final report
The results must be summarized in a **document** useful for all the scientists of the Consortium.

Thank you for your attention!