COSMO PP CITTA' Kick-Off Meeting: Introduction

Jan-Peter Schulz

Deutscher Wetterdienst, Offenbach, Germany

and the PP CITTA' team

COSMO PP CITTA' Kick-Off Meeting, 4 Nov. 2021, Video Conference

COSMO Priority Project CITTA':

City Induced Temperature change Through A'dvanced modelling

Project leader: Jan-Peter Schulz (DWD)

Project duration: Jul. 2021 – Aug. 2024

The COSMO PP CITTA' team

ARPAP:	Valeria Garbero, Massimo Milelli
CIRA:	Edoardo Bucchignani
CMCC:	Paola Mercogliano, Carmela Apreda, Carmine De Lucia, Alfredo Reder, Francesco Repola
DWD:	Jan-Peter Schulz
IMGW-PIB:	Adam Jaczewski, Andrzej Wyszogrodzki, Witold Interewicz, Alan Mandal
IMS:	Leenes Uzan, Pavel Khain, Yoav Levi
KIT:	Julia Fuchs
NMA:	Rodica Dumitrache, Amalia Iriza-Burca, Bogdan Maco
PoliTo:	Francesca Bassani
RHM:	Mikhail Varentsov, Denis Blinov, Vladimir Kopeykin, Timofey Samsonov, Gdaly Rivin
VITO:	Hendrik Wouters

Agenda

- Introduction [Jan-Peter]
- New urban external parameters in EXTPAR [Carmela, Adam, ...]
- Implementation of TERRA_URB in ICON [Jan-Peter, Mikhail, Carmine]
- Miscellaneous [all]

Task 2: External parameters

Subtask 2.1: Consistency of urban external parameters

A method should be designed and implemented in order to avoid inconsistencies due to the differences between the URBAN (based on land use classes) and ISA (Impervious Surface Area, based on independent data sources) fields.

Deliverables: Consistent way to derive urban external parameters in EXTPAR.

Involved scientists: Valeria Garbero (ARPAP) 0.1 FTE, Mikhail Varentsov (RHM) 0.1 FTE, Alfredo Reder (CMCC) 0.1 FTE

FTEs: 0.3 FTE (Jul. 2021 – Jun. 2022)

Task 2: External parameters

Subtask 2.2: New urban external parameters in EXTPAR for ICON(-LAM)

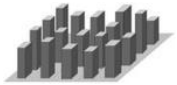
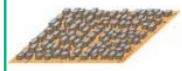
Meanwhile, two raw EXTPAR datasets for TERRA_URB are outdated and should be replaced. Furthermore, several internal parameters describing the urban geometry and the urban thermal and radiative properties, which were hardcoded in TERRA_URB as global constants, will be replaced by 2-dimensional fields from EXTPAR.

Deliverables: New urban external parameters in EXTPAR for ICON-LAM.

Involved scientists: Carmela Apreda (CMCC) 0.2 FTE, Adam Jaczewski (IMGW-PIB) 0.35 FTE, Andrzej Wyszogrodzki (IMGW-PIB) 0.15 FTE, Mikhail Varentsov (RHM) 0.2 FTE, Timofey Samsonov (RHM) 0.2 FTE, Valeria Garbero (ARPAP) 0.15 FTE, Massimo Milelli (ARPAP) 0.05 FTE, Francesca Bassani (PoliTo) 0.2 FTE, Jan-Peter Schulz (DWD) 0.2 FTE

FTEs: 1.7 FTE (Jul. 2021 – Jun. 2022)

Description of LCZs classes – ECOCLIMAP-SG

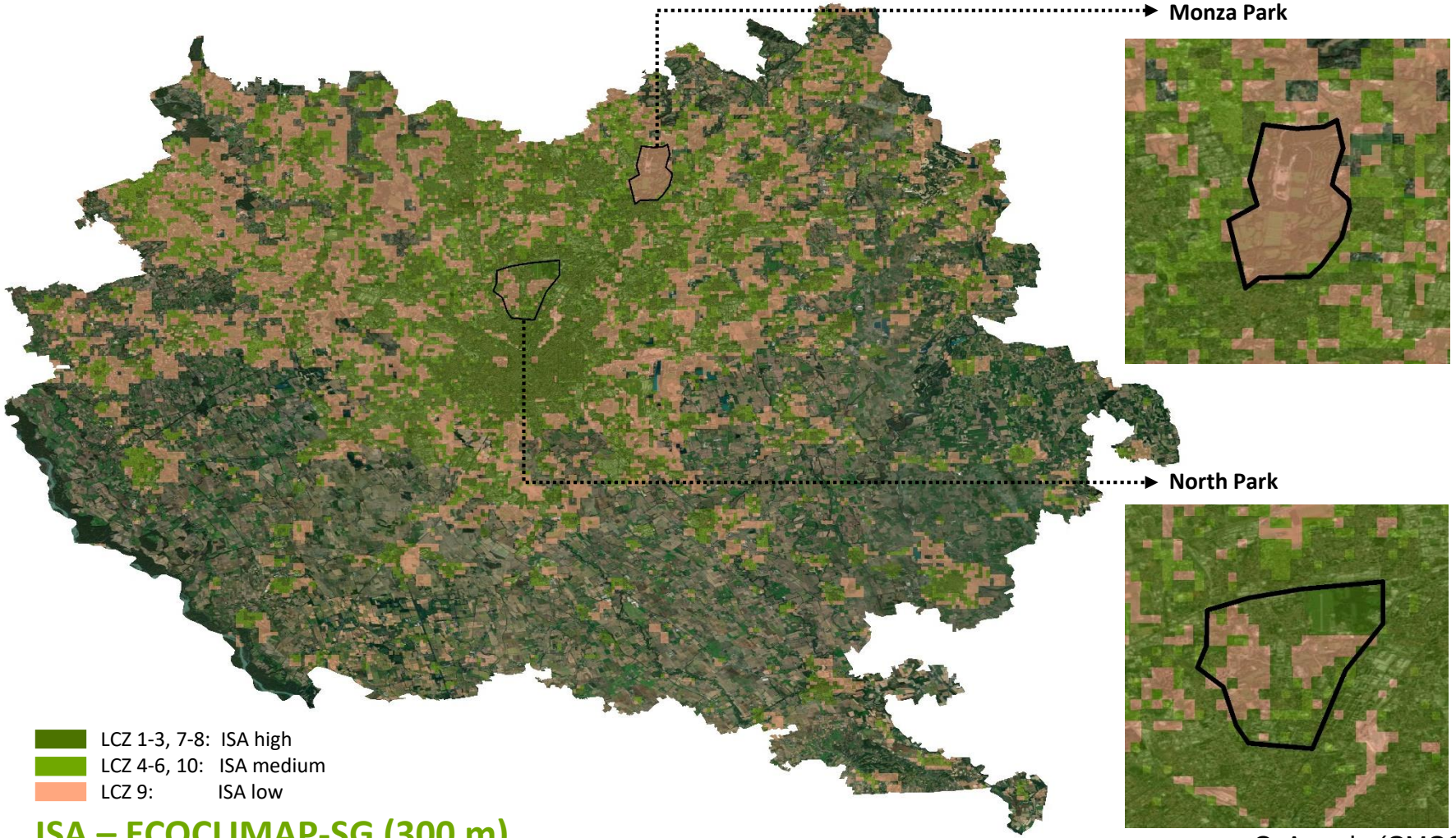
Dataset/*Producer*	Classes*	Descriptions
ECOCLIMAP-SG/*CNRM*	 24. LCZ1: compact high-rise	• Strong built-up NDVI <= 0.2 and high rise buildings (3D roughness 50-100m) • Strong built-up NDVI <= 0.2 and very high rise buildings (3D roughness > 100m)
	 25. LCZ2: compact midrise	• Continuous urban fabric (from CLC) • Strong built-up NDVI <= 0.2 and medium rise buildings (3D roughness 25-50m)
	 26. LCZ3: compact low-rise	• Strong built-up NDVI <= 0.2 and low rise buildings (3D roughness <25m)
	 27. LCZ4: open high-rise	n.a. - Despite the class is included in the legend of ECOCLIMAP-SG, the data are not available in the European map. Technical documentation doesn't provide further details.
	 28. LCZ5: open midrise	• Medium built-up 0.2 < NDVI <= 0.3 (o 6)
	 29. LCZ6: open low-rise	• Light built-up 0.3 < NDVI <= 0.4
	 30. LCZ7: lightweight low-rise	n.a. - Despite the class is included in the legend of ECOCLIMAP-SG, the data are not available in the European map. Technical documentation doesn't provide further details.
	 31. LCZ8: large low-rise	• Industrial or commercial unit, Airports (from CLC) • Built-up with highly reflecting roof (associated to productive and commercial use) • Roads
	 32. LCZ9: sparsely built	• Road and rail networks and associated land, Mineral extraction sites, Dump sites, Construction sites, Green Urban Areas, Sport and leisure facilities (from CLC) • Very light built-up NDVI > 0.4
	 33. LCZ10: heavy industry	• Port areas (from CLC)

**Stewart I.D., Oke T.R., 2012. Local Climate Zones for Urban Temperature Studies. Bull Am Meteorol Soc., 93(12):1879-1900. doi:10.1175/BAMS-D-11-00019.1*

Milan

C. Apreda (CMCC)

Milan



ISA – ECOCLIMAP-SG (300 m)

C. Apreda (CMCC)

Task 1: Implementation of TERRA_URB in ICON

During the COSMO Priority Tasks AEVUS and AEVUS2 the TERRA_URB urban parameterisation in the COSMO model was demonstrated to be able to reproduce the key urban meteorological features. In the framework of the transition of the COSMO Consortium to the ICON model TERRA_URB needs to be implemented in ICON.

Deliverables: TERRA_URB in ICON.

Involved scientists: Jan-Peter Schulz (DWD) 0.4 FTE, Mikhail Varentsov (RHM) 0.1 FTE, Carmine De Lucia (CMCC) 0.1 FTE

FTEs: 0.6 FTE (Jul. 2021 – Jun. 2022)

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Task 1: Implementation of TERRA_URB in ICON

Proposal for different steps of implementation:

1. Porting of TERRA_URB from the COSMO to the ICON model par for par. Implement namelist switches (`lterra_urb`, `lurbfab`, `itype_eisa`) and fields (`sa_uc`, `ai_uc`, `alb_red_uc`, `w_imp`, `w_isa`) for TERRA_URB in ICON. Keep land use classification GlobCover and hardcoded global constants for testing the functionality of TERRA_URB in ICON.
2. Once the functionality is confirmed and the new urban canopy parameter fields are available from EXTPAR, implement them in ICON, likely together with a new land use classification (ECOCLIMAP-SG).
3. Extended tuning of ICON for ECOCLIMAP-SG, with first TERRA_URB switched off, after successful tuning switched on.

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