ICCARUS 2022 – WG3b meeting (CITTÀ)

10 March 2022

Updating the current field of ISA in the urban canopy scheme TERRA_URB

Survey of existing land cover datasets

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CONSORTIUM FOR SMALL SCALE MODELING COSMO

Deutscher Wetterdienst
Wetter und Klima aus einer Hand

DWD

cmcc
Centro Euro-Mediterraneo sui Cambiamenti Climatici

Overview

- Methodology
- Summary of preliminary activities
  → case studies: **Barcelona, Budapest, Milan**
- Comparison between land cover datasets
  → case study: **Naples**

Methodology

Impervious Surface Area - ISA

URBAN datasets

- GlobCover
- ESA-CCI/C3S LC project
- GLC2000
- CORINE Land Cover

ISA = NO
EXTPAR = NO

Dataset with LCZs

- **ECOCLIMAP-SG** (10 urban LCZs)

ISA = NO
EXTPAR = YES

ISA datasets

- **GAIA** (impervious pixels)
- **GAUD** (impervious pixels)
- **CLMS-IMD** (degree of imperviousness 1-100%)

ISA = YES
EXTPAR = NO

C1.1	GAIA 2018 GAUD 2015 ECOCLIMAP-SG 2018 CLMS – IMD 2018
C1.2	GAIA 1985-2018 GAUD 1985-2015 ECOCLIMAP-SG 2018 CLMS – IMD 2006, 2009, 2012, 2015, 2018
C2	GAIA 2018 GAUD 2015 ECOCLIMAP-SG 2018 CLMS – IMD 2018

Desk review of land cover datasets → **Selection of datasets** → **Comparison of datasets**

Methodology

Dataset/ Producer	Resolution		Coverage		Classification scheme	Source
	Spatial	Temporal	Spatial	Temporal		
Land cover datasets (Urban field)						
GlobCover/*ESA & UCLouvain*	300 m	Single year	Global	2009	FAO LCCS 22 classes	https://bit.ly/3uzxbxC
ESA CCI/C3S LC project/*VITO on behalf of the ECMWF*	0.00277 8° (≈ 300 m)	yearly	Global	1992 -2020	FAO LCCS 22 classes	https://bit.ly/3twOnCp
GLC2000 (Regional dataset)/*EU-JRC*	0.00892 857° (≈ 960 m)	Single year	European	2000	FAO LCCS 23 classes	https://bit.ly/3ot9tAE
CORINE Land Cover, CLC/*EEA*	100 m	Single year	European	1990 - 2000 - 2006 - 2012 - 2018	44 classes	https://bit.ly/3yI57dL
Land cover dataset with LCZs						
ECOCLIMAP-SG/*CNRM*	300 m	Single year	Global	2018	33 classes (from ESA-CCI GLC v1.6.1 and CLC)	https://bit.ly/3bihmDJ
Impervious areas datasets (ISA field)						
GAIA/*Gong et al., 2020*	30 m	yearly	Global	from 1985 to 2018	Non-impervious/ impervious areas	https://bit.ly/3bhABxb
GAUD/*Liu et al., 2020*	30 m	yearly	Global	from 1985 to 2015	Urban grid	https://bit.ly/3wf9xqw
CLMS Imperviousness Density, IMD/*EEA*	100 m 20 m 10 m (2018)	Single year	European (EEA39)	2006 - 2009 - 2012 - 2015 - 2018	Degree of imperviousness (0-100%)	https://bit.ly/2Qwkipf

Desk review of land cover datasets

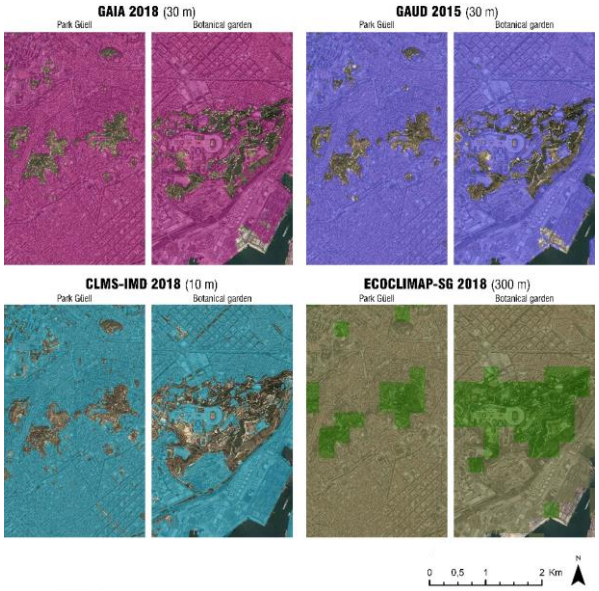
ID	Datasets	Spatial scale	Scope
C1	**GAIA 2018** **GAUD 2015** **ECOCLIMAP-SG 2018** **CLMS – IMD 2018** + **Satellite image**	Original resolution	Verify the ability of each dataset in representing urban heterogeneity and similarities and differences between land cover classes and urban environment
C2	**GAIA 2018** **GAUD 2015** **ECOCLIMAP-SG 2018** **CLMS – IMD 2018**	2km grid	Verify the difference between datasets in terms of ISA values

Comparison of datasets at local level

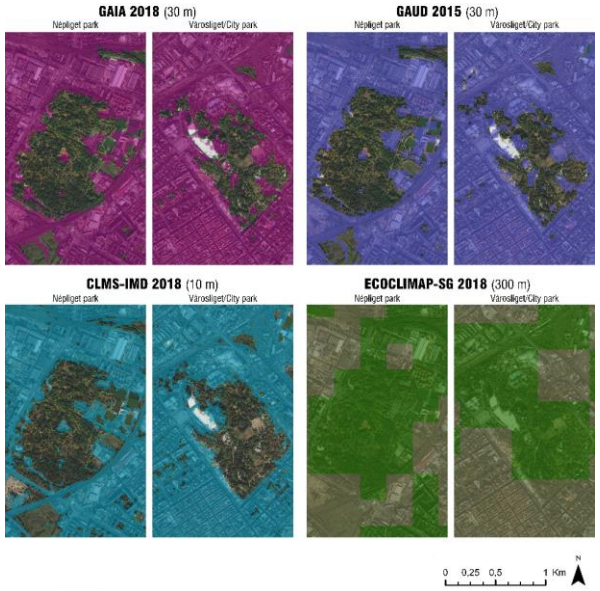
Summary of preliminary activities

C1

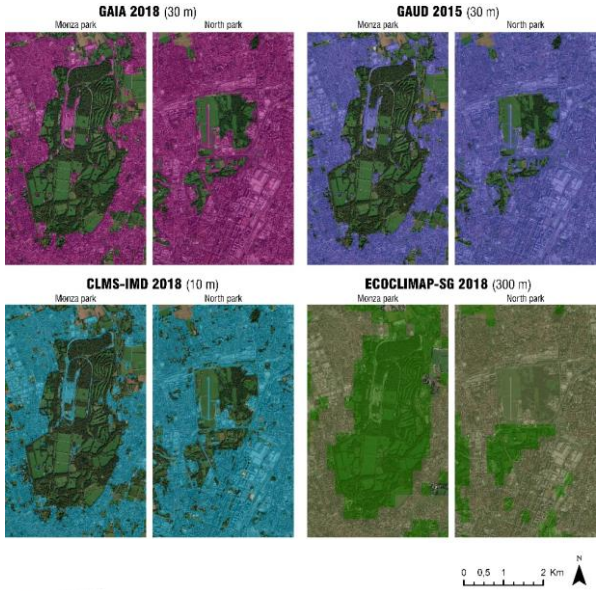
Barcelona



Budapest



Milan



GAIA 2018 (30m): Impervious areas
GAUD 2015 (30m): Impervious areas
CLMS-IMD 2018 (10m): Degree of imperviousness 1-100%
ECOCLIMAP-SG (300m): LCZs 1-2-3-5-6-8-10
ECOCLIMAP-SG (300m): LCZ 9

ECOCLIMAP-SG includes parks and green areas in the urban LCZs in all three cities: they are mainly identified as **LCZ 9 = Sparsely built.**

Summary of preliminary activities

C2

LOCAL CLIMATE ZONES - LCZs

ECOCLIMAP-SG include 10 urban classes derived from CORINE urban classes and translated by adopting LCZs classes.

ISA dataset

The classes of CLMS-IMD include all artificially sealed areas, which are mapped as the degree of imperviousness (1-100%).

New ISA classes	
ISA high=80%	3
ISA medium=60%	2
ISA low=30%	1

ECOCLIMAP-SG	
ECOCLIMAP-SG classes	LCZs
24-25-26-30-31	1-2-3-7-8
27-28-29-33	4-5-6-10
32	9

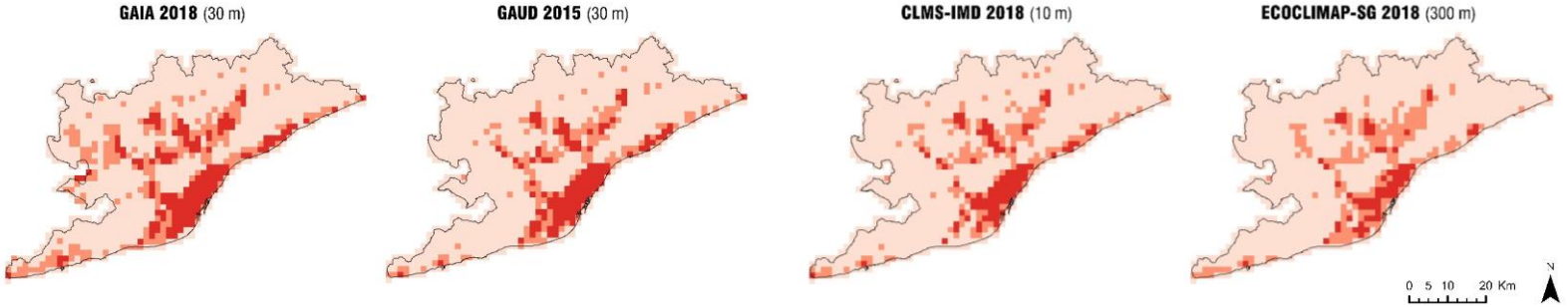
CLMS-IMD
71-100%
41-70%
1-40%

Such a classification is our proposal, all suggestions are welcome!

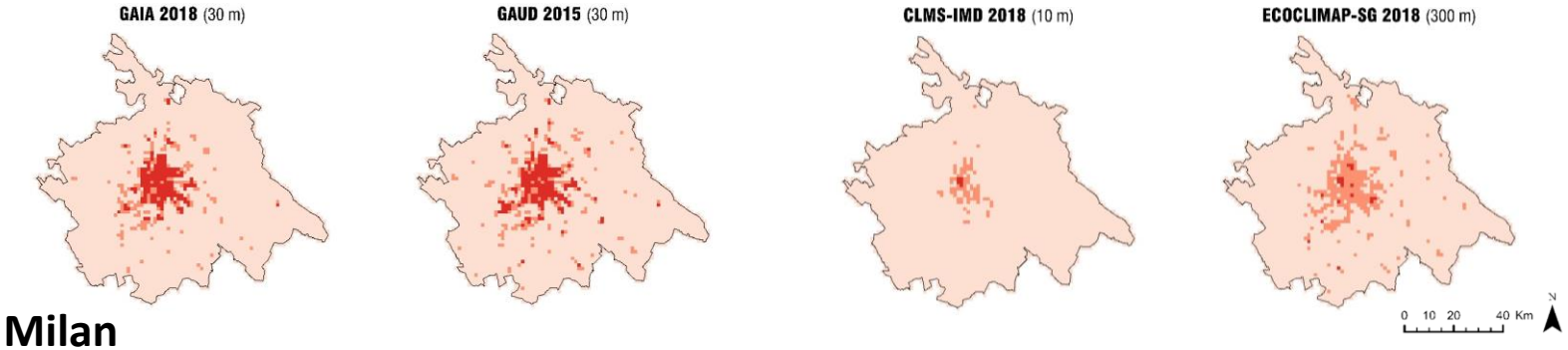
Summary of preliminary activities

C2

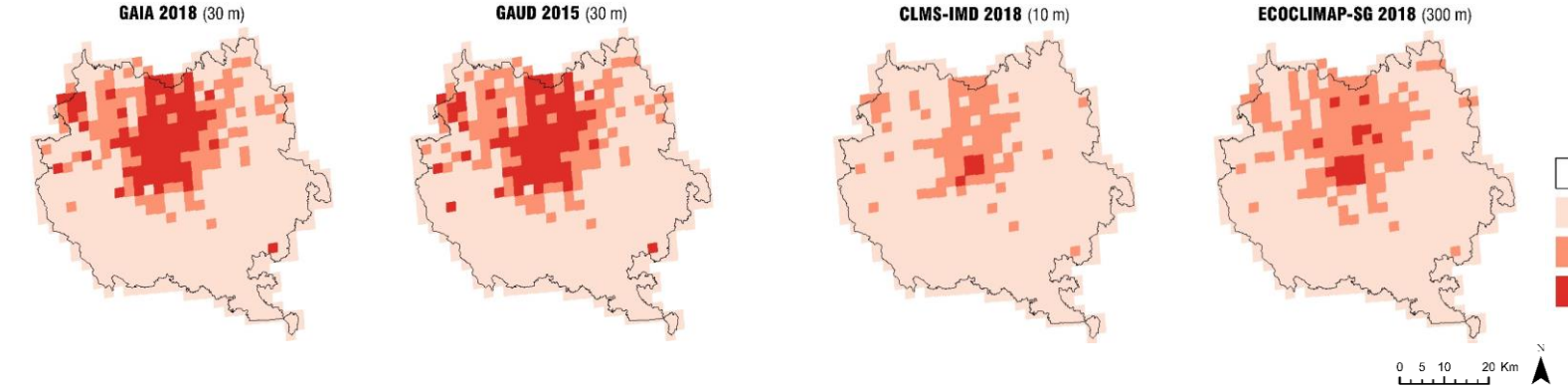
Barcelona



Budapest



Milan

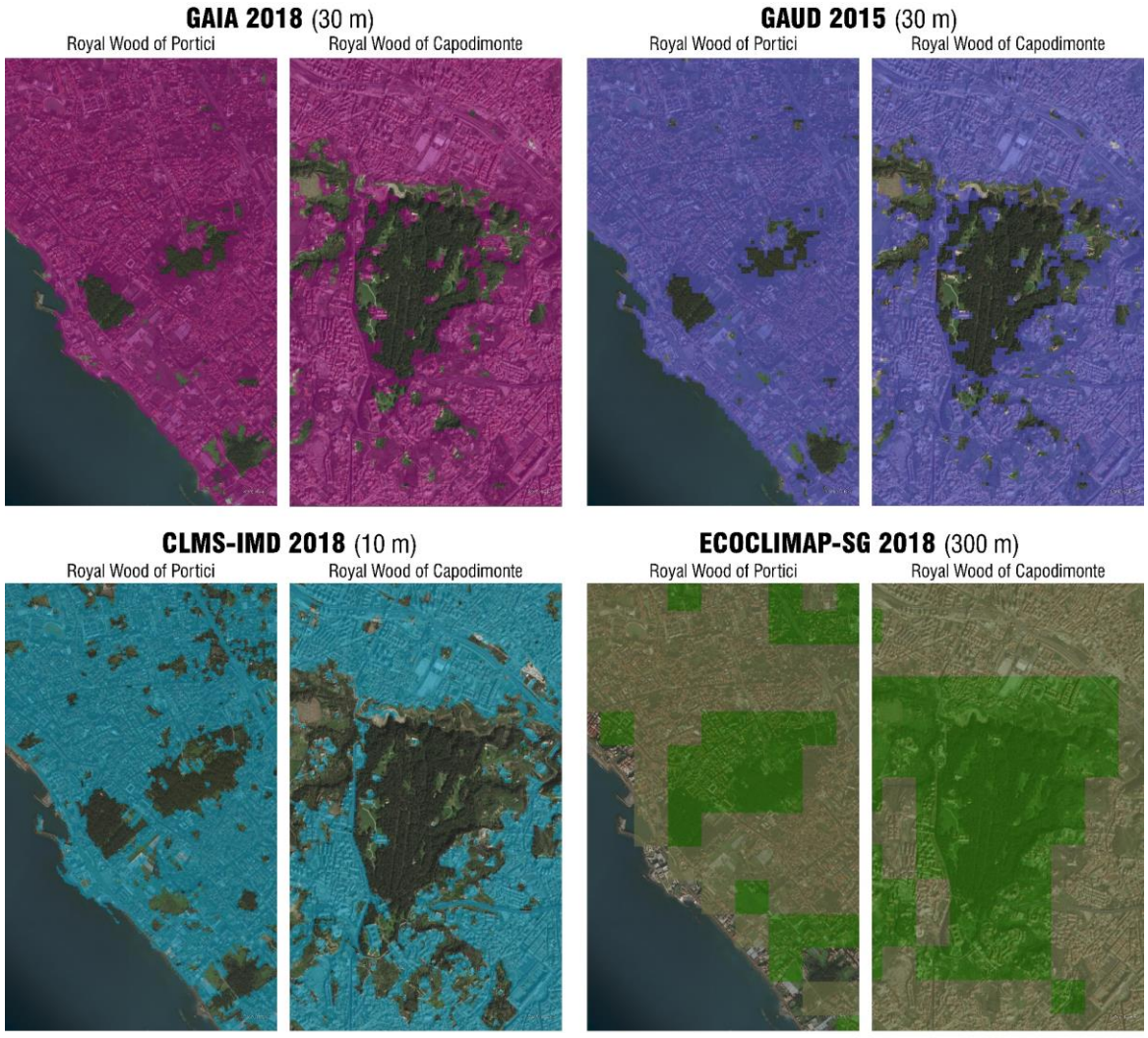


Comparison between land cover datasets

PP CITTÀ TASK 3: Numerical experiments

Comparison between land cover datasets → Naples

C1

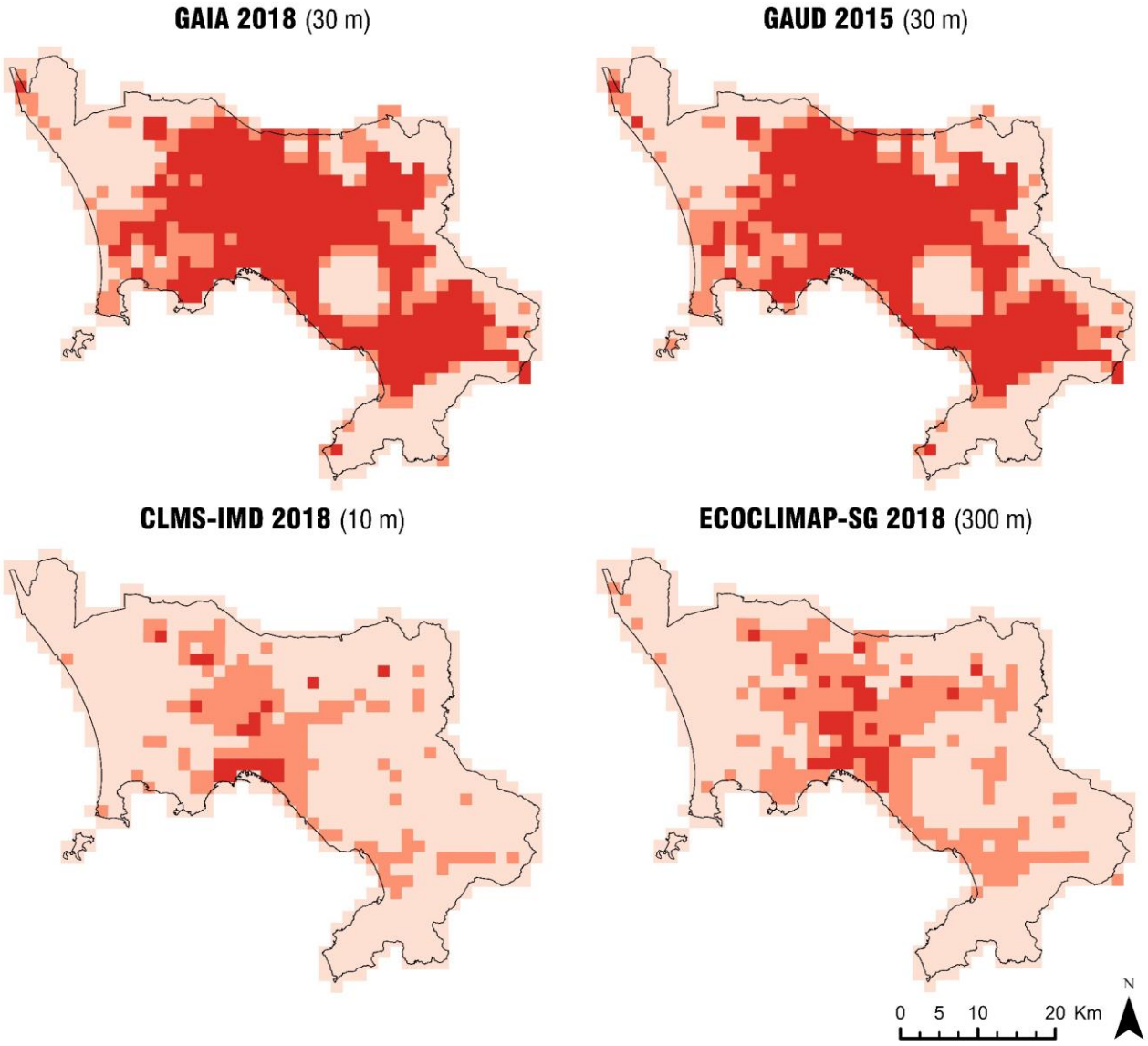


ECOCLIMAP-SG includes parks and green areas in the urban LCZs: they are mainly identified as **LCZ 9 = Sparsely built.**

GAIA 2018 (30m): Impervious areas
GAUD 2015 (30m): Impervious areas
CLMS-IMD 2018 (10m): Degree of imp. 1-100%
ECOCLIMAP-SG (300m): LCZs 1-2-3-5-6-8-10
ECOCLIMAP-SG (300m): LCZ 9

Comparison between land cover datasets → Naples

C2



The maps show a great consistency between **GAIA** and **GAUD**, and between **CLMS-IMD** and **ECOCLIMAP-SG**.

Summary and conclusions

SOME CONSIDERATIONS

- LCZs looks very promising for the aims of PP-CITTÀ
- ECOCLIMAP-SG could be a good dataset to derive ISA for two reasons: 1) it is a global dataset; 2) it also includes EXTERNAL PARAMETERS
- CLMS-IMD could have an added value related to the degree of imperviousness (1-100%)

OPEN ISSUE/ONGOING ACTIVITIES

- fine-tuning of range/intervals for classifying ISA
- preparing a paper

POTENTIAL FUTURE ACTIVITIES (beyond the aim of the task 2 of PP CITY)

- conversion of Arcgis workflow into Python scripts
- running simulations with new dataset (e.g. run the same year with different ISA datasets)

All comments and suggestions are welcome!

References

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Thank you!

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