

A case study on COSMO and ICON-LAM models for Warsaw, Poland

Task 3. Numerical experiments/Subtask 3.6: Warsaw

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IMWM - Centre of Numerical Weather Prediction
03/09/2024, COSMO PP CITTA' at the GM 2024

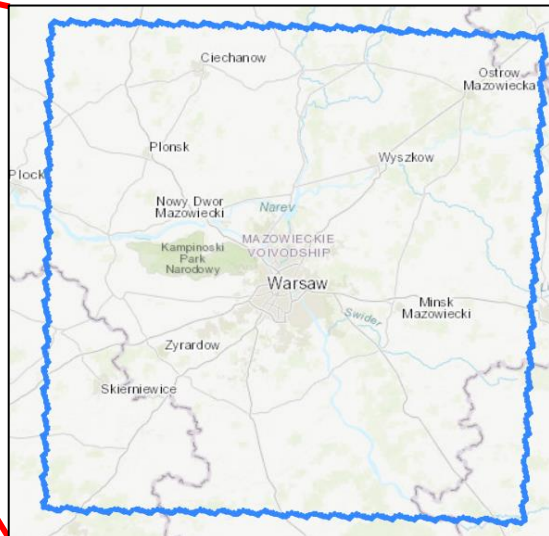


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IMGW-PIB
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COSMO and ICON-LAM configurations

ICBC

IC: ICON global analysis daily
2022-06-22:2022-07-02@00UT
BC: every 3 hr
forecast time: 48 hr



COSMO

Resolutions:

❖ 1 km

Landuse:

☐ GLOBCOVER

☐ ECOCLIMAP-SG

ICON-LAM

Resolution

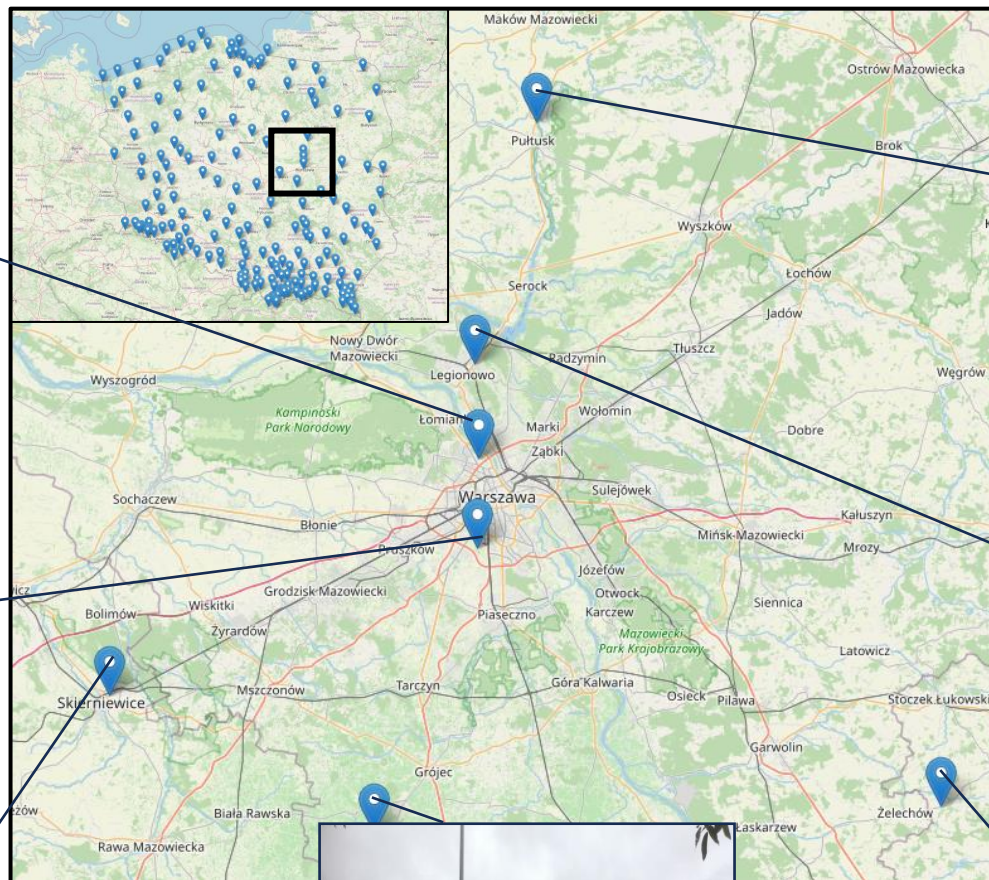
❖ 600 m

❖ no TERRA_URB

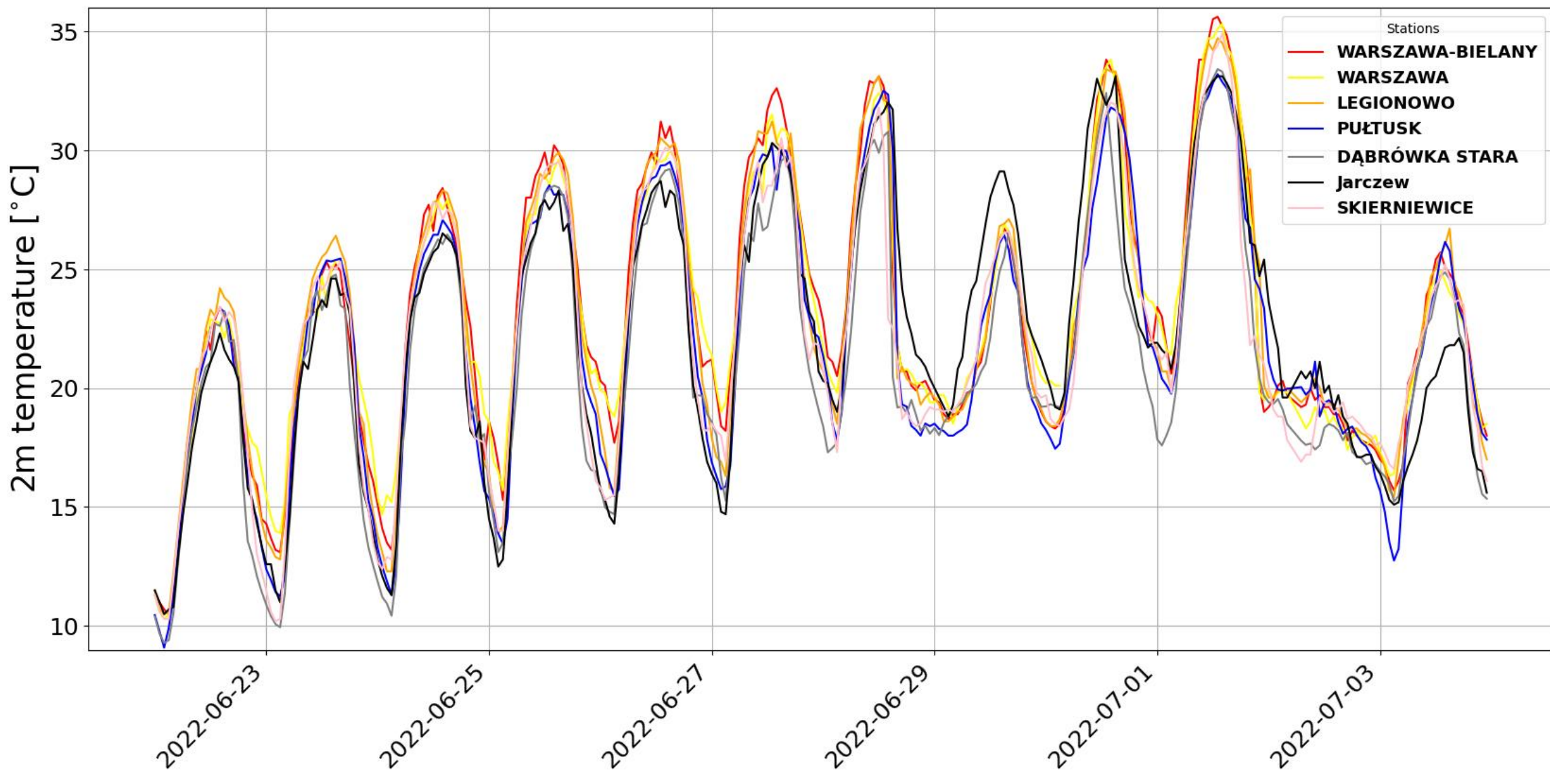
Landuse:

☐ GLOBCOVER

Stations in the Warsaw domain



2 m observed temperature series

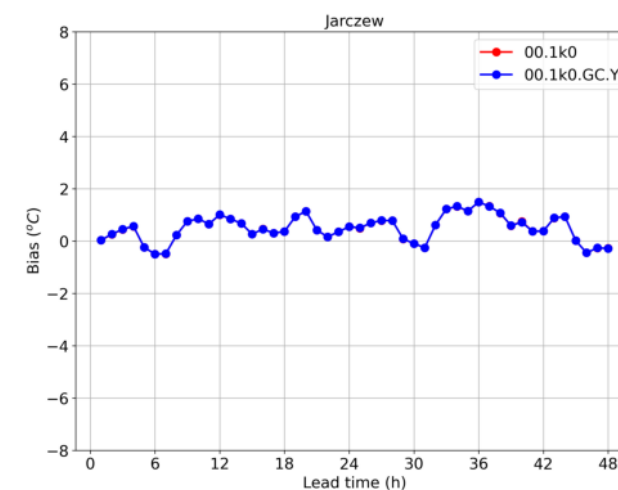
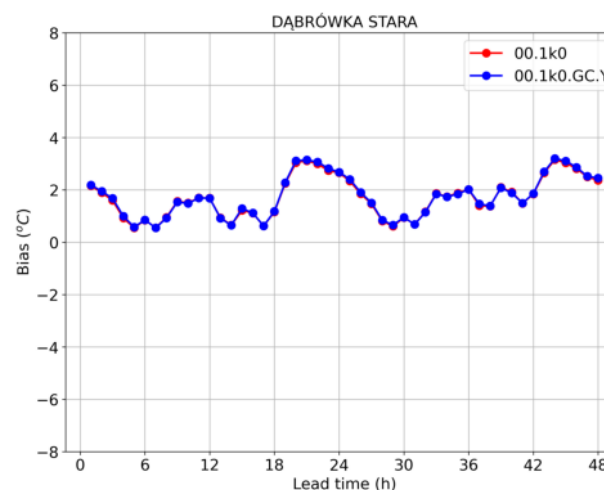
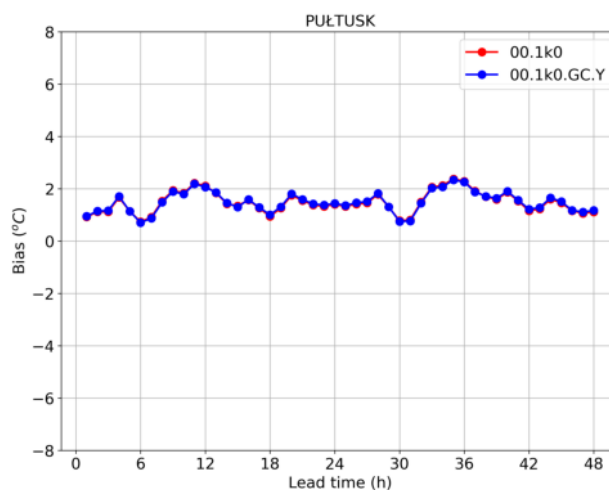
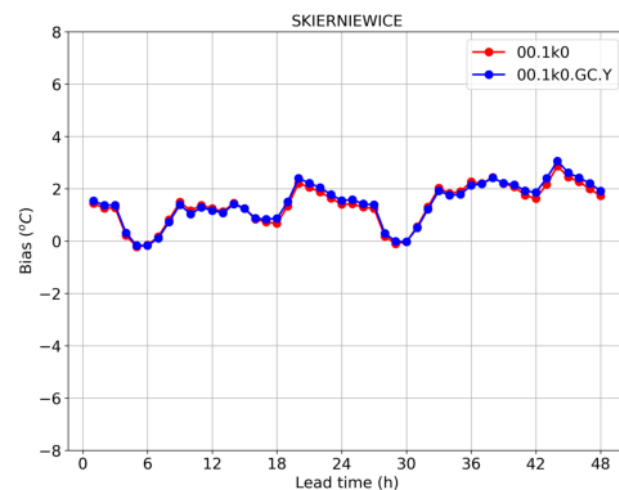
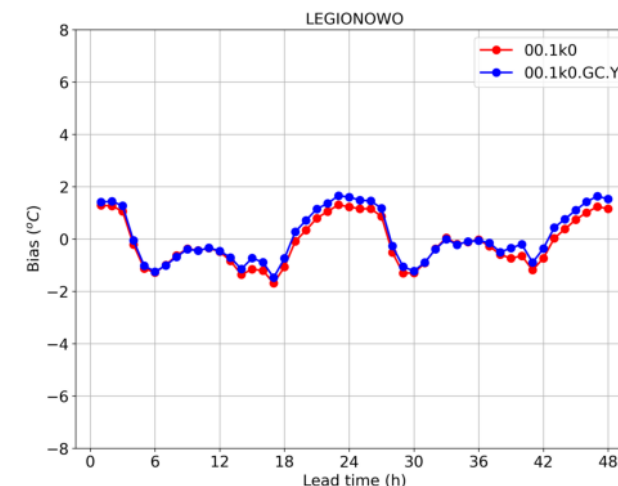
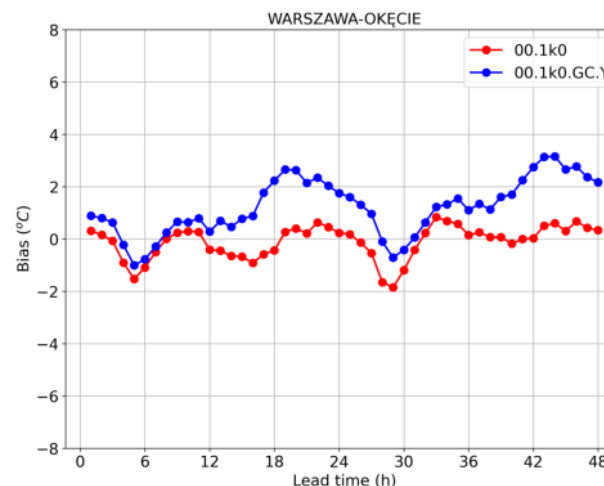
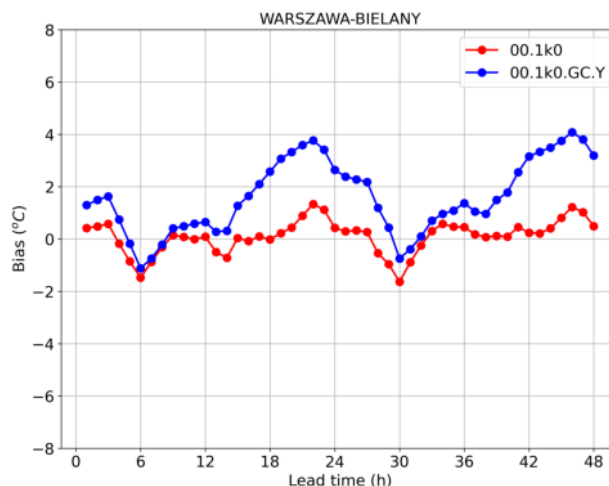


TERRA_URB parameterization with default settings OFF vs ON (Globcover)

1 km

GLOBCOVER
GLOBCOVER+TU

initialisation period: 20220622-20220702, lead times: 1-48

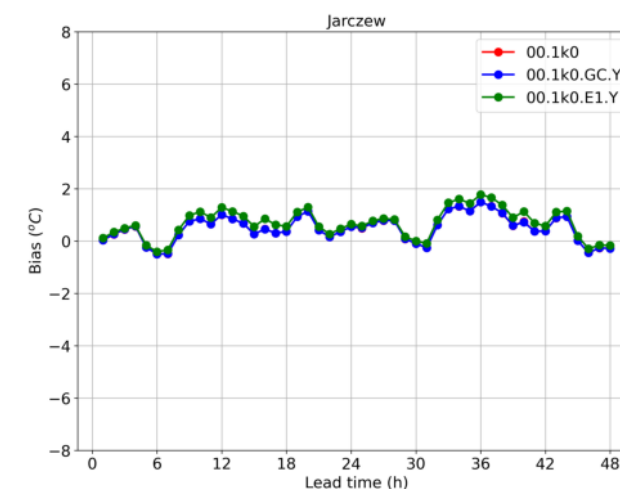
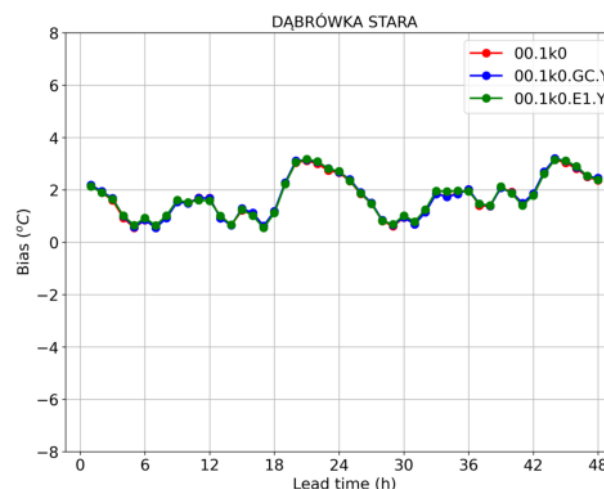
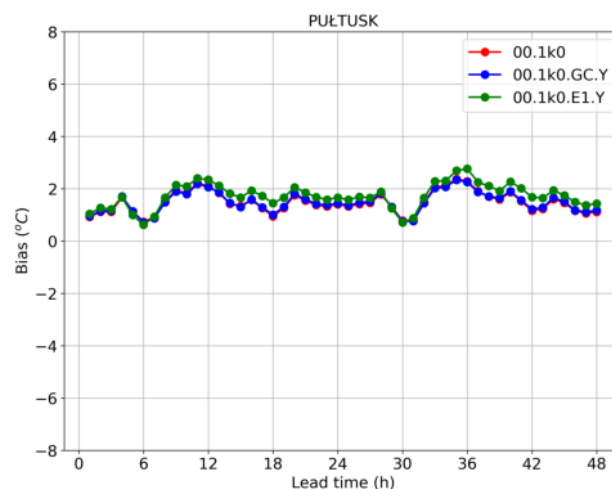
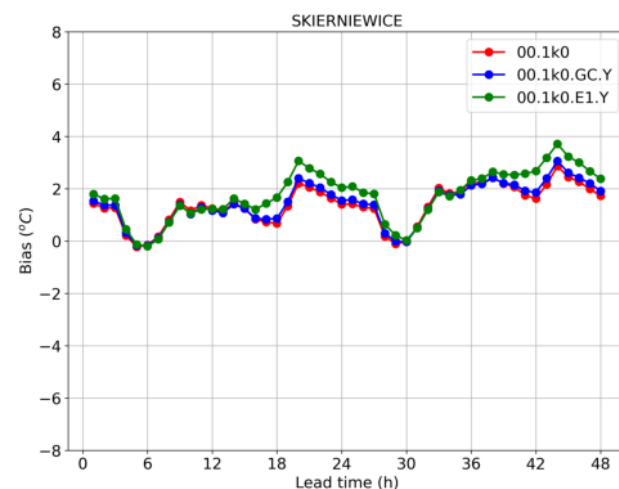
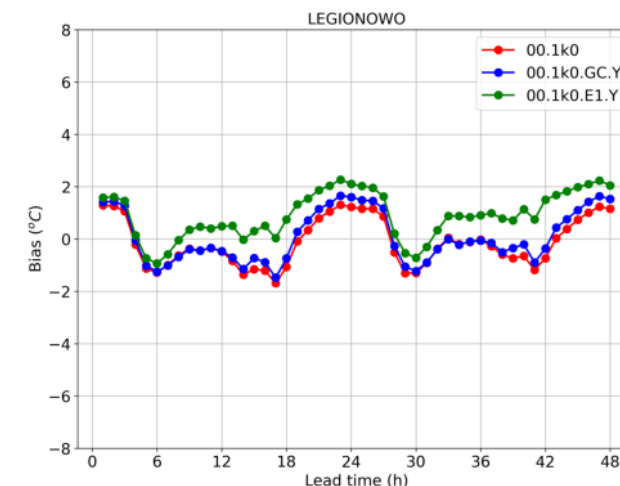
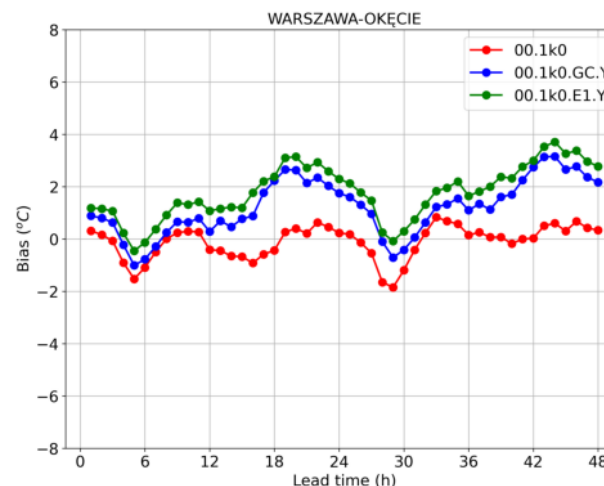
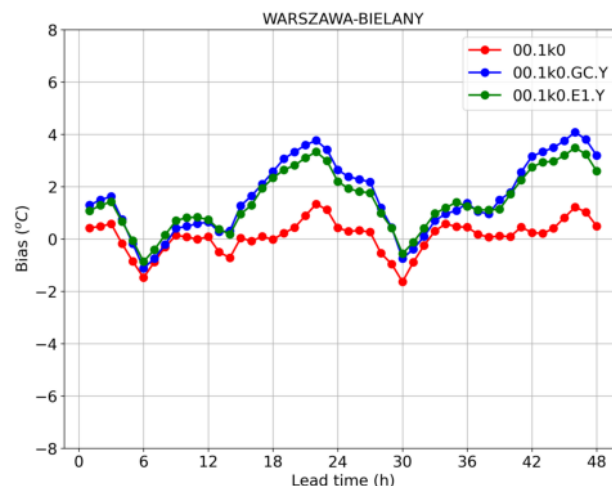


TERRA_URB parameterization with default settings OFF vs ON (Globcover, ECOCLIMAP-SG)

1 km

GLOBCOVER
GLOBCOVER+TU
ECOCLIMAP-SG+TU

initialisation period: 20220622-20220702, lead times: 1-48



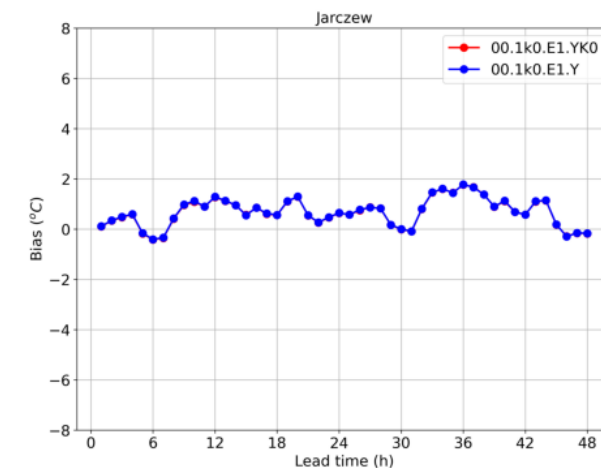
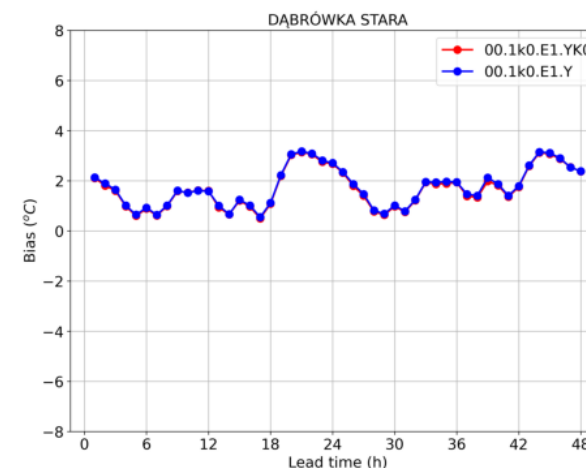
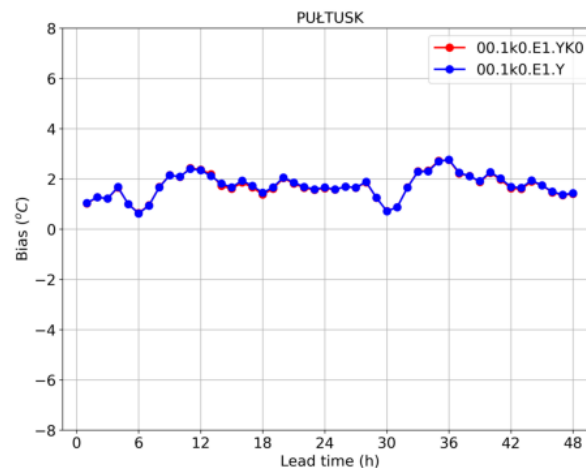
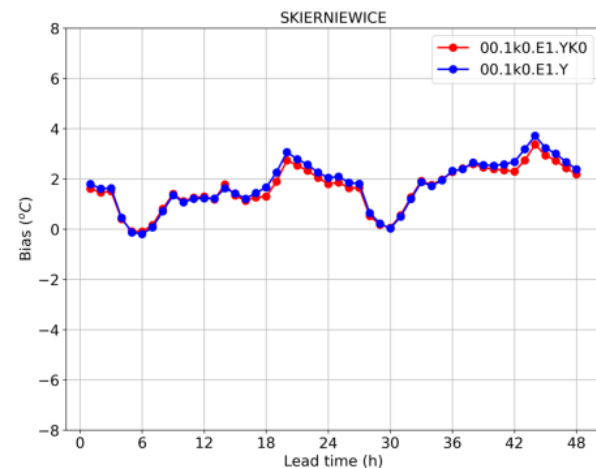
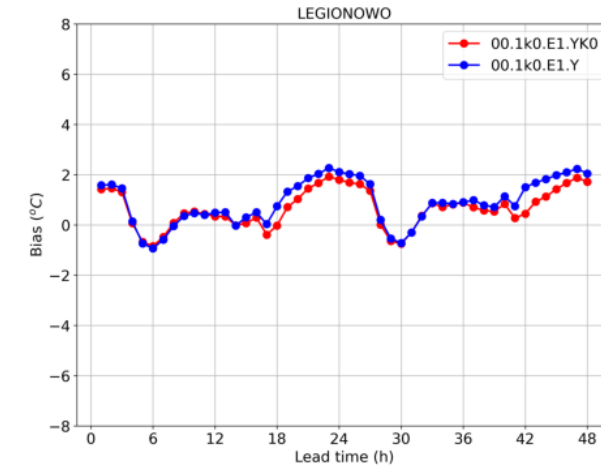
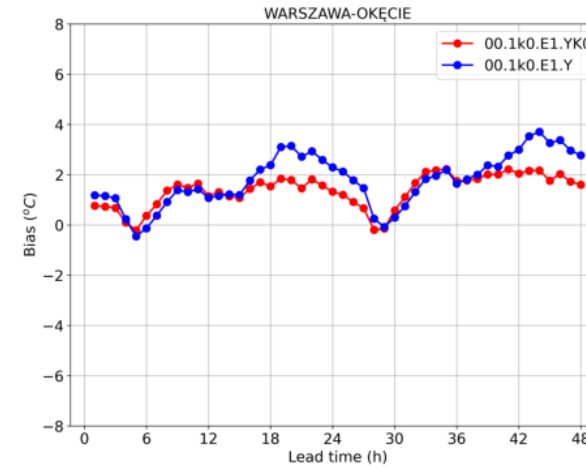
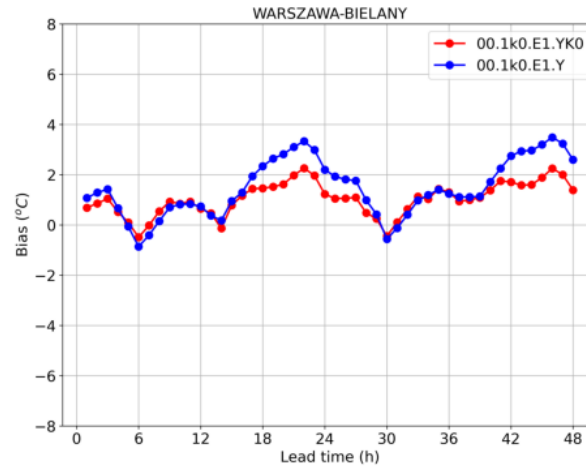
surface-layer transfer scheme for the urban fabric (itype_kbmo_uf) ECOCLIMAP-SG+TU

1 km

standard of COSMO5.0

Brutsaert/Kanda, TU default

initialisation period: 20220622-20220702, lead times: 1-48



The winner is ... ?

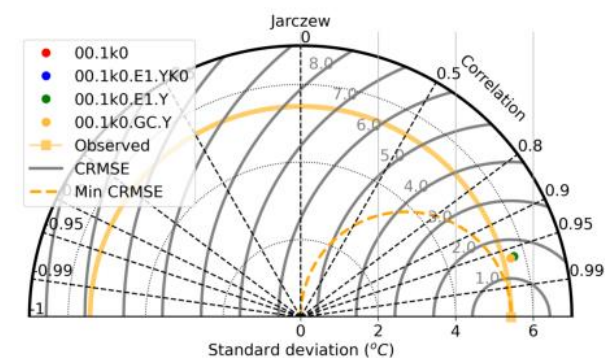
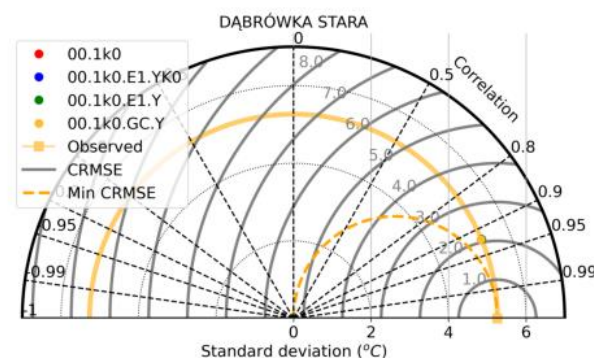
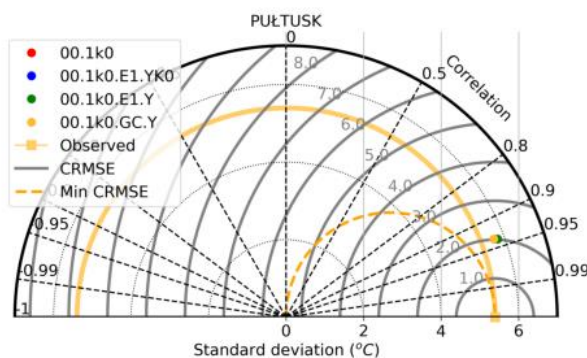
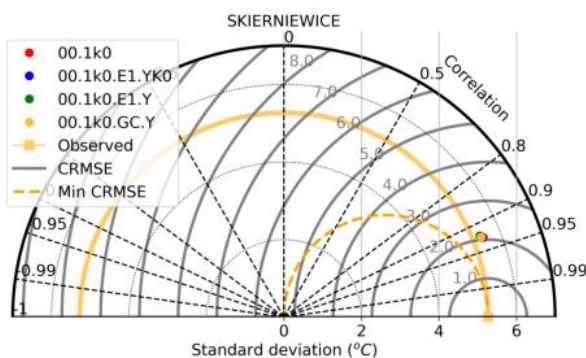
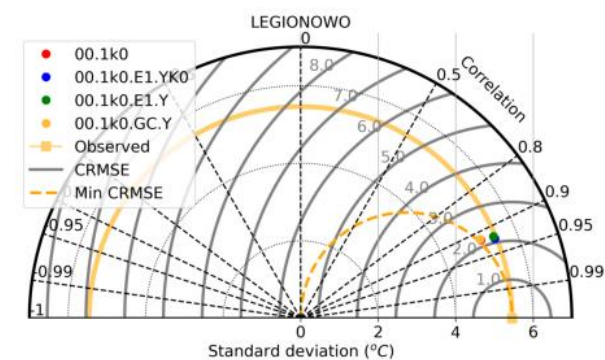
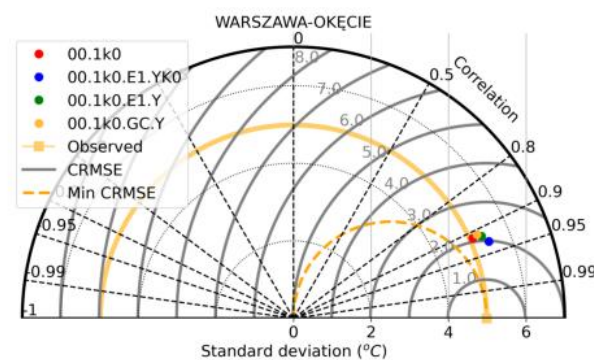
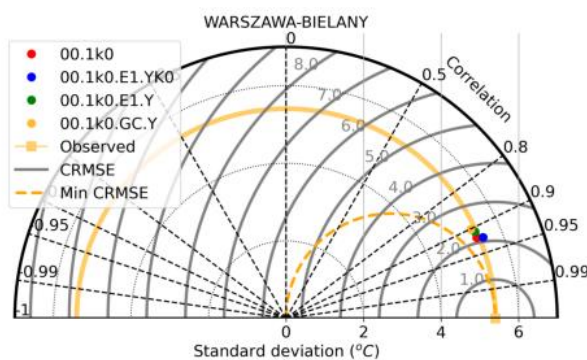
initialisation period: 20220622-20220702, lead times: 1-48

GLOBCOVER

ECOCLIMAP-SG+TU+kbmo

ECOCLIMAP-SG+TU

GLOBCOVER+TU

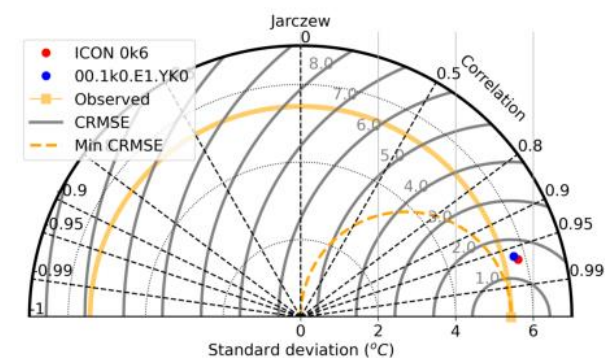
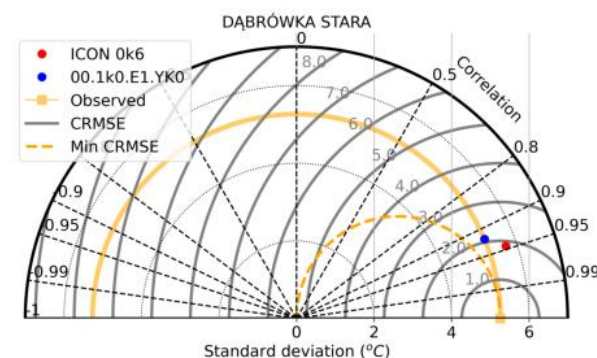
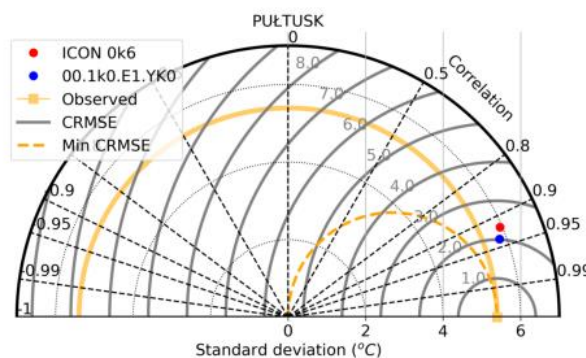
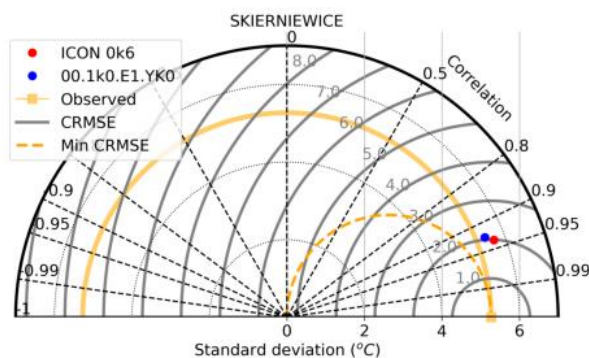
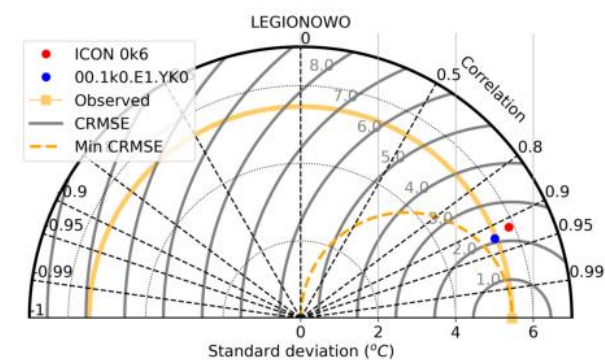
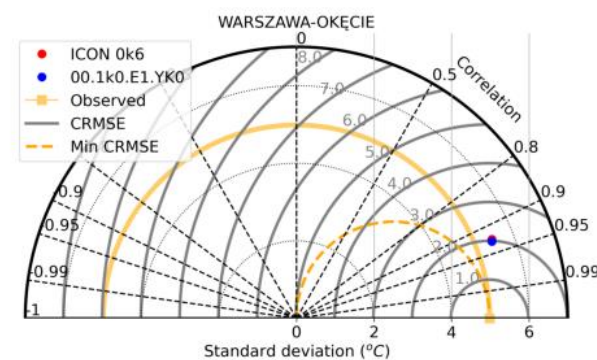
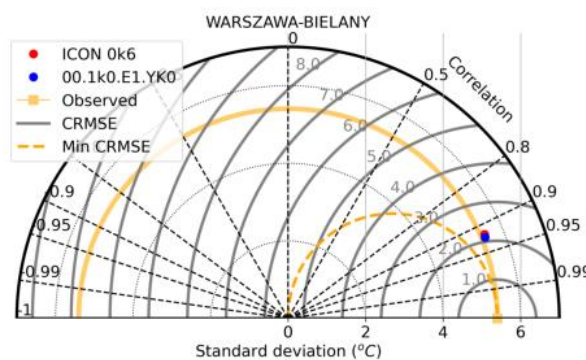


The winner is ... ?

initialisation period: 20220622-20220702, lead times: 1-48

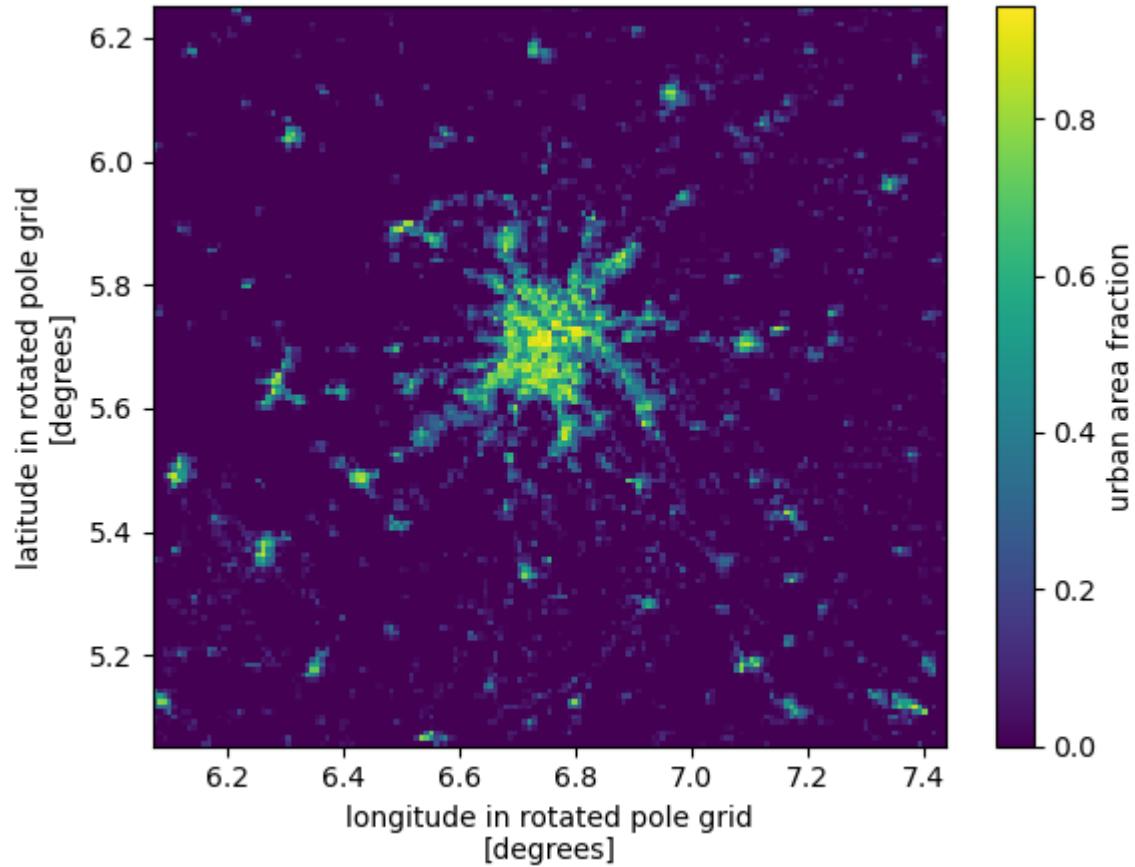
ICON@600m

ECOCLIMAP-SG+TU+kbmo

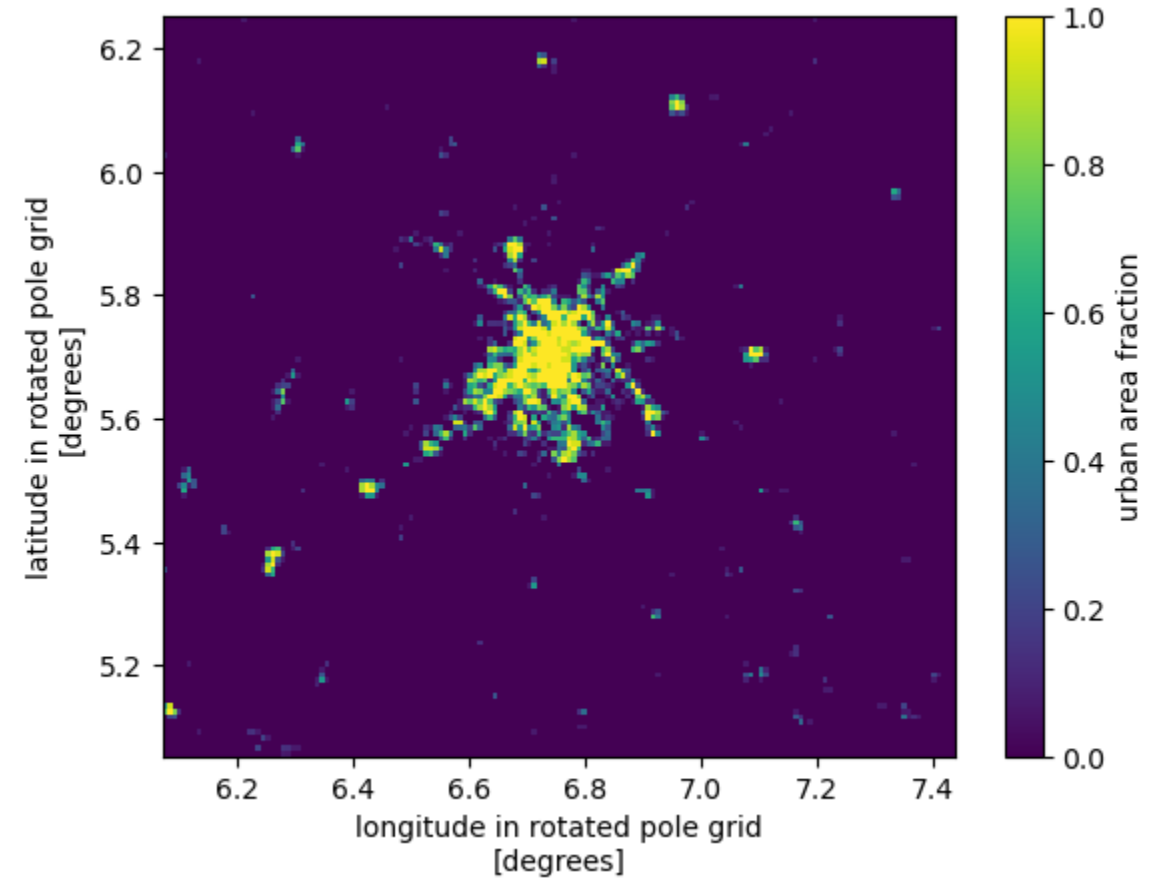


Urban fraction of GLOBCOVER and ECOCLIMAP-SG datasets

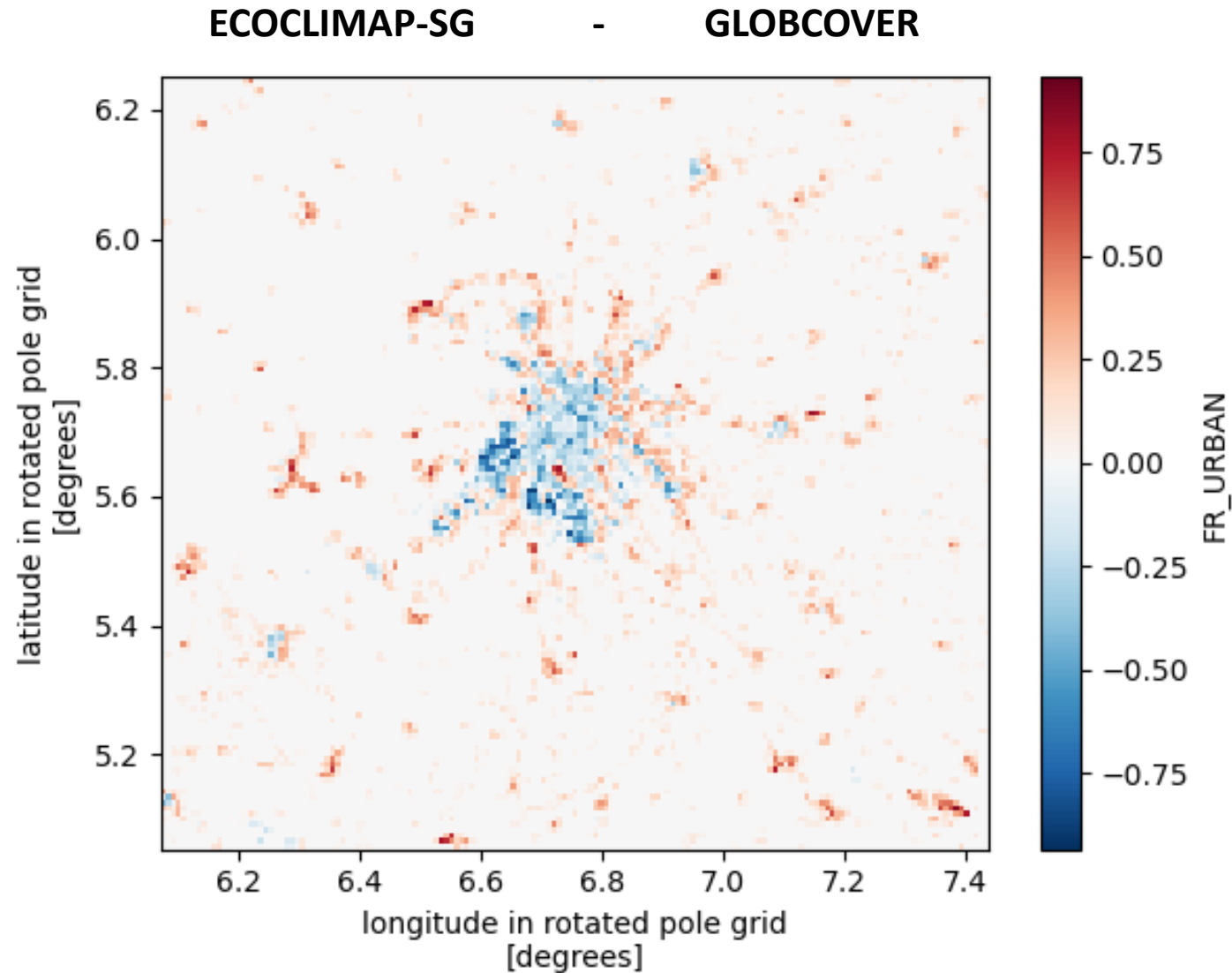
ECOCLIMAP-SG



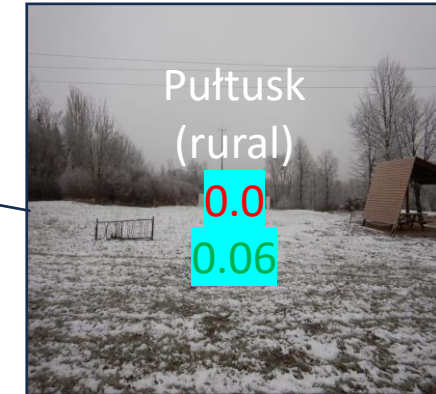
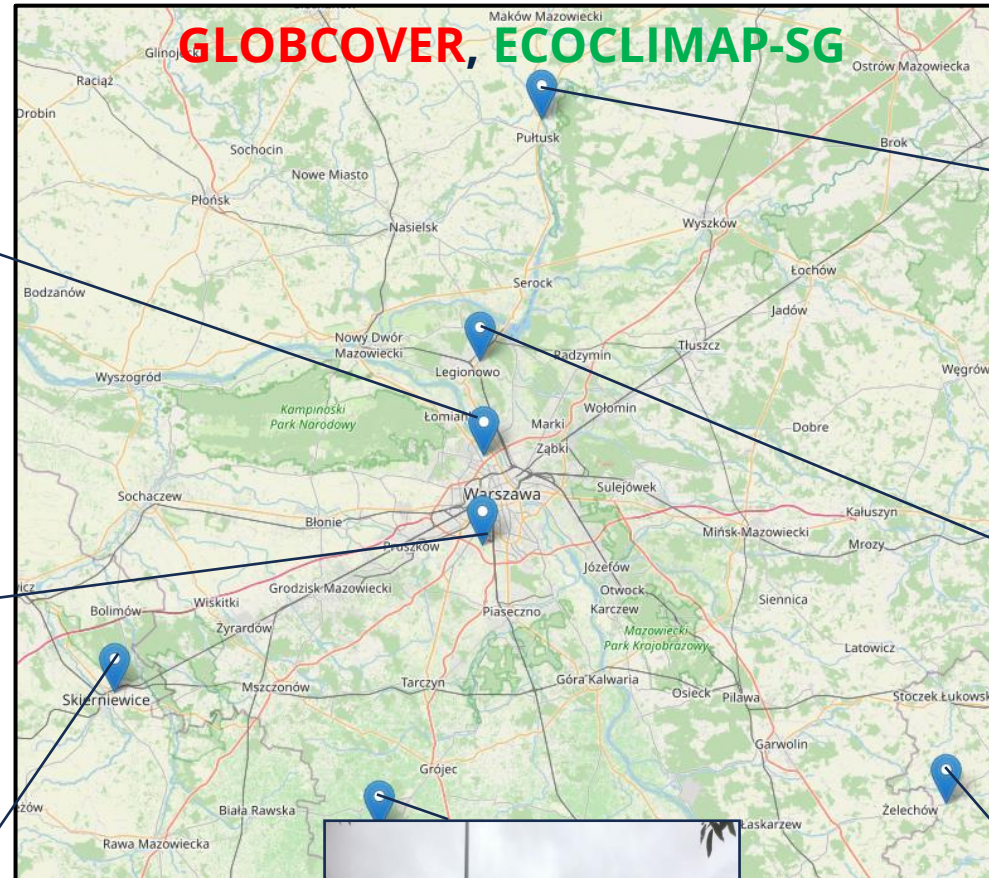
GLOBCOVER



The difference in urban fraction between GLOBCOVER and ECOCLIMAP-SG

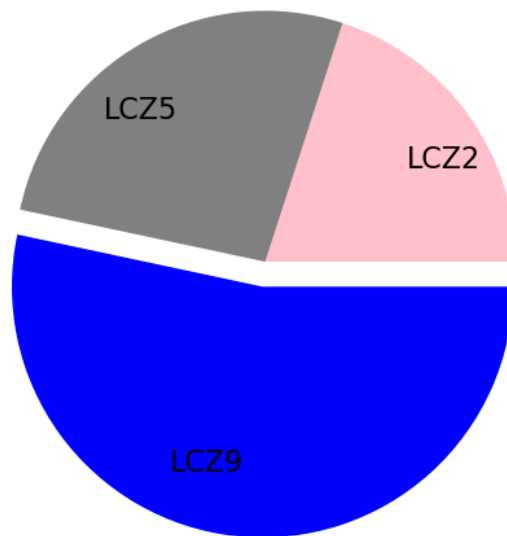


Urban fractions for the nodes nearest to the station for GLOBCOVER and ECOCLIMAP-SG

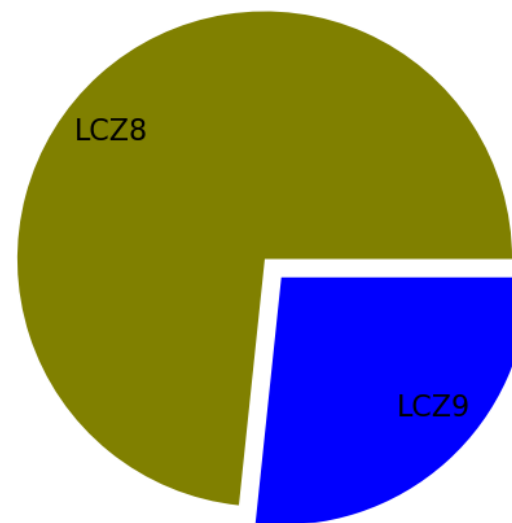


Shares of ECOCLIMAP-SG classes in the EXTPAR's aggregation

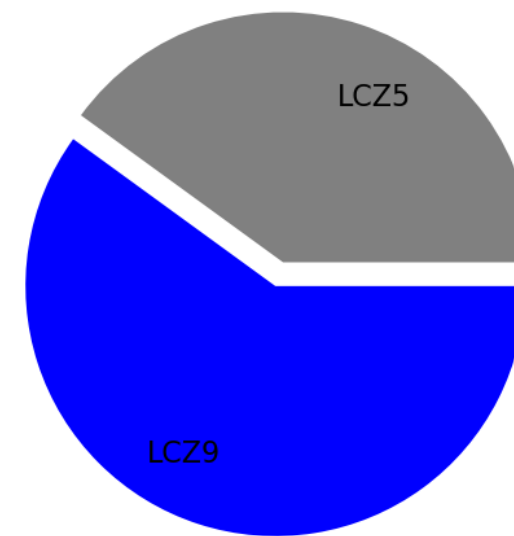
WARSZAWA-BIELANY



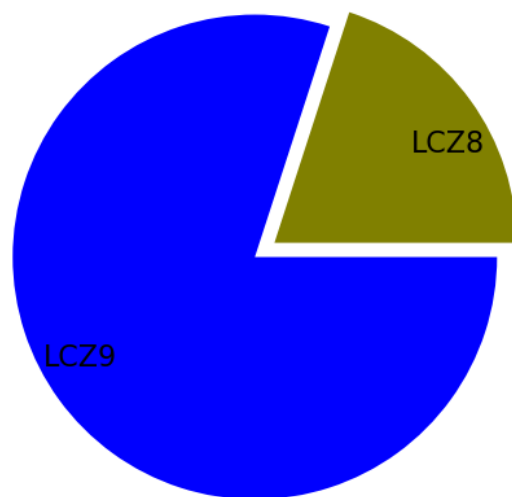
WARSZAWA-OKĘCIE



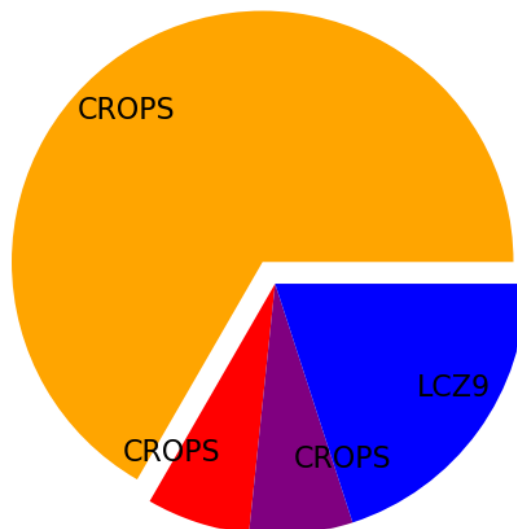
LEGIONOWO



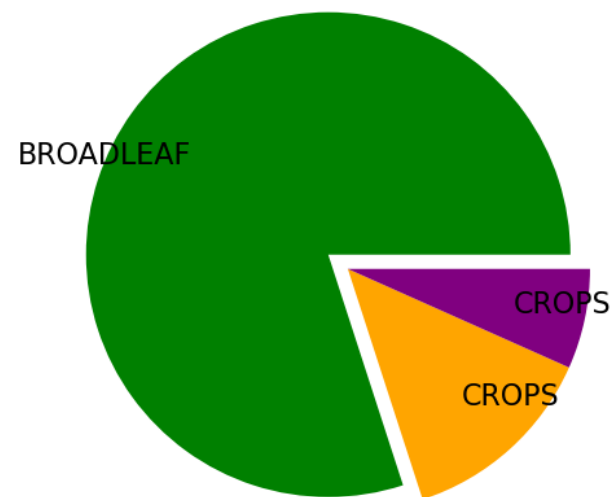
SKIERNIEWICE



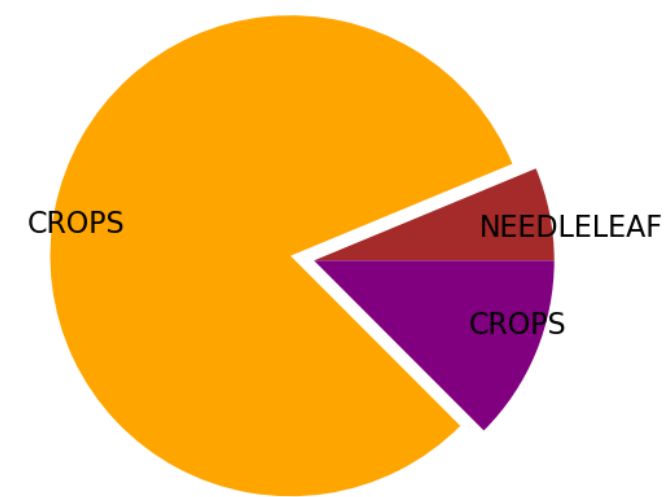
PUŁTUSK



DĄBRÓWKA STARA



Jarczew



- Using ECOCLIMAP-SG showed a slight improvement in temperature forecasting (but with different default switches than TERRA_URB).
- Is this the result of the urban coverage update?
- What is the station's representativeness?
- Other meteorological parameters should be tested (RH, wind, soil/surface temperature, precipitation)
- Other COSMO switches should be tested (AHF on/off, kbmo/Zilitinkevich, vegetation-canopy parameterisation, evaporation from impervious surfaces)
- ECOCLIMAP-SG + LCZ (2d urban parameters) simulations are running

Thank you

Witold Interewicz

**Institute of Meteorology and Water Management -
National Research Institute
Centre of Numerical Weather Prediction**

03/09/2024, PP CITTA/GM



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