Thermal properties of urban landscape

Global Change Research Institute

Czech Academy of Sciences

Brno, Czech Republic

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CzechGlobe RS activities

Forestry

- Biochemical properties, RT modelling (HS, LiDAR)
- Biomass estimation (airborne HS, LiDAR data)

Agriculture

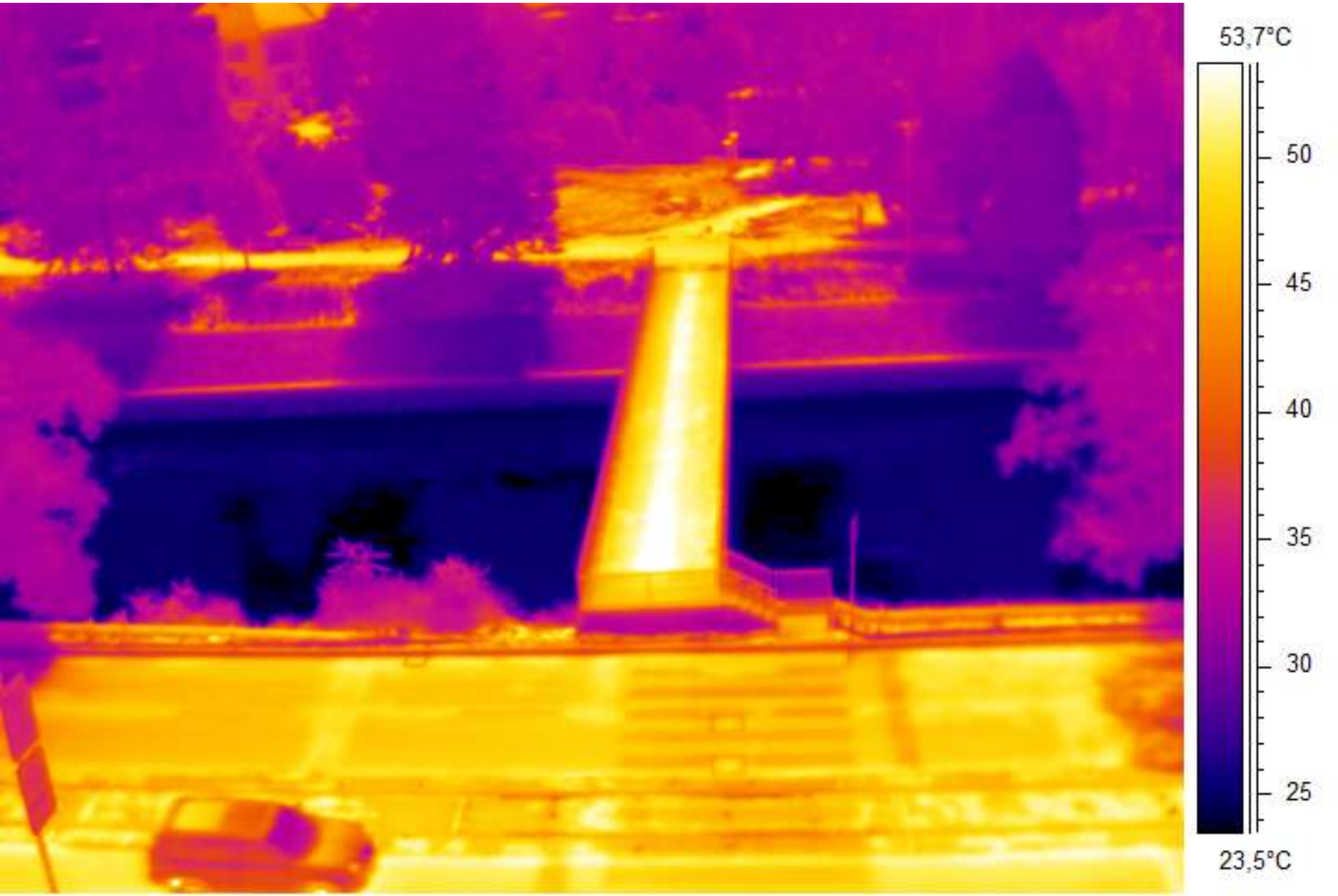
- Soil properties (VNIR, SWIR, TIR)
- Green biomass properties (VNIR, SWIR)

Urban

- Thermal properties – structure (airborne HS, TIR, LiDAR data)

Field and laboratory measurements: spectral properties, emissivity, temperature

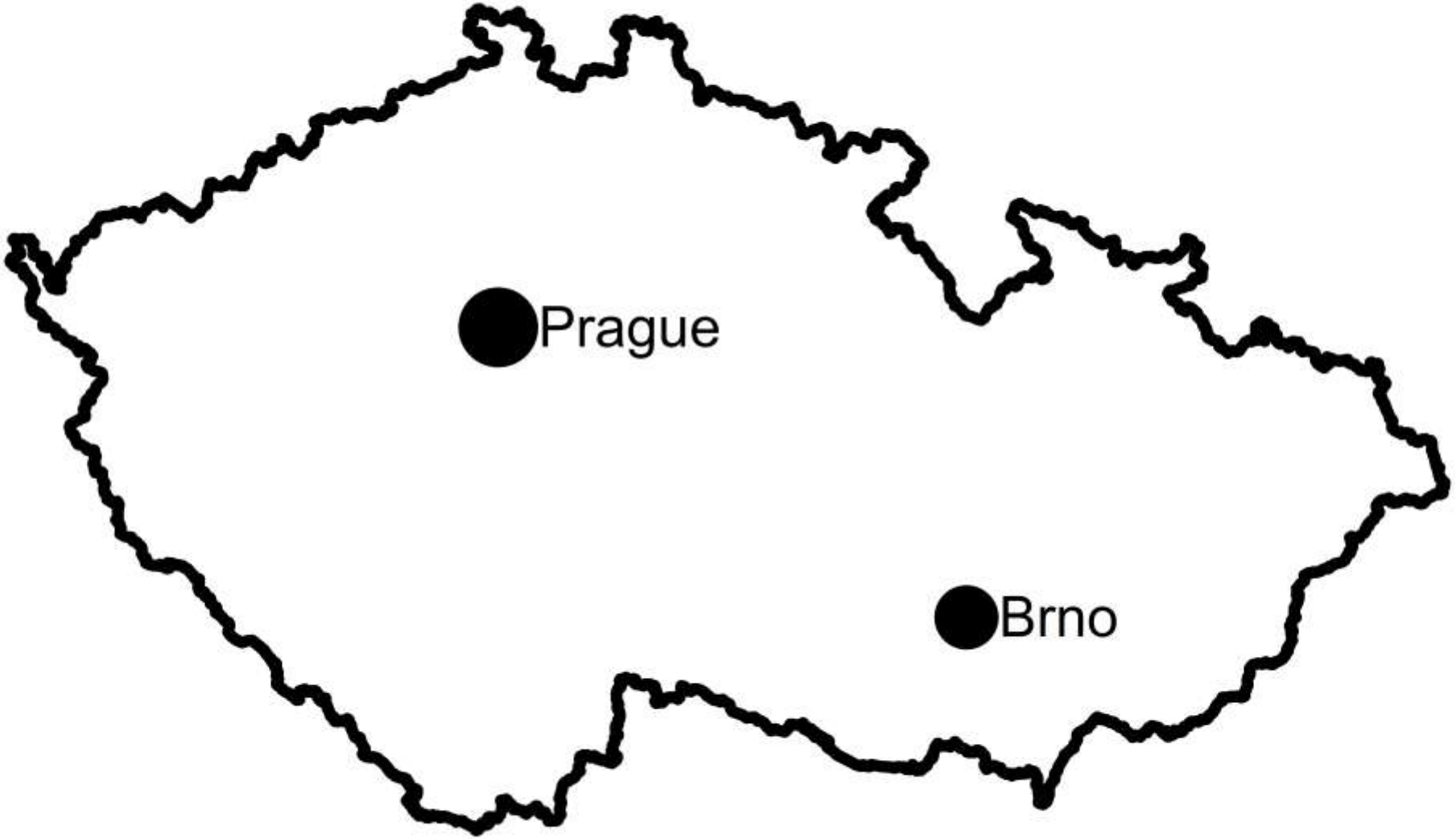
75,8°C
75
70
65
60
55
50
45
40
35
30
29,8°C


53,7°C
50
45
40
35
30
25
23,5°C

Aims

- Identification of relationships between structural features and thermal regime of urban landscape
- To support town planning with spatial quantitative information

Brno town cadaster


Prague
Brno

Objectives and expected outputs

- Map of temperature distribution in winter and summer time
- Map of land cover and 3D model of the Brno town
- Map of town greenery and its impact on thermal regime of build-up areas; health status of trees
- Modelling relationships between **town greenery**, open water bodies, build-up areas and **thermal regime** of town

Flying Laboratory of Imaging Systems

Visible and near infra-red imaging spectroscopy

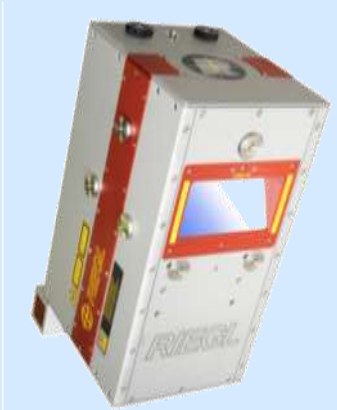
CASI-1500

SASI-600

Thermal imaging spectroscopy

TASI-600

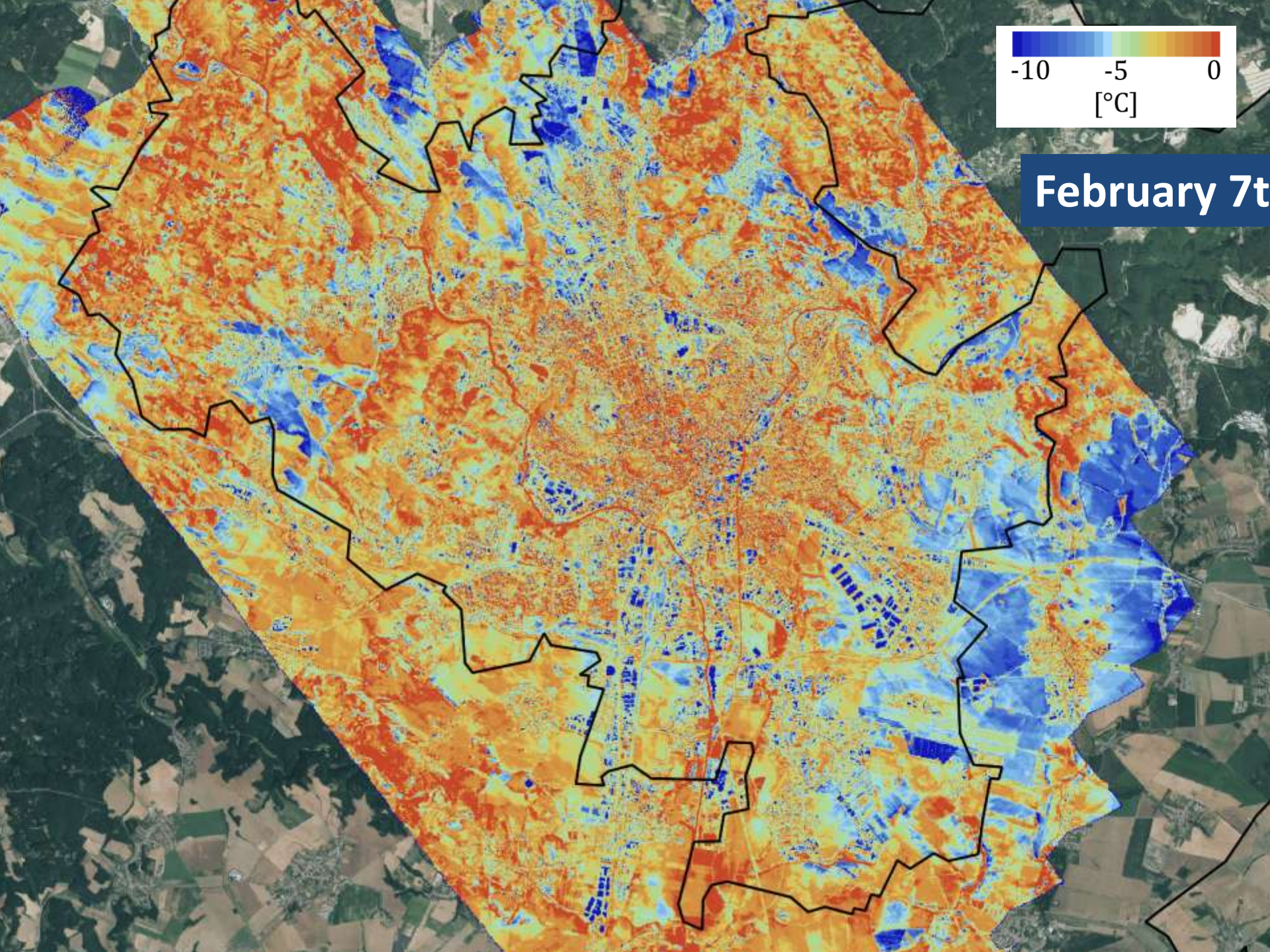
Laser scanning

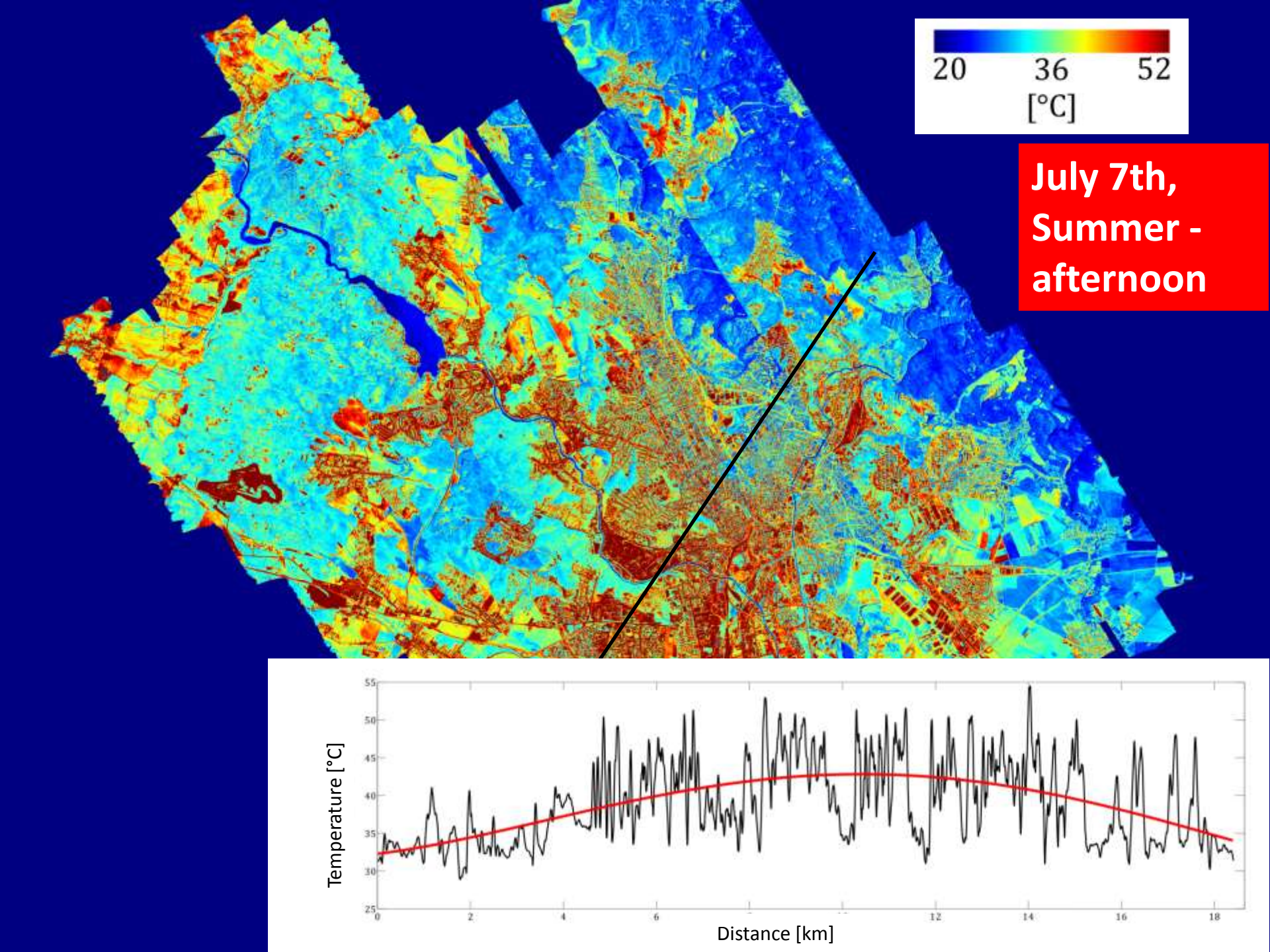


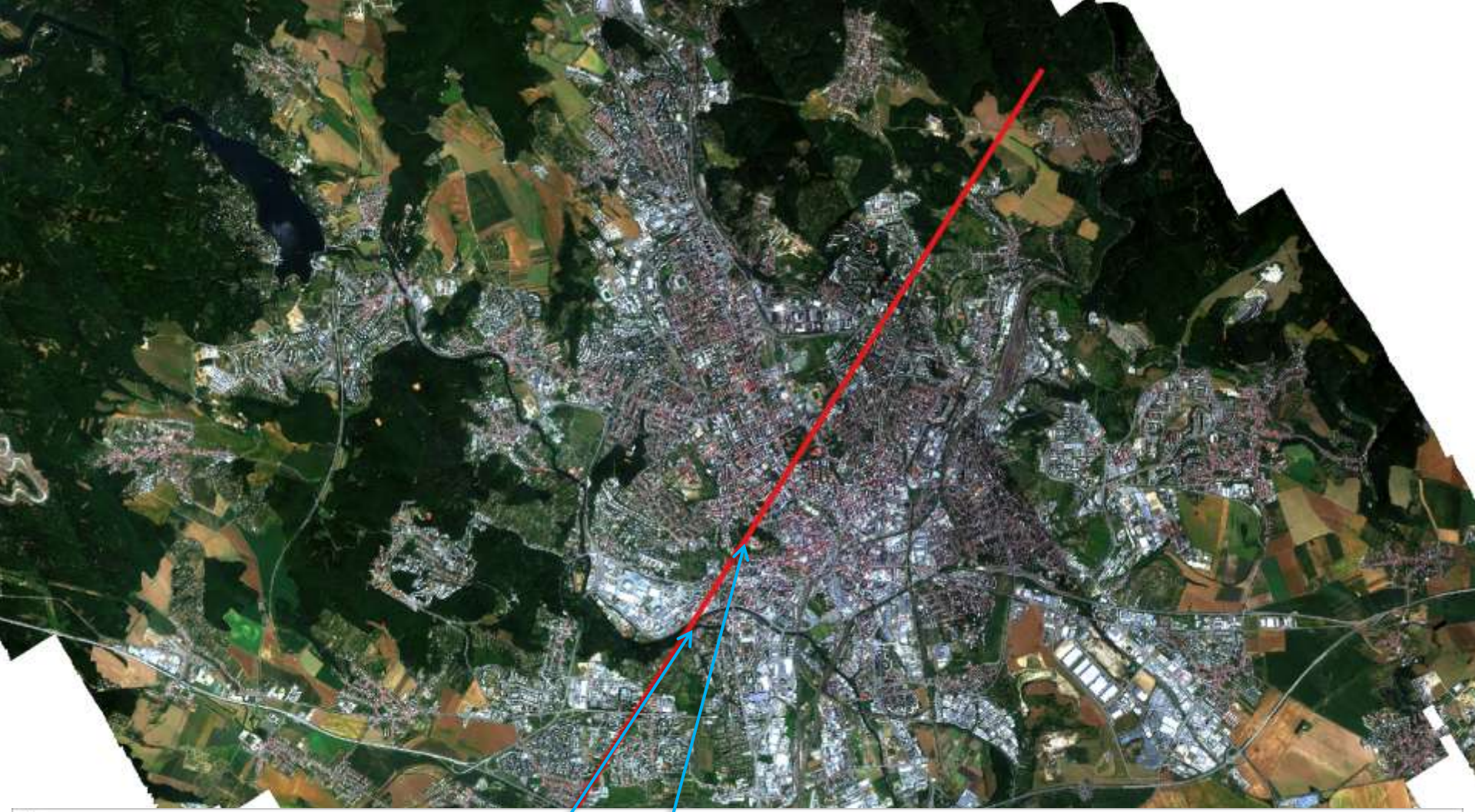
Riegl LMS – Q780

Data acquisition

Feb. 7th 2015	
20:30 – 22:15	**TASI (1m, 4m)**
July 4th	
9:30 – 15:00	**CASI (0,5; 1m), SASI (1; 2m),**
21:30 – 23:15	**TASI (1; 2; 4m)**
July 7th	
21:30 – 23:15	**TASI (1; 2m)**
September 15th	
10:00 – 15:00	**LiDAR (Riegl, Q680i)**
Field spectral	**Fieldspec ASD**
Emissivity/temperature	**FTIR**

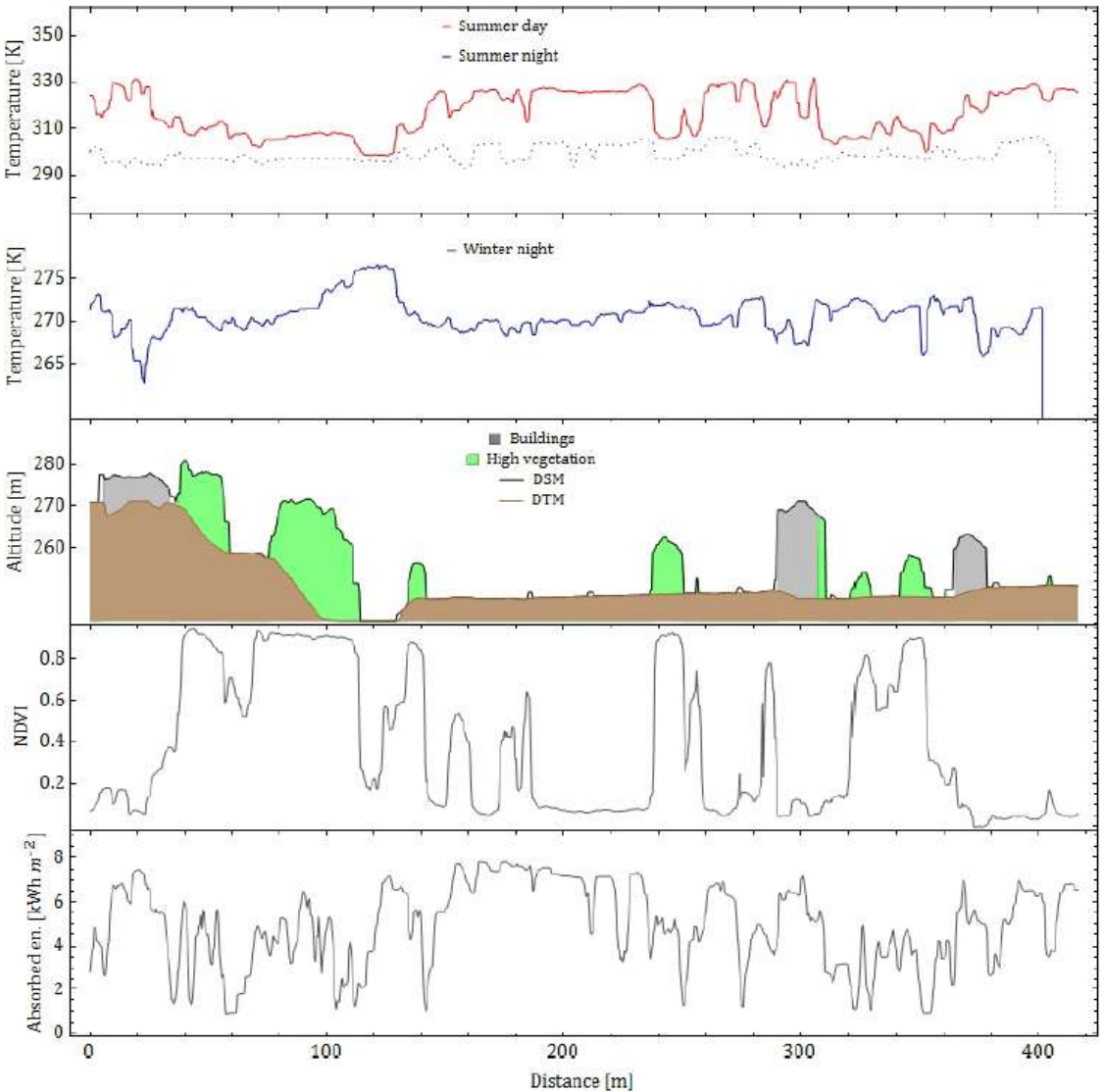

-10
-5
0
[°C]
February 7t

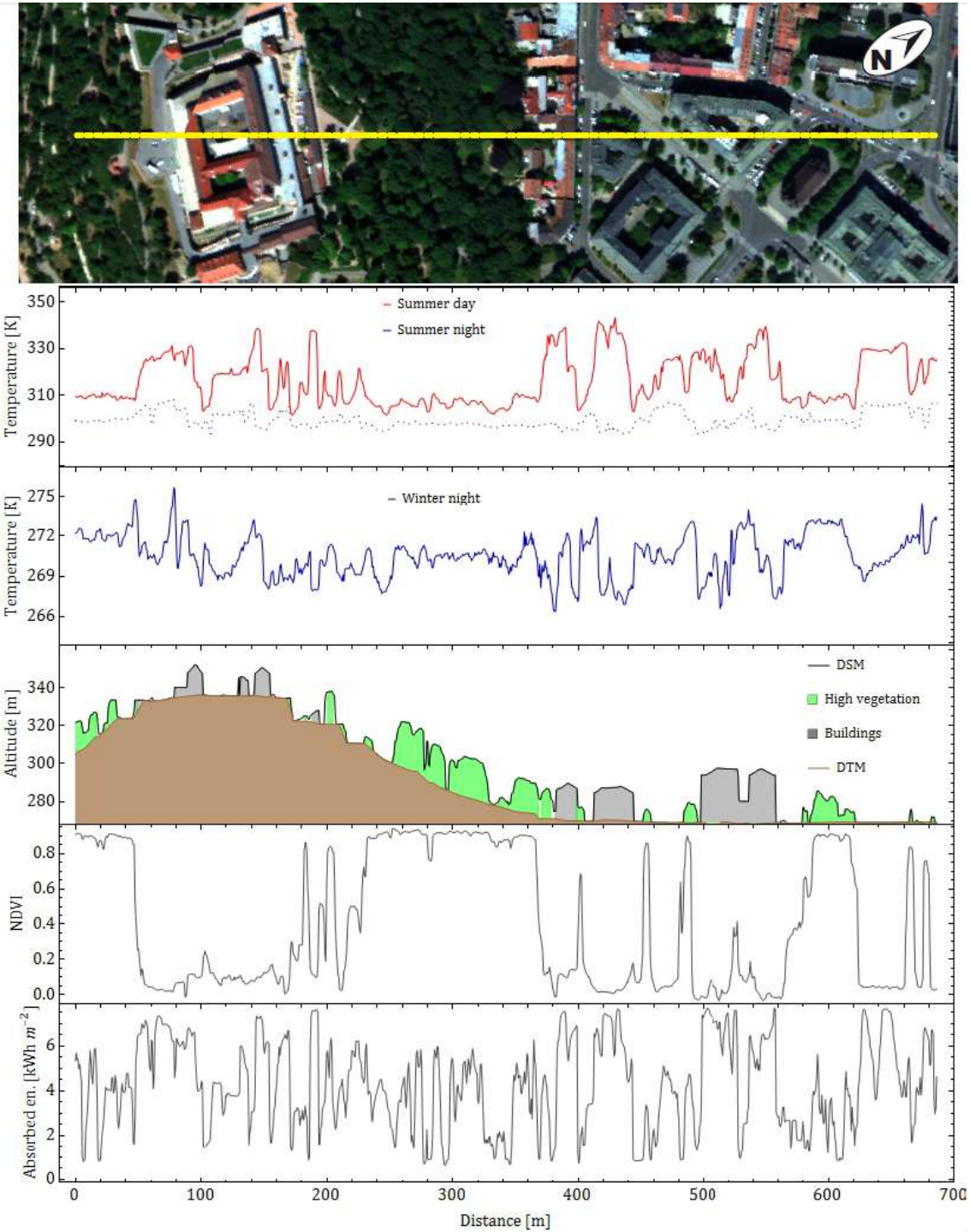

20
36
52
[°C]
July 7th, Summer - afternoon
Temperature [°C]
Distance [km]



DEM
410
390
370
350
330
310
290
270
250
230

N

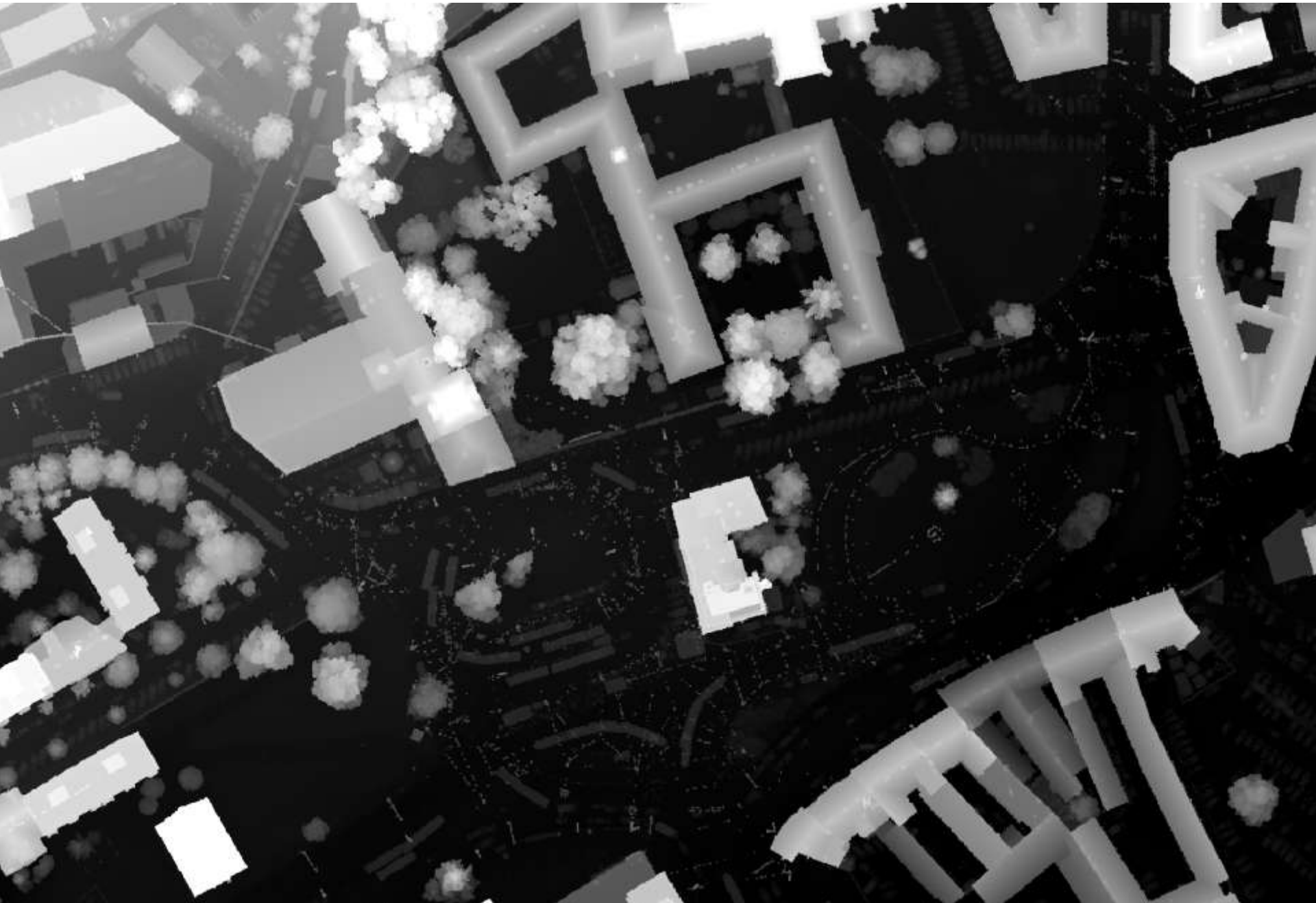

Summer day
Summer night
Temperature [K]
350
330
310
290
Winter night
Temperature [K]
275
270
265
Buildings
High vegetation
DSM
DTM
Altitude [m]
280
270
260
NDVI
0.8
0.6
0.4
0.2
Absorbed en. [kWh m-2]
8
6
4
2
0
0
100
200
300
400
Distance [m]


N
Summer day
Summer night
Temperature [K]
350
330
310
290
Winter night
Temperature [K]
275
272
269
266
DSM
High vegetation
Buildings
DTM
Altitude [m]
340
320
300
280
NDVI
0.8
0.6
0.4
0.2
0.0
Absorbed en. [kWh m^{-2}]
6
4
2
0
0
100
200
300
400
500
600
700
Distance [m]

SASI – VNIR (RGB) summer afternoon

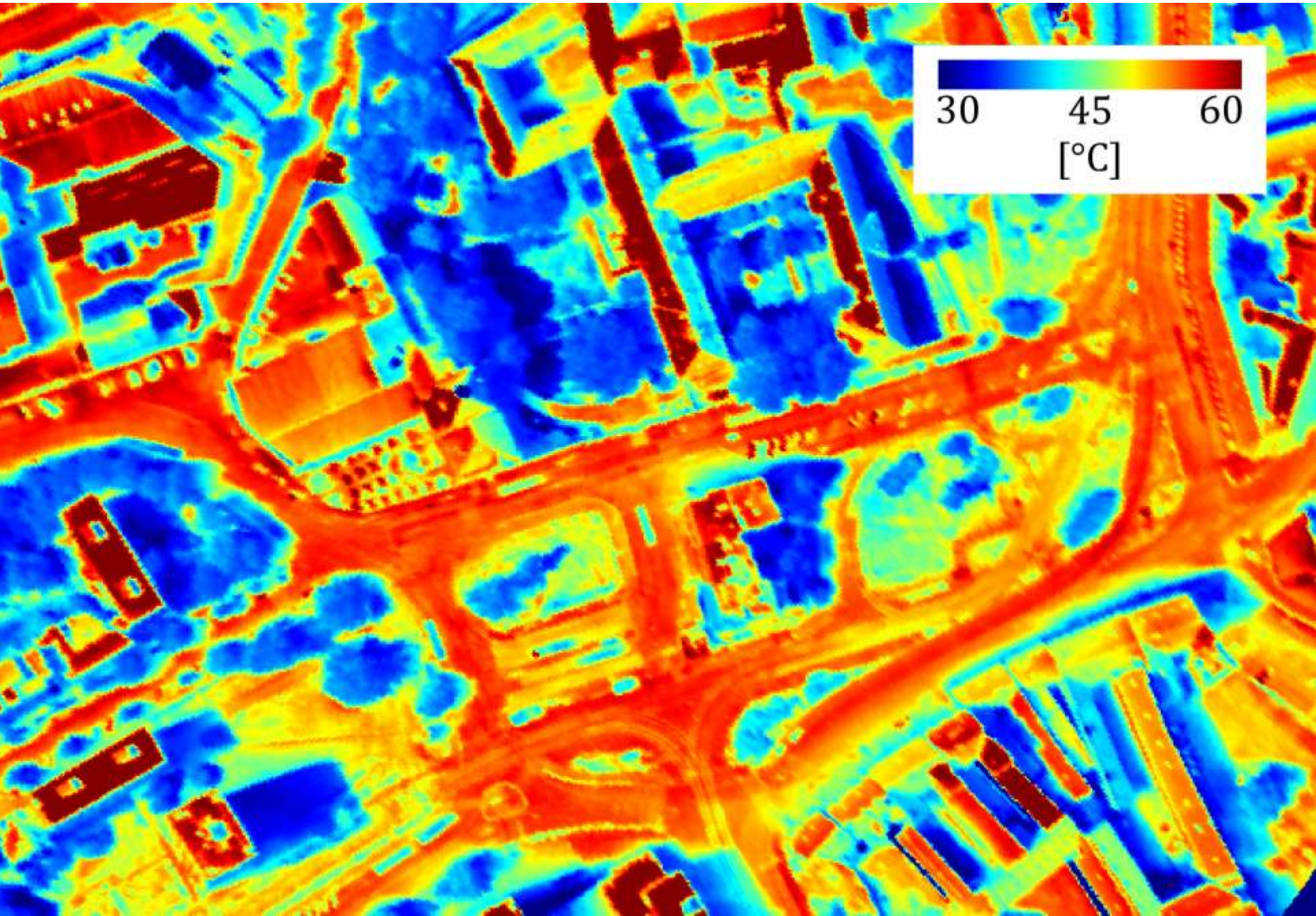
SASI – SWIR, summer afternoon

DSM from LiDAR data

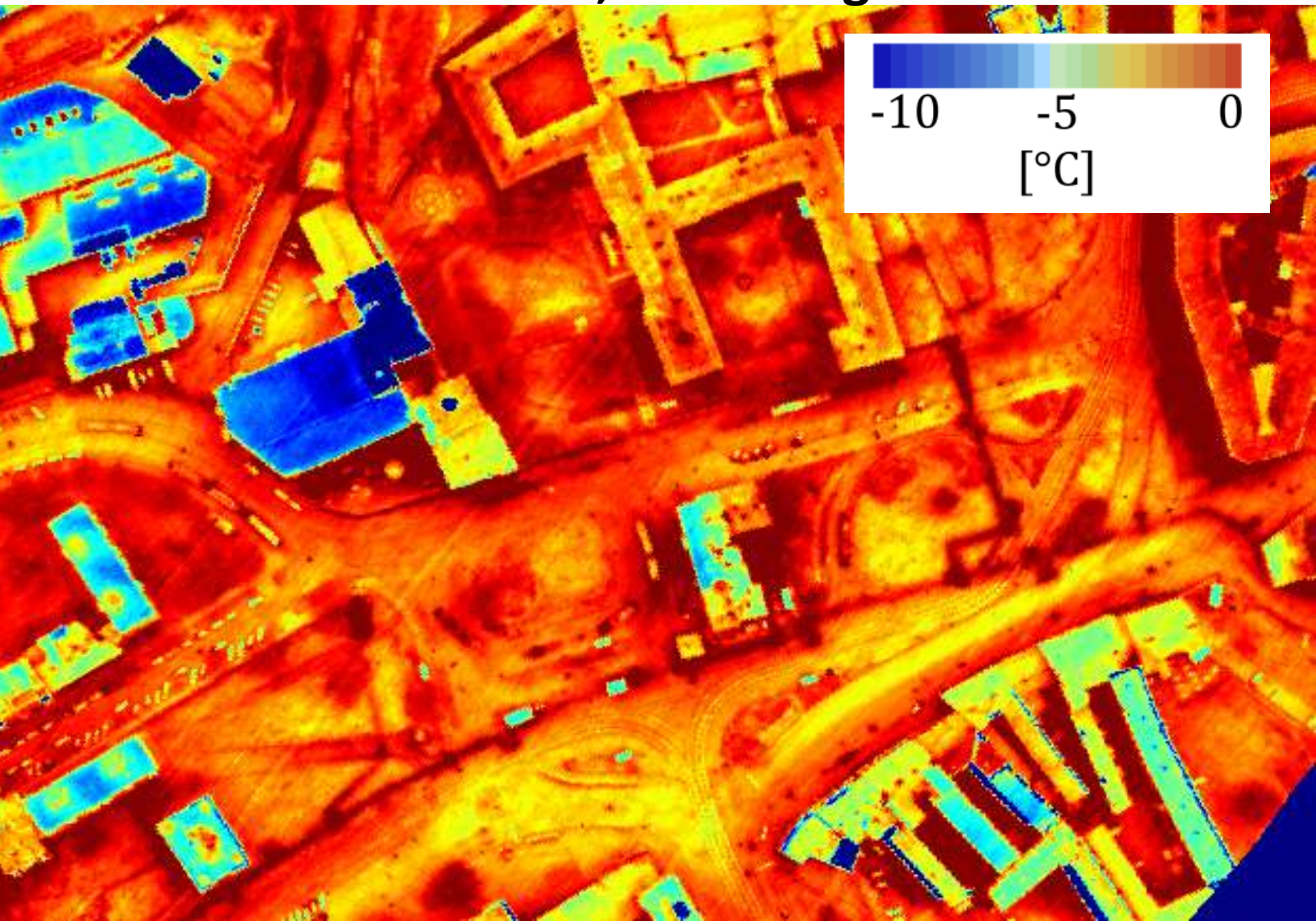


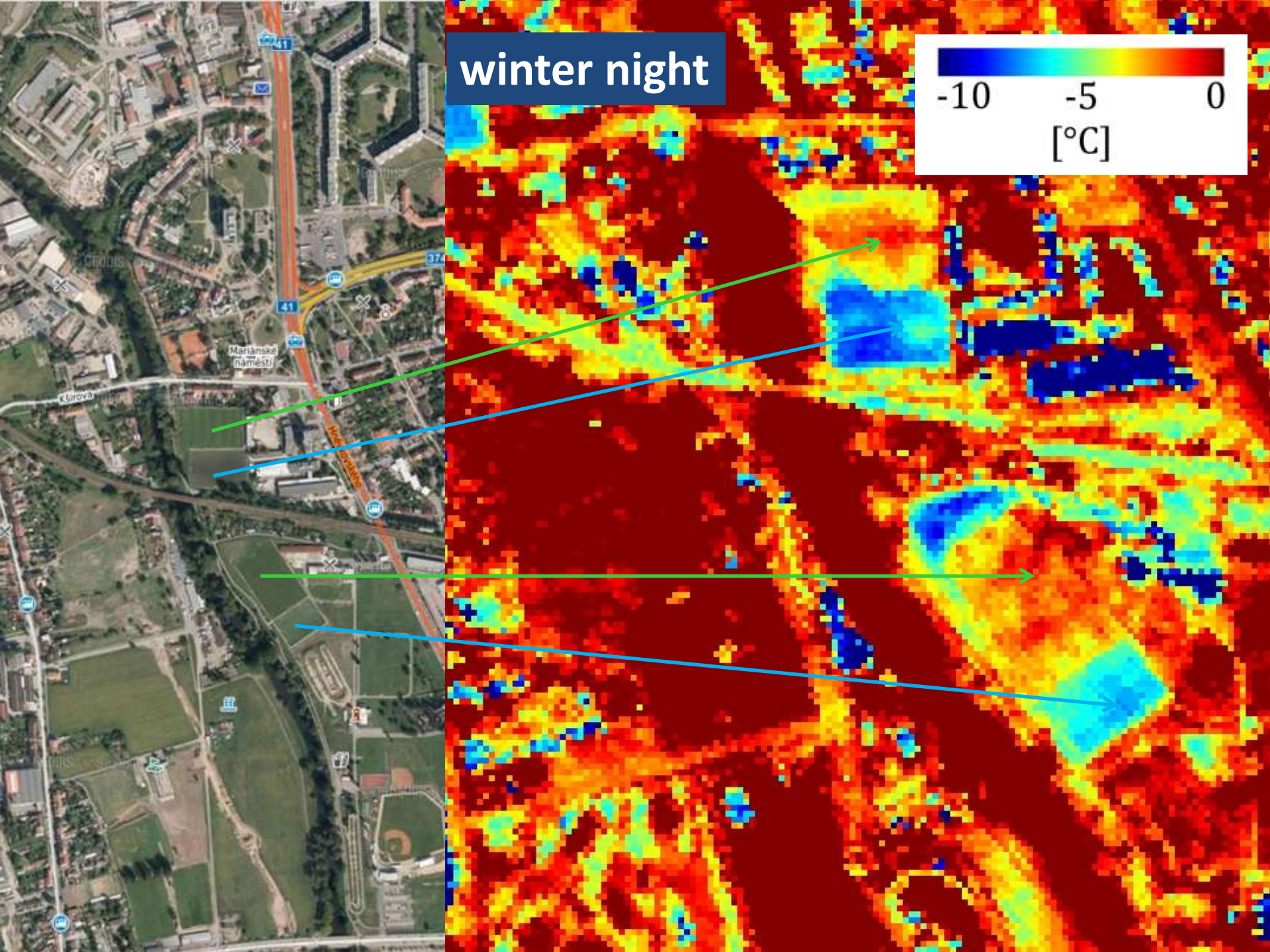
3-D model from LiDAR data

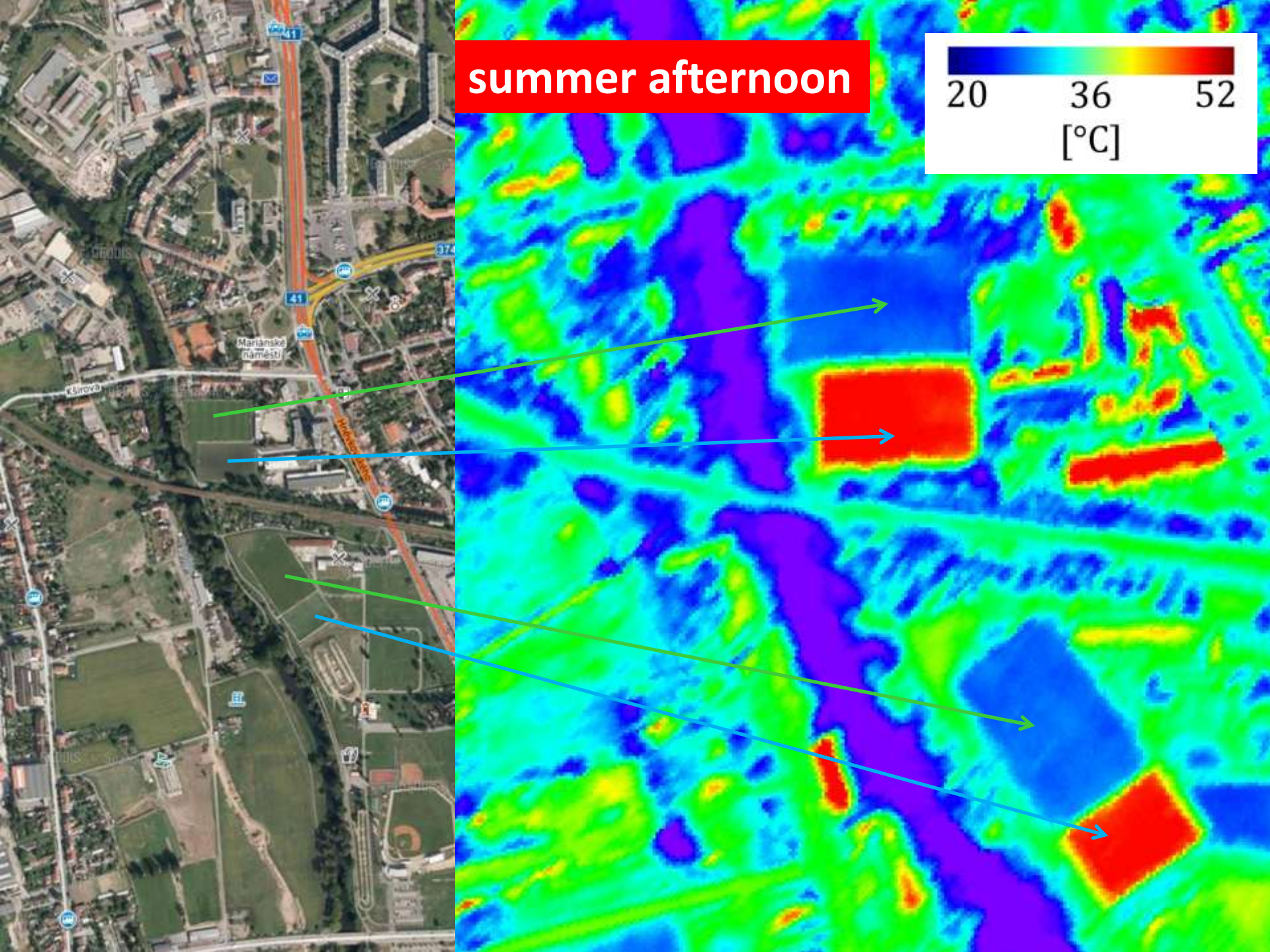
TASI – TIR, summer afternoon



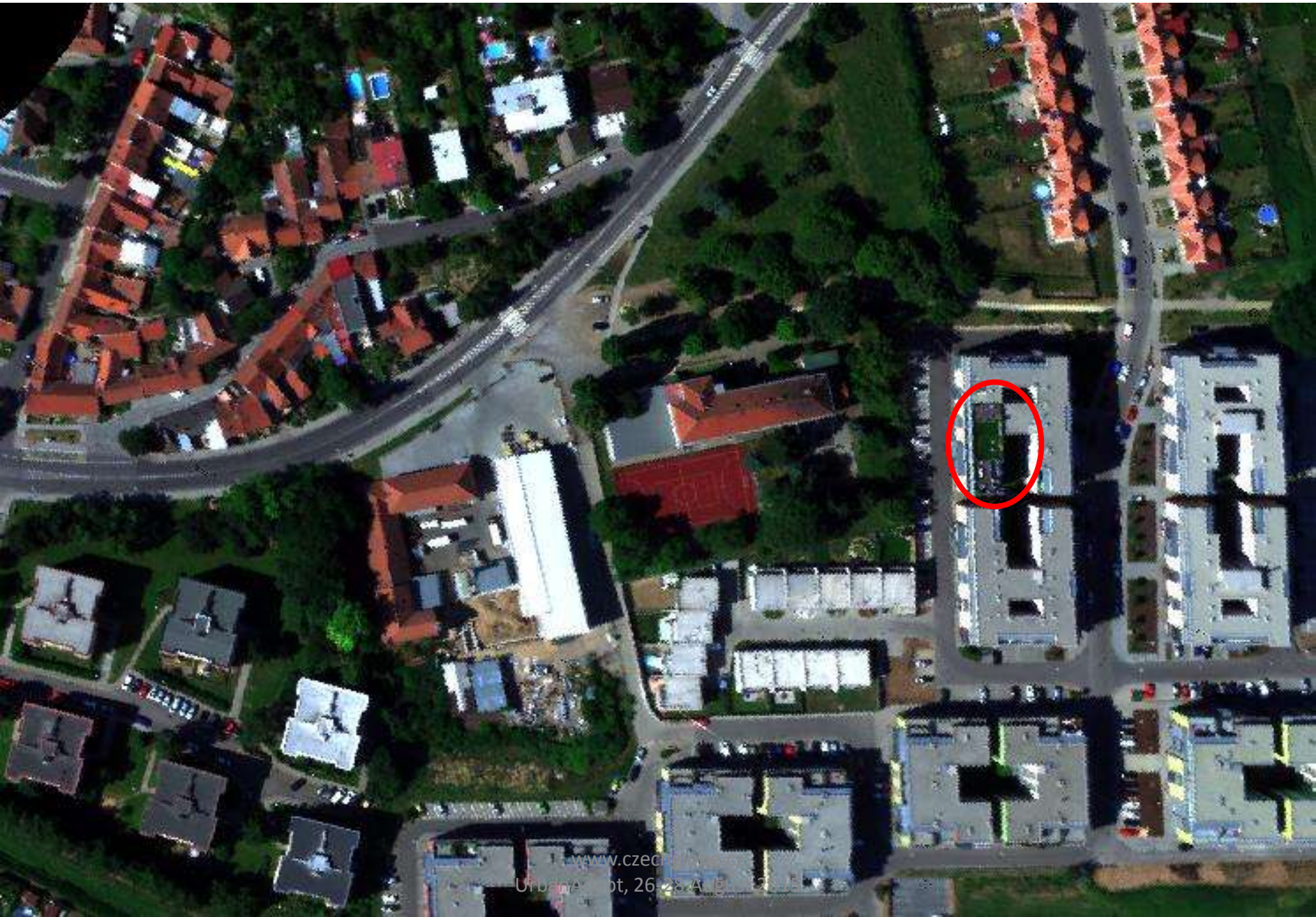
TASI – TIR, winter night



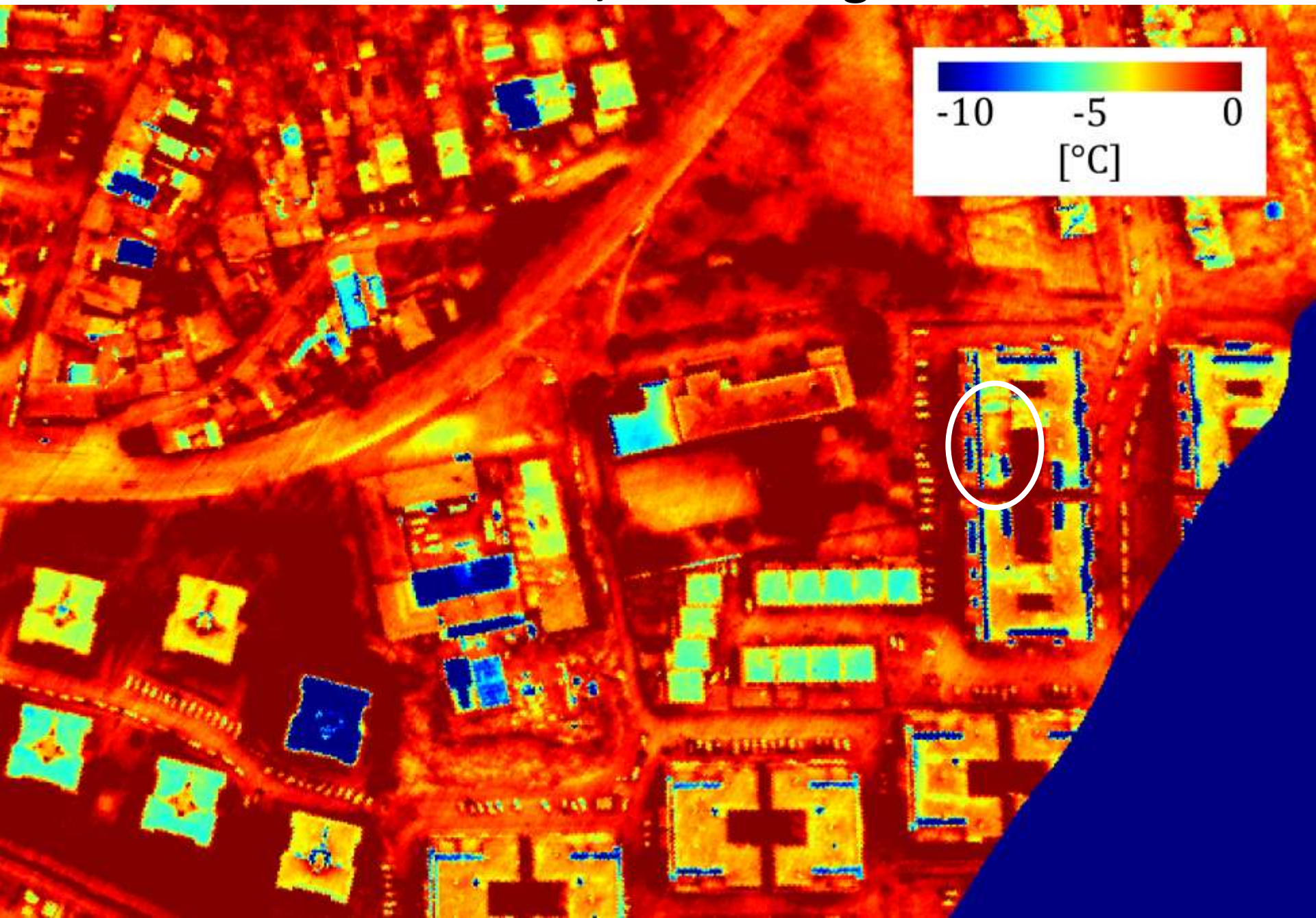

winter night
-10
-5
0
[°C]
Mariánské náměstí
Klírova


summer afternoon
20
36
52
[°C]
41
Mariánské náměstí
Křivova

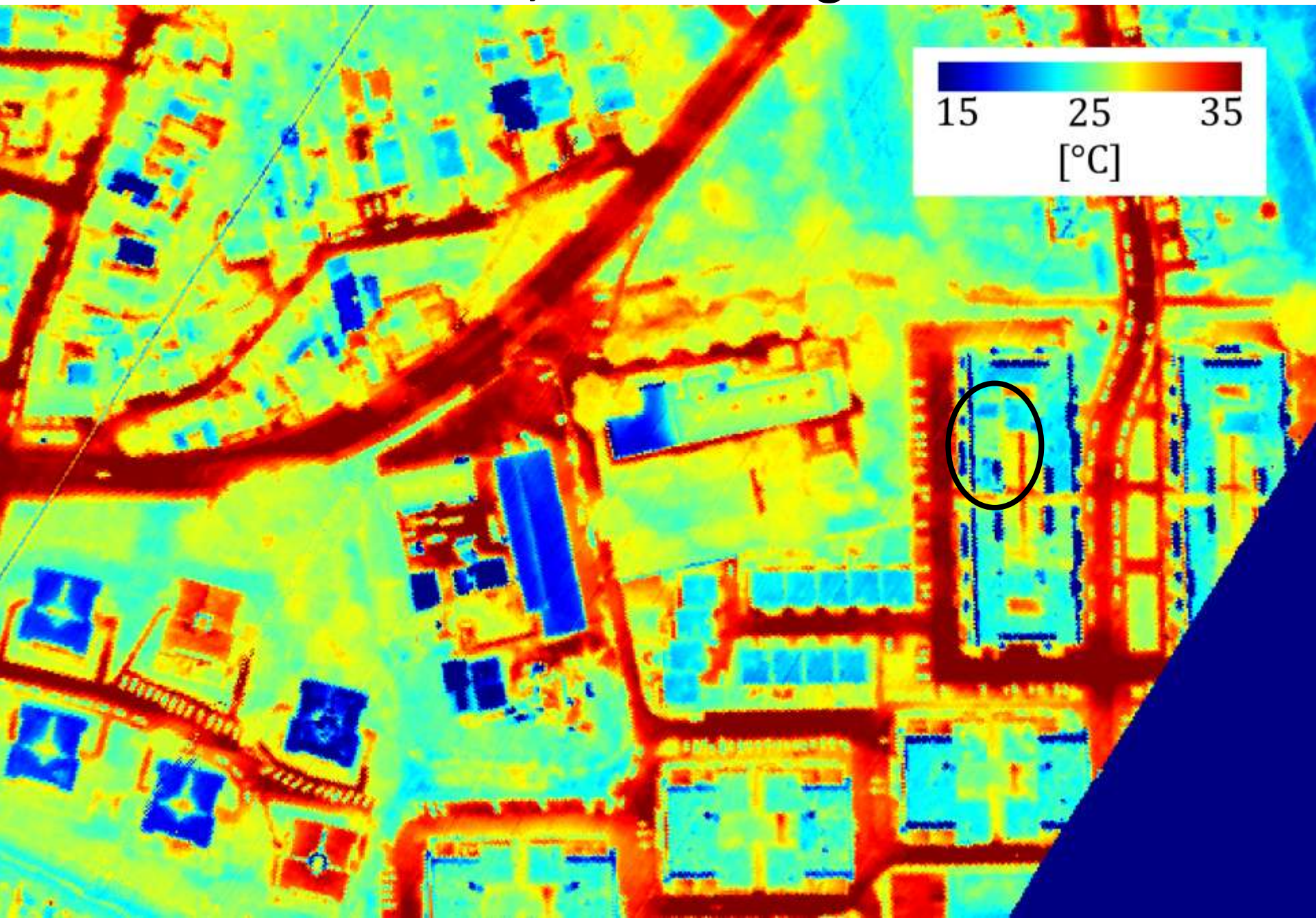
Green roof



TASI – TIR, winter night

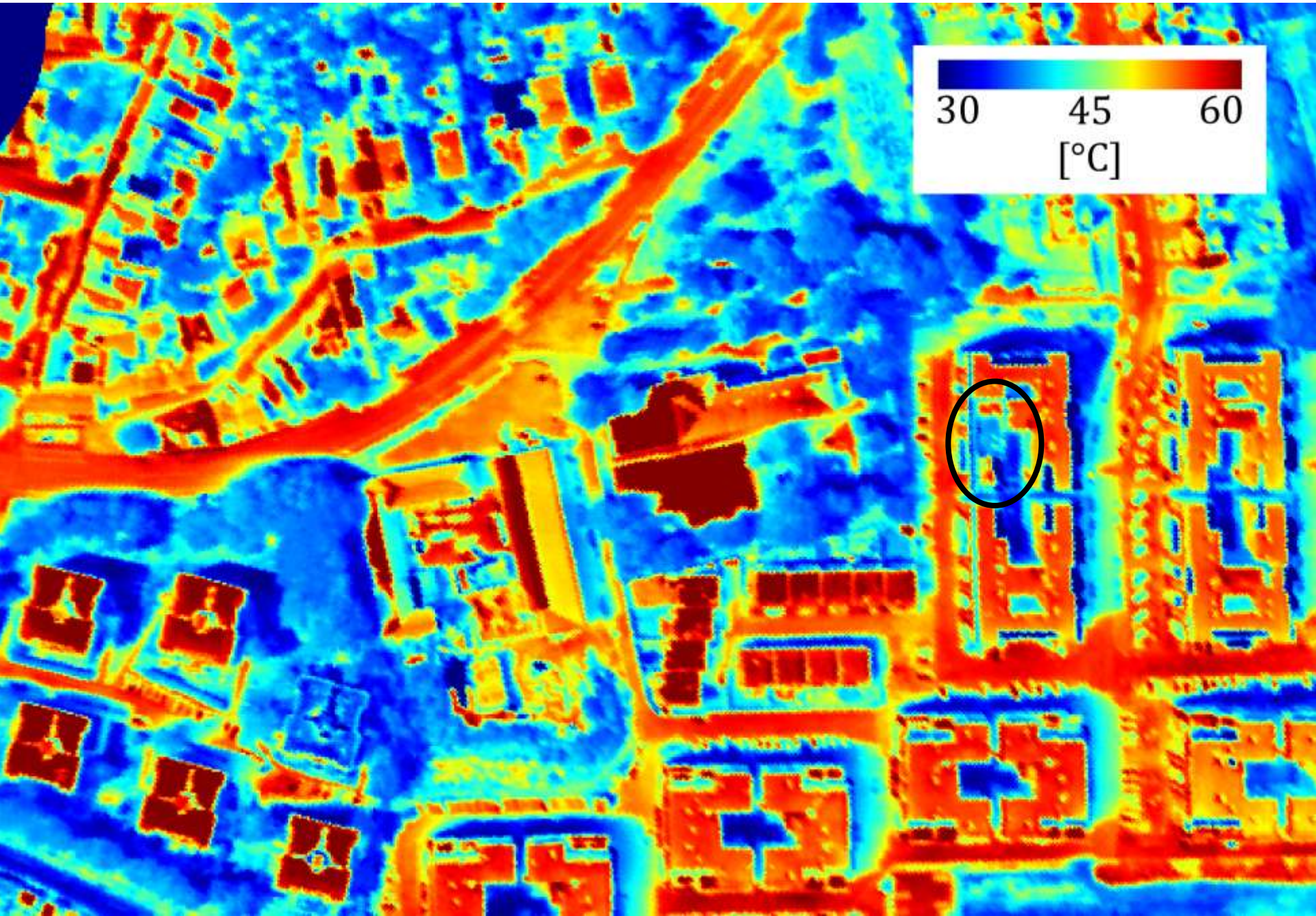


TASI – TIR, summer night



Leskava2.mov

TASI – TIR, summer afternoon



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More info

www.czechglobe.cz

http://mapserver.czechglobe.cz/mapserver-en.html

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