UNIVERSITY OF GOTHENBURG

THERMAL MAPPING IN FLAT LOWLANDS AND UNDULATING UPLANDS – A COMPARISON OF RESULTS

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Presentation plan

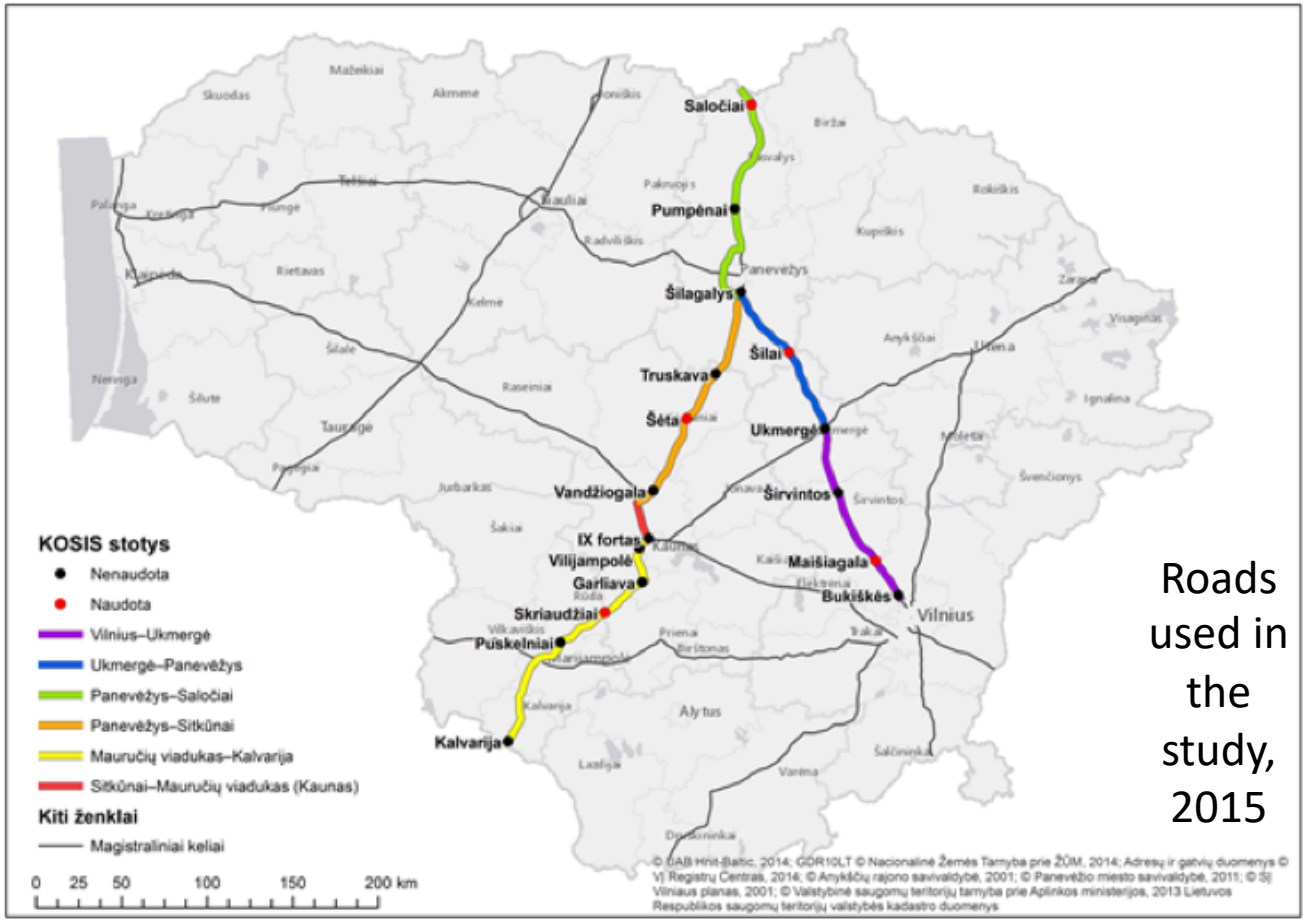
1. Background information, source of the topic
2. Observed differences in Chechia and Lithuania
3. Comparison and discussion

Thermal mapping in Lithuania. The problem.

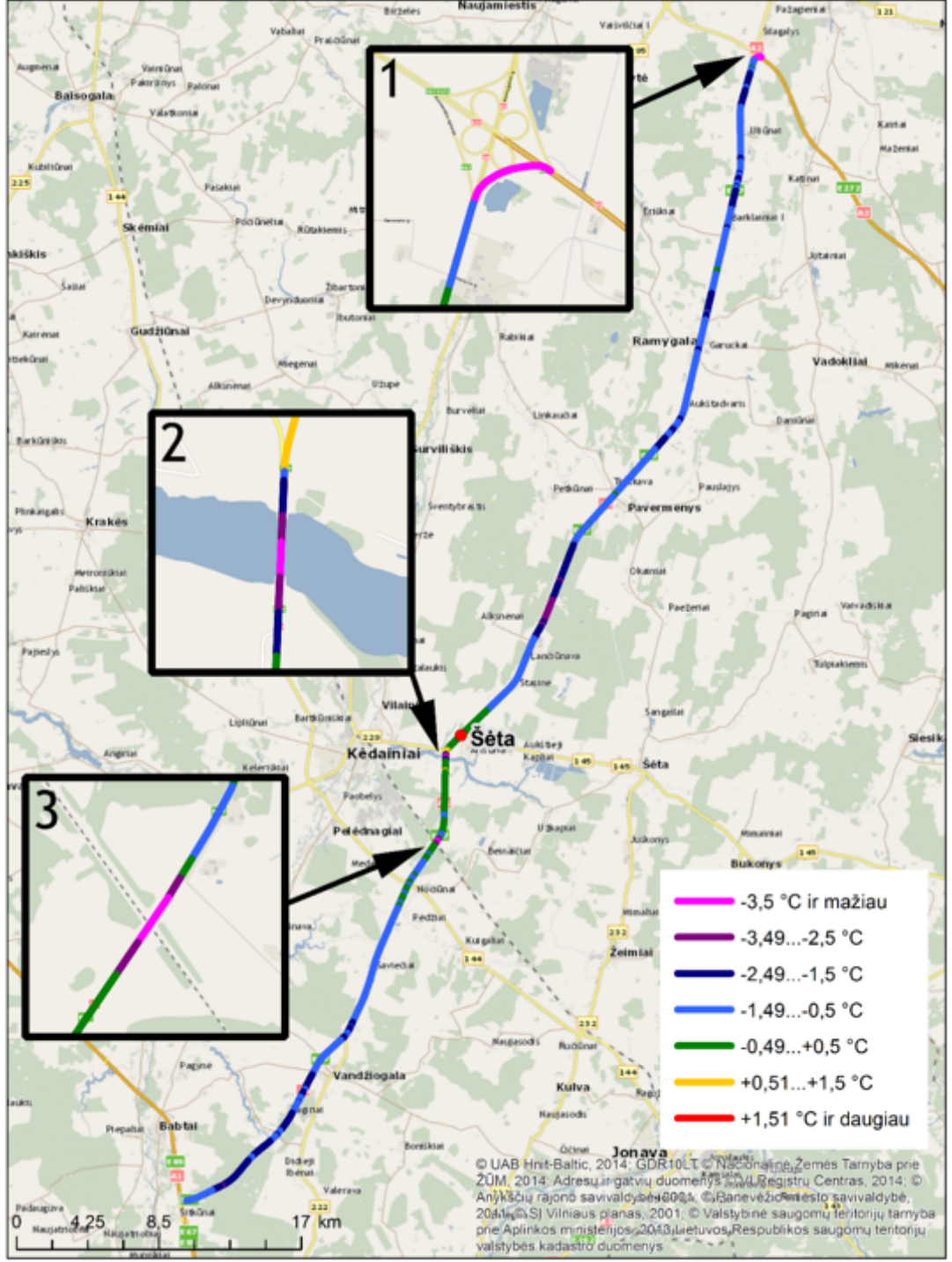
The method was applied twice in Lithuania – in 2000 (when the very first RWIS were installed) and in 2015.

In 2000: linear observation based forecasting models were developed but never used in operational work.

In 2015 the purpose of TM was to incorporate a road weather forecasting module (with METRo model) into Lithuanian ITS. Unfortunately, the idea was not fully implemented.



Roads used in the study, 2015


1
2
3
Šėta
Kėdainiai
Pelėdnagiai
Vandžiogala
Babtai
Jonava
Ramygala
Pavermenys
Gudžiūnai
Skėmiai
Krakės
Balsogala
Naujamiestis
Žeimiai
Bukonys
Kulva
-3,5 °C ir mažiau
-3,49...-2,5 °C
-2,49...-1,5 °C
-1,49...-0,5 °C
-0,49...+0,5 °C
+0,51...+1,5 °C
+1,51 °C ir daugiau
0 4,25 8,5 17 km
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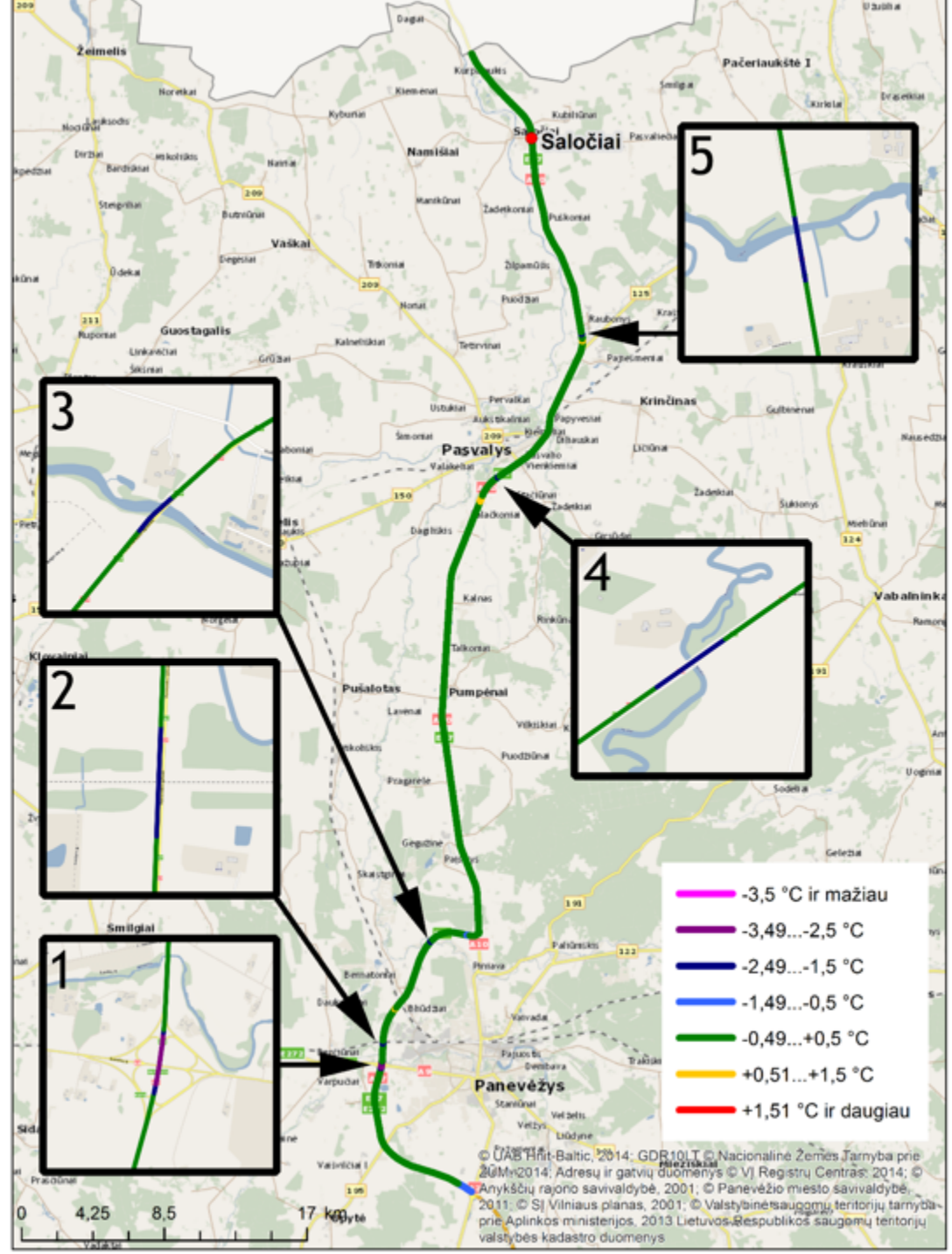
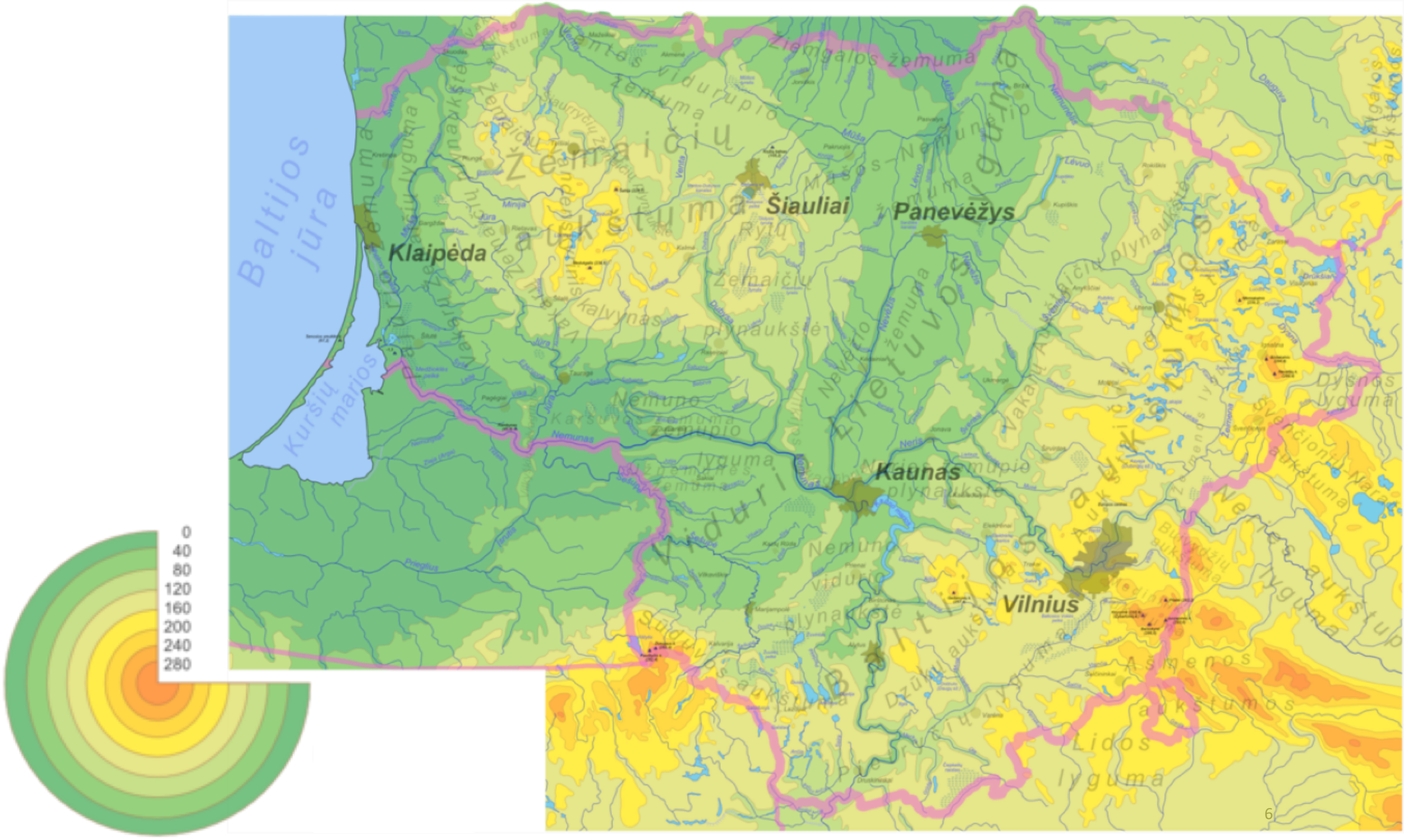
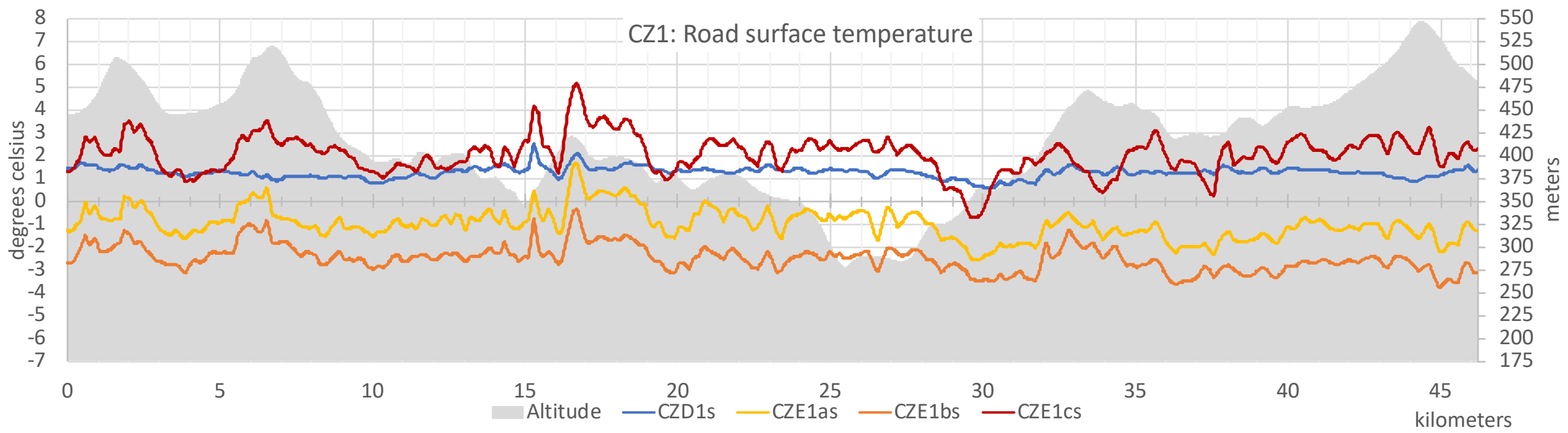
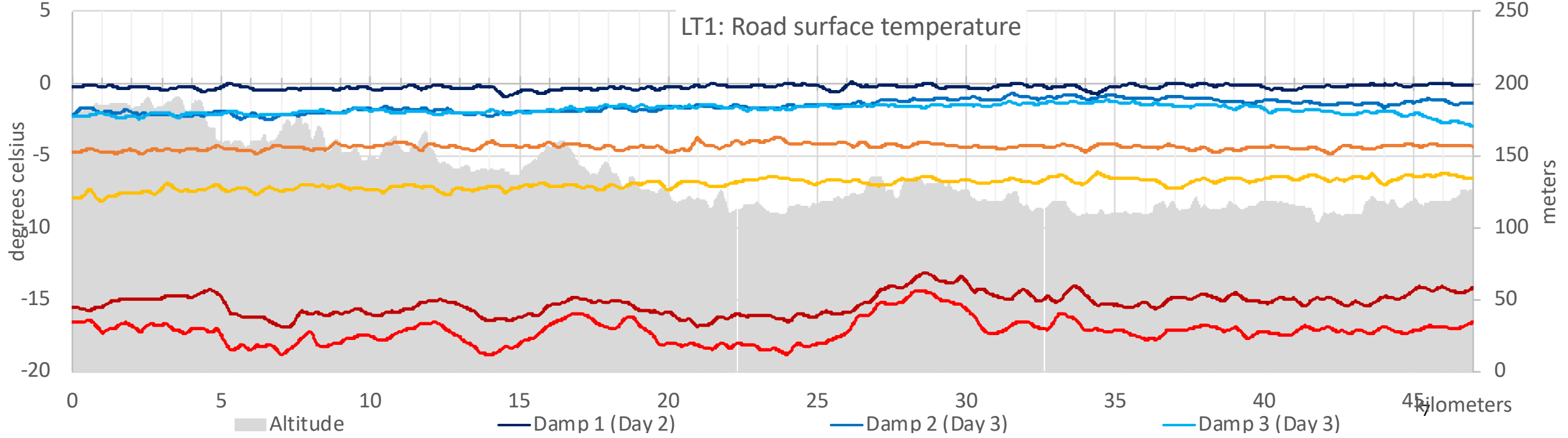
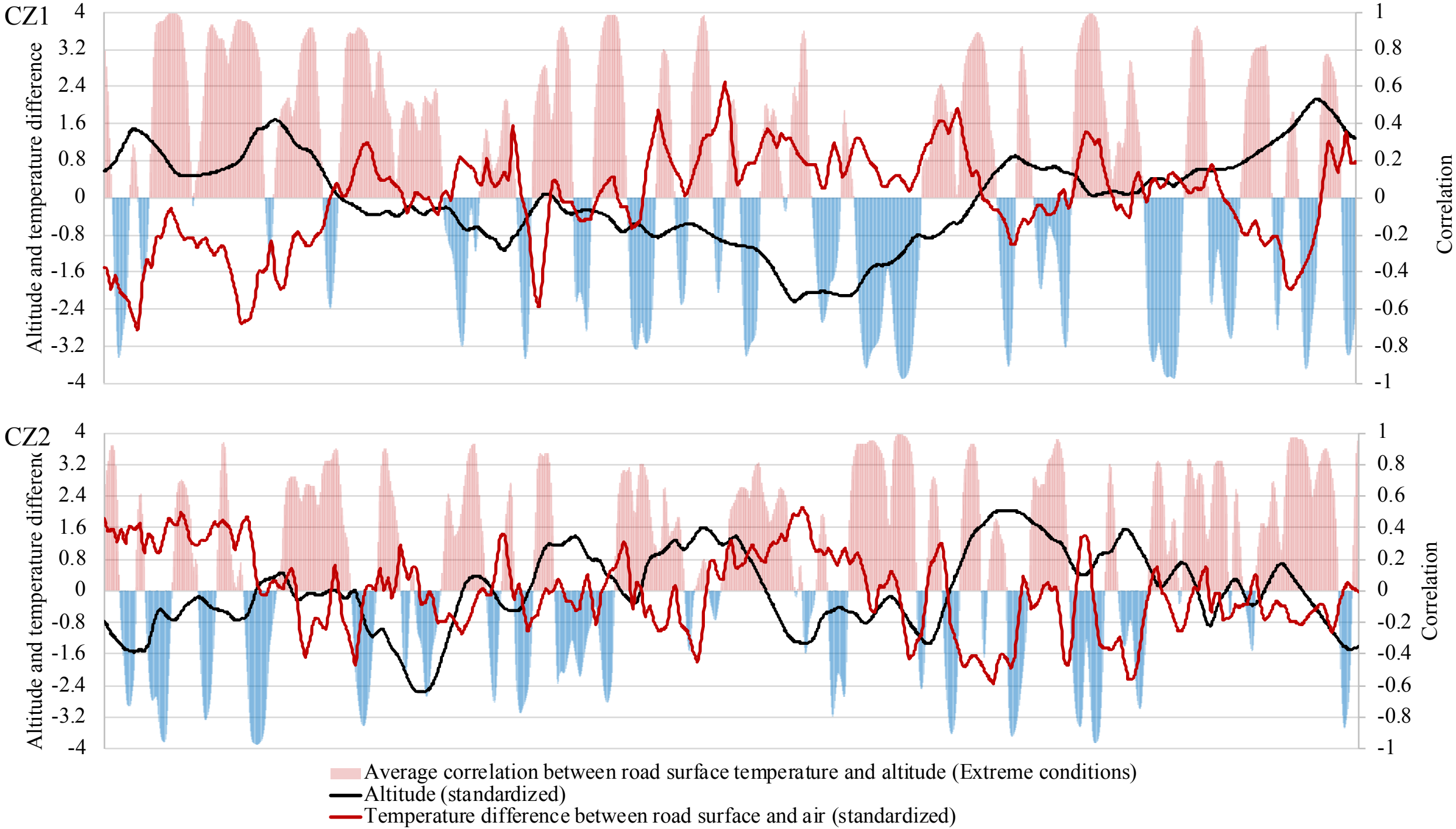

1
2
3
4
5
Saločiai
Pasvalys
Panevėžys
Namišiai
Vaškai
Guostagalis
Krinčinas
Pušalotas
Pumpėnai
Smilgiai
Žeimelis
Pačeriaukštė I
-3,5 °C ir mažiau
-3,49...-2,5 °C
-2,49...-1,5 °C
-1,49...-0,5 °C
-0,49...+0,5 °C
+0,51...+1,5 °C
+1,51 °C ir daugiau
0 4,25 8,5 17 km
© UAB Hnit-Baltic, 2014; GDR10LT © Nacionalinė Žemės Tarnyba prie ŽŪM, 2014; Adresų ir gatvių duomenys © VĮ Registrų Centras, 2014; © Anykščių rajono savivaldybė, 2001; © Panevėžio miesto savivaldybė, 2011; © SĮ Vilniaus planas, 2001; © Valstybinė saugomų teritorijų tarnyba prie Aplinkos ministerijos, 2013 Lietuvos Respublikos saugomų teritorijų valstybės kadastro duomenys

Can thermal mapping be as effective in lowlands as in mountainous or hilly regions?

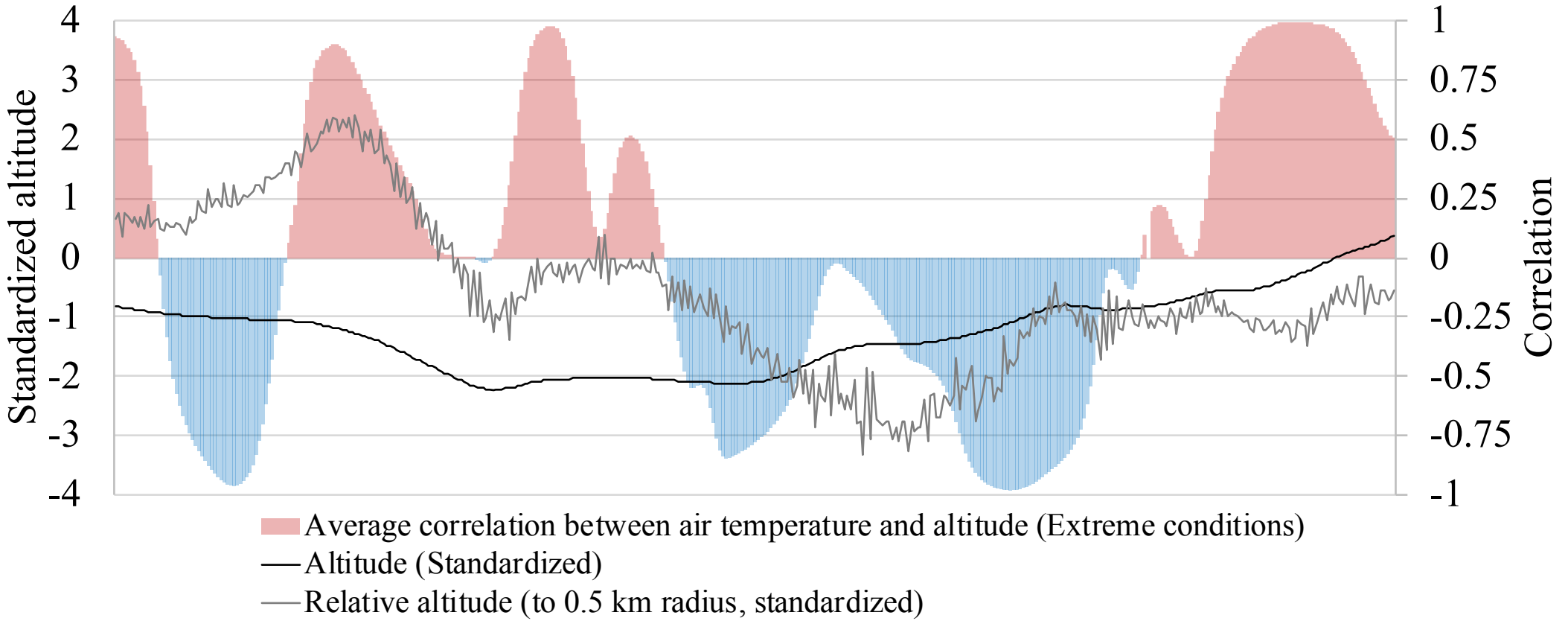

Baltijos jūra
Kuršių marios
Klaipėda
Šiauliai
Panevėžys
Kaunas
Vilnius
0
40
80
120
160
200
240
280


CZ1: Road surface temperature
degrees celsius
meters
kilometers
Altitude
CZD1s
CZE1as
CZE1bs
CZE1cs


LT1: Road surface temperature
degrees celsius
meters
kilometers
Altitude
Damp 1 (Day 2)
Damp 2 (Day 3)
Damp 3 (Day 3)


CZ1
CZ2
Altitude and temperature difference
Correlation
4
3.2
2.4
1.6
0.8
0
-0.8
-1.6
-2.4
-3.2
-4
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
Average correlation between road surface temperature and altitude (Extreme conditions)
Altitude (standardized)
Temperature difference between road surface and air (standardized)

Undulating uplands example - Chechia

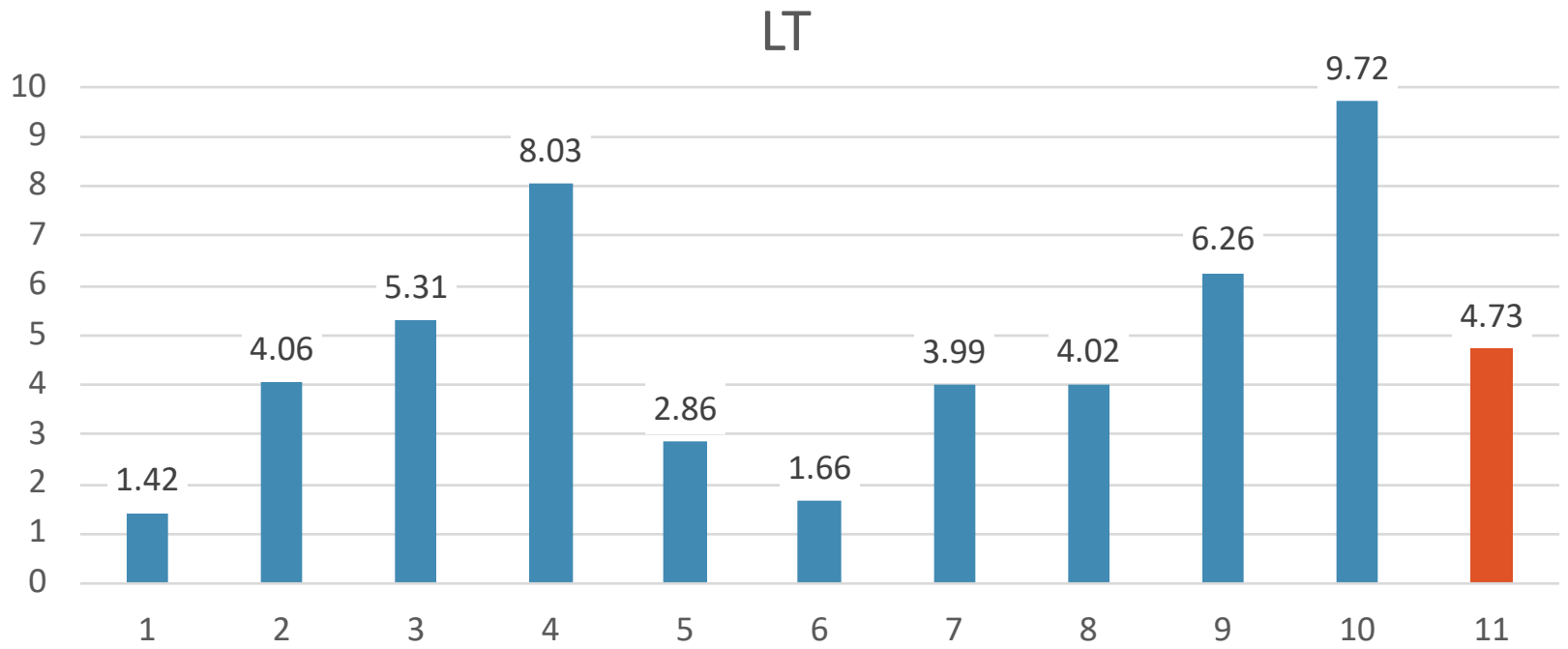


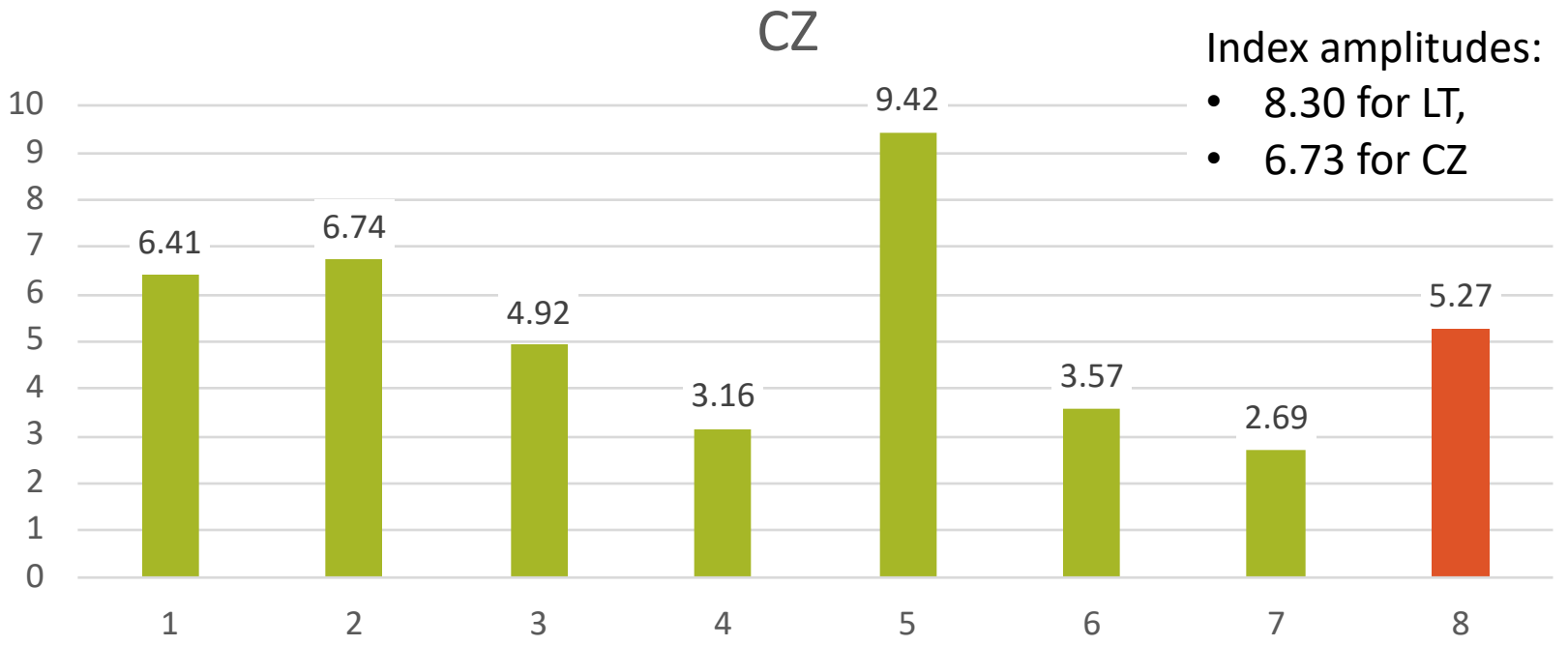
Cold air pooling potential

Percentage of a route where certain conditions were met:

- where road was colder than air
- moving correlation (0.5 km radius) between road temperature and altitude was +0.8 or above

Left: bars – the index value on every measurement event during extreme conditions, bar in red – average.





Index amplitudes:

- 8.30 for LT,
- 6.73 for CZ

Conclusions

For altitude to be a decent predictor it is necessary to have an *area with smaller depressions and less frequent overall landscape shifts*, rather than a constantly interchanging hills and valleys.

There are still some cases in Lithuanian roads, where road temperature consistently dropped lower than air during most of the measurement events, therefore thermal mapping is still a valid method for *determining such cold spots*.

However, usage of TM for road temperature forecasting is becoming questionable and *somewhat inefficient*, for them being quite expensive to make and having a significantly low predictability value.