Spatial representativeness test - Slovakia, selected domain

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**SLOVENSKÝ HYDROMETEOROLOGICKÝ ÚSTAV**

Slovakia/
 zone Banskobystrický kraj
computational domains
Jelsava, BB

Measurement station

*   Jelšava – UB

*   Pollutants: PM, NO2, BAP

*   Year: 2021

*   Type of model used: Lagrangian

*   Model scale / resolution:

    10 x 10 m AtmoStreet (road traffic)
    250 x 250 m – CALPUFF (point sources and domestic heating),
   interpolated to 10 x 10m.
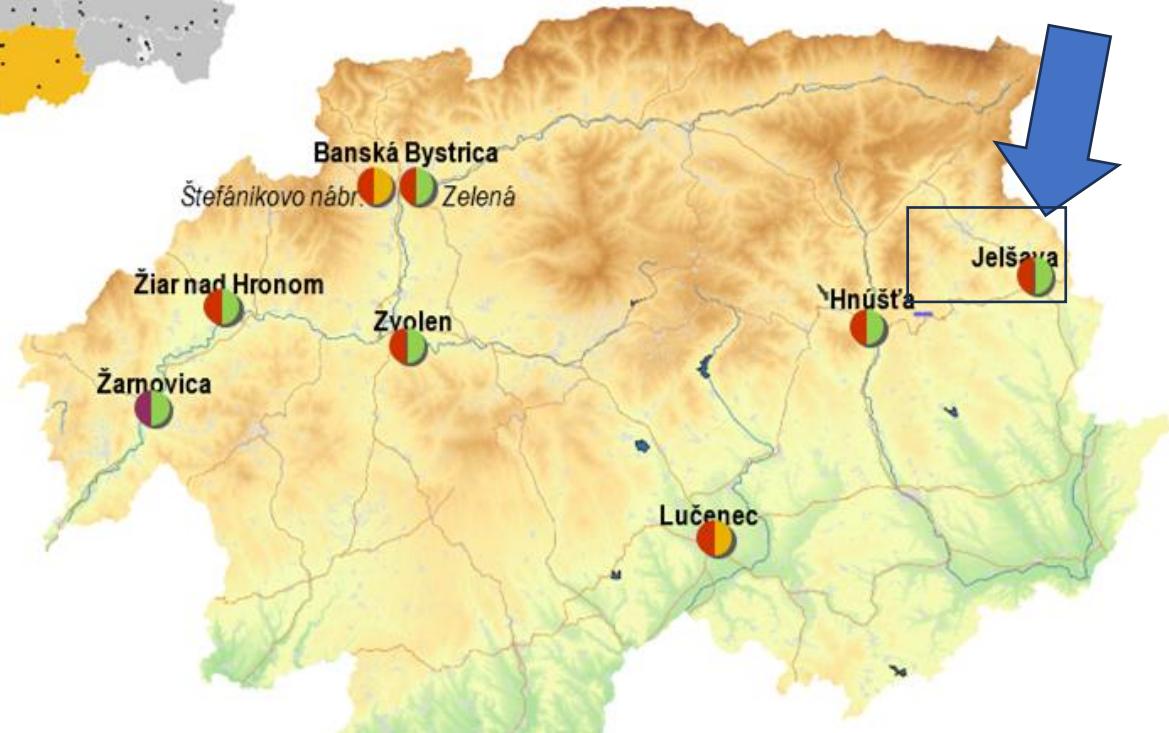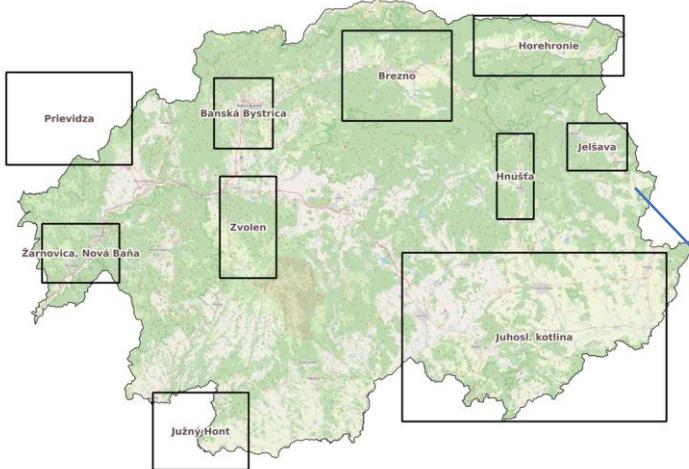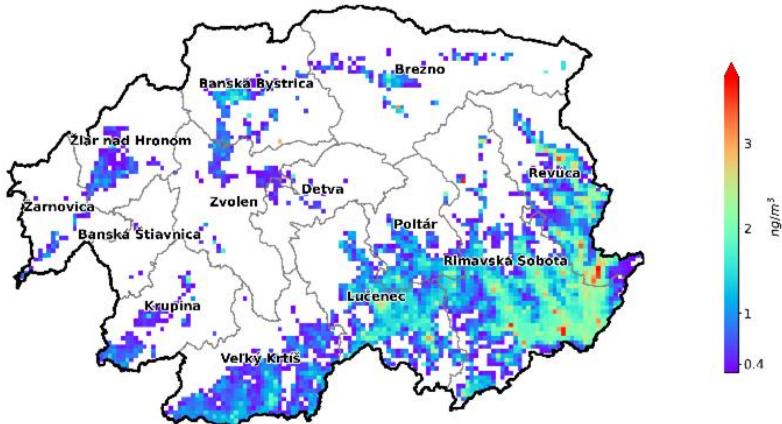
|	2017	2018	2019	2020	2021
Target value [ng·m⁻³]	1.0	1.0	1.0	1.0	1.0
Banská Bystrica, Štefánikovo nábrežie	2.9	2.1	1.7	1.6	1.7
Banská Bystrica, Zelená			1.1	1.2	1.3
Jelšava, Jesenského		3.9	4.0	3.0	2.8
Žarnovica, Dolná					2.2

≥90% of valid measurements

CALPUFF - lagrangian   UB Jelšava

Priemerné ročné koncentrácie BaP - 2021 - celkové
$(c > 1.0\ ng/m^3)$

RIO - interpolation
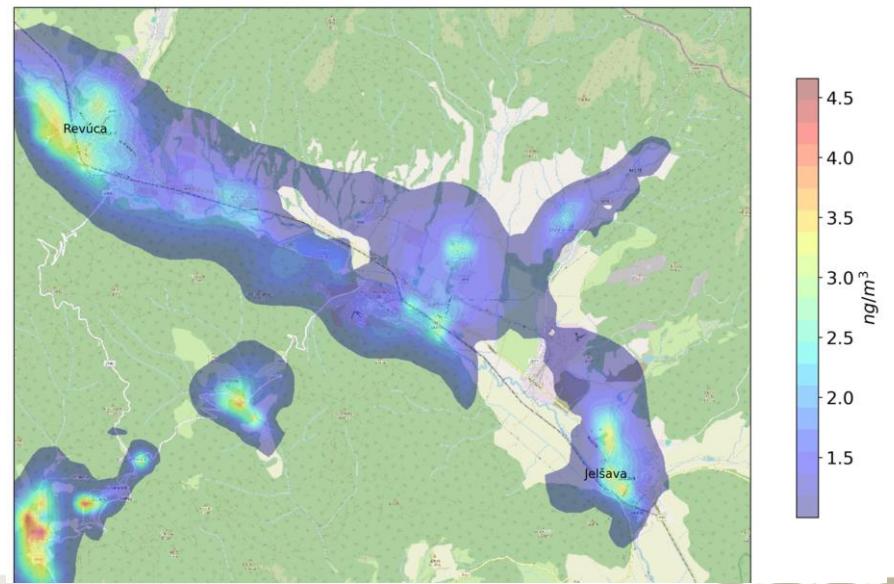
Monthly SA -BaP
Jelšava, Jesenského

CALPUFF, BaP annual mean

UB, Jelšava,

BaP
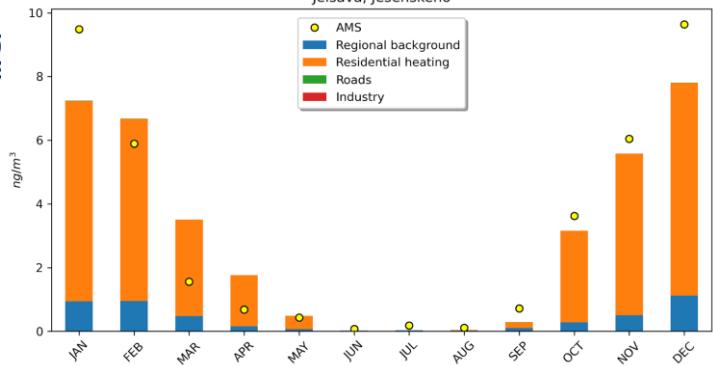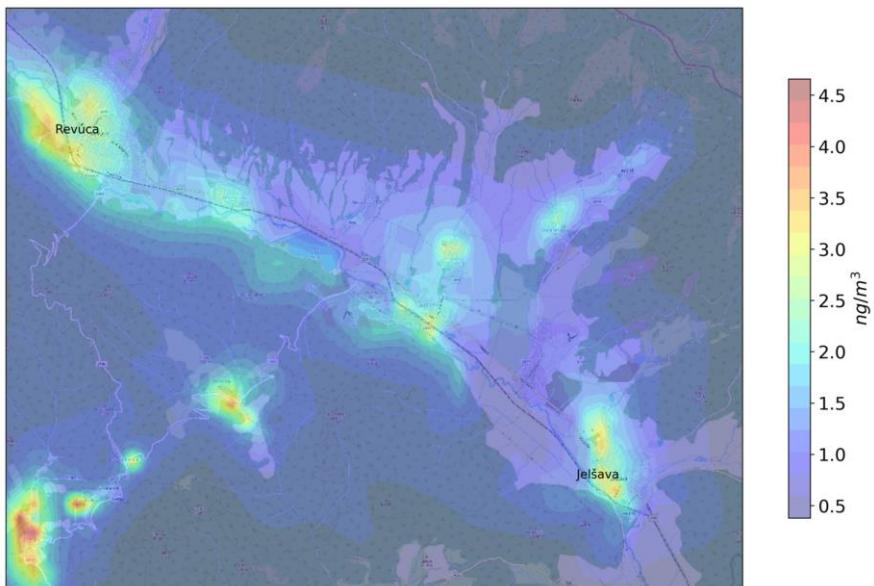
	tol	SRA (km^2)
BaP	10%	1.5

Annual mean BaP - 2021 - total
(c > 0 ng/m^3)

BaP - 2021 - SR
(Tolerance 10.0%; 2.5 - 3.1 ng/m^3)
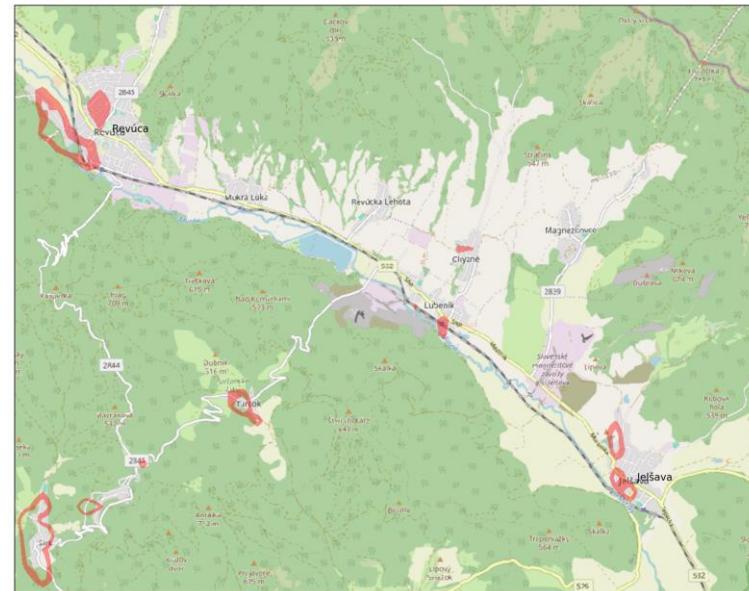
CALPUFF, BaP annual mean   UB, Jelšava,   BaP
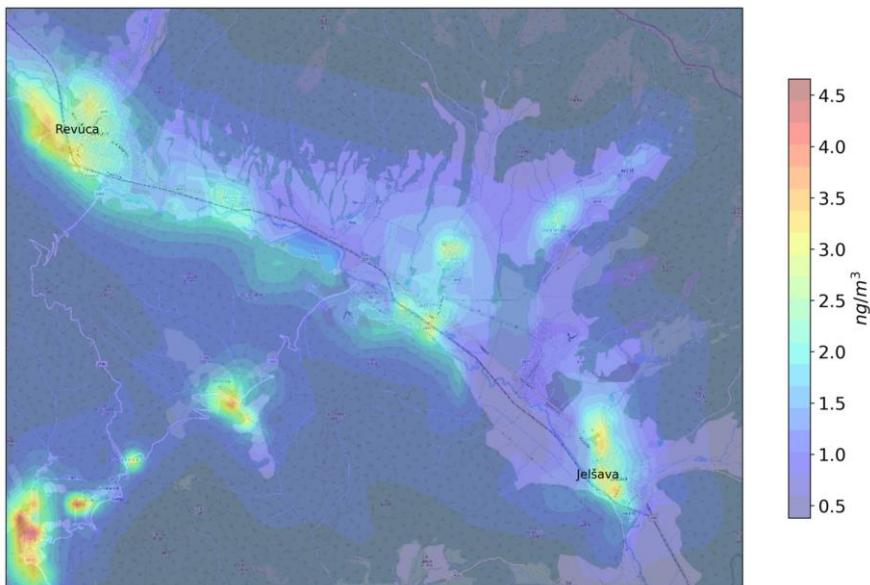
	tol	SRA (km^2)
BaP	15%	2.5

Annual mean BaP - 2021 - total
(c > 0 *ng/m^3*)

BaP - 2021 - SR
(Tolerance 15.0%; 2.4 - 3.2 *ng/m^3*)
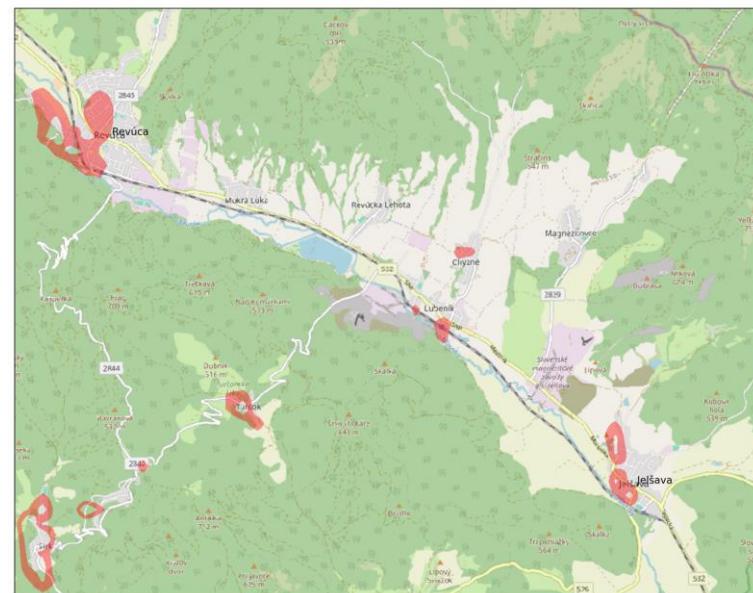
	tol	SRA (km^2)
BaP	20%	3.5

CALPUFF, BaP annual mean   UB, Jelšava,   BaP
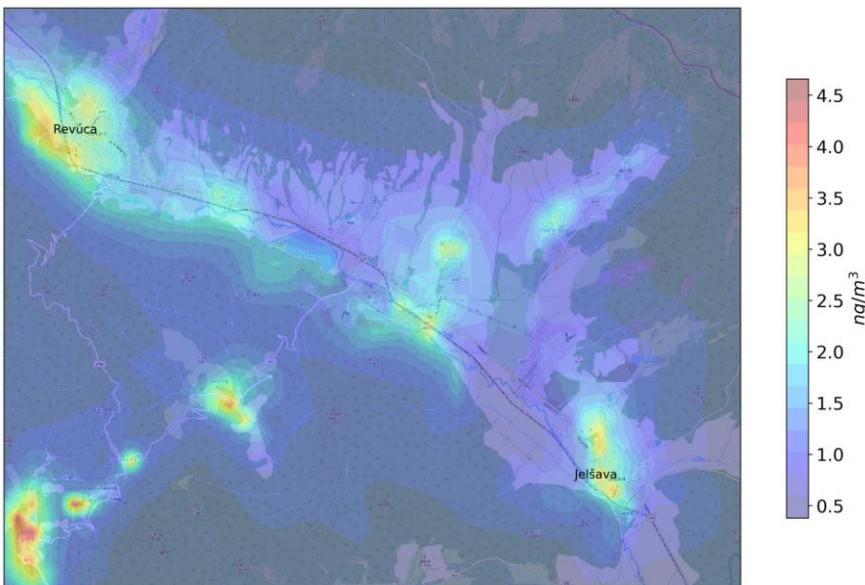
Annual mean BaP - 2021 - total
(c > 0 *ng/m^3*)

BaP - 2021 - SR
(Tolerance 20.0%; 2.2 - 3.4 *ng/m^3*)

Monthly SA -PM10
Jelšava, Jesenského
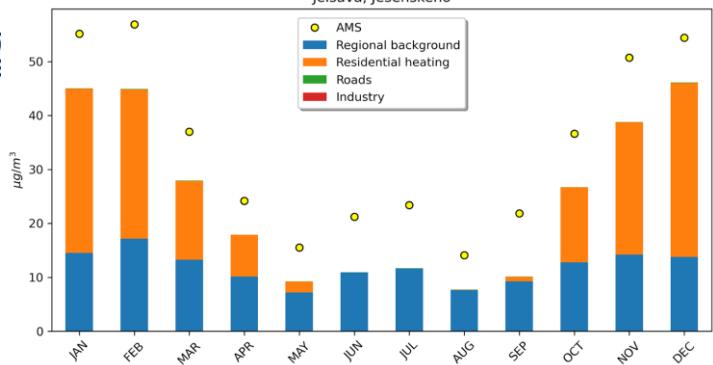
CALPUFF, PM$_{10}$ annual mean   UB, Jelšava,   PM$_{10}$
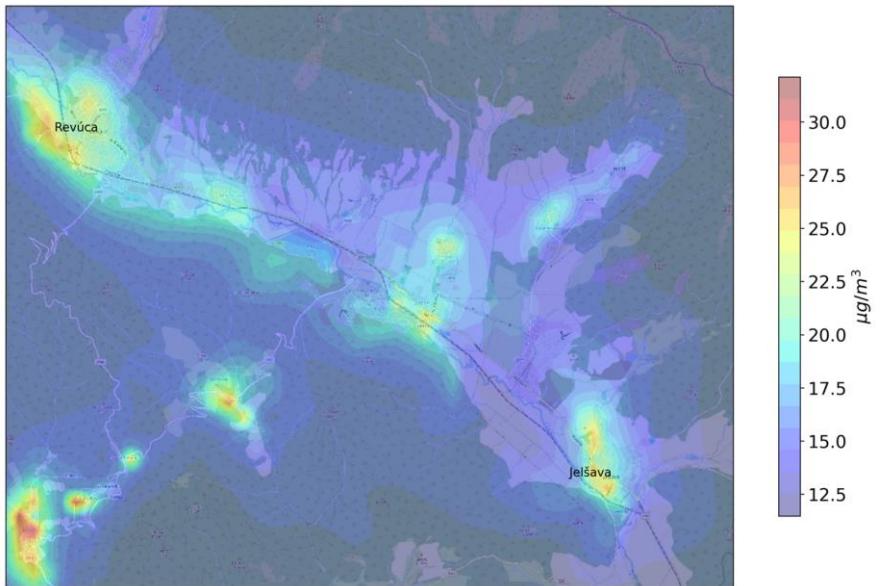
	tol	SRA (km^2)
PM$_{10}$	10%	2.1

Annual mean PM10 - 2021 - total
(c > 0 $\mu g/m^3$)

PM10 - 2021 - SR
(Tolerance 10.0%; 22.2 - 27.2 $\mu g/m^3$)
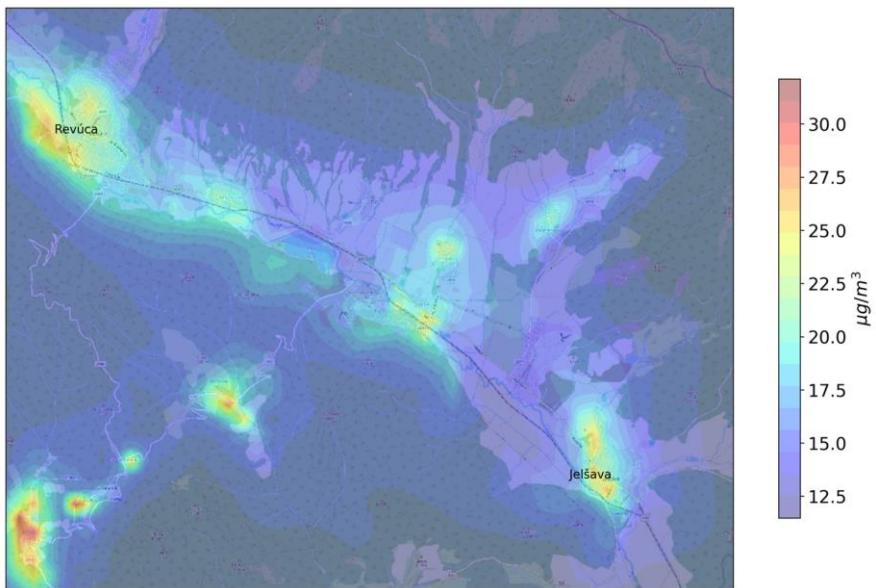
	tol	SRA (km^2)
PM$_{10}$	15%	3.4

CALPUFF, PM$_{10}$ annual mean   UB, Jelšava,   PM$_{10}$

Annual mean PM10 - 2021 - total
(c > 0 $\mu g/m^3$)

PM10 - 2021 - SR
(Tolerance 15.0%; 21.0 - 28.4 $\mu g/m^3$)

|	tol	SRA (km²)
PM_{10}	20%	5.1

CALPUFF, PM_{10} annual mean   UB, Jelšava, PM_{10}
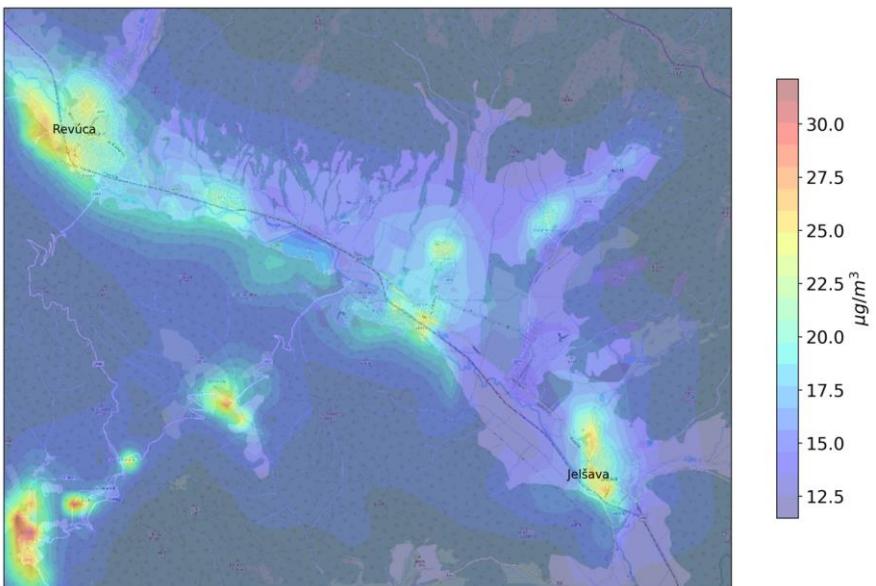
Annual mean PM10 - 2021 - total
(c > 0 $\mu g/m^3$)


PM10 - 2021 - SR
(Tolerance 20.0%; 19.8 - 29.6 $\mu g/m^3$)
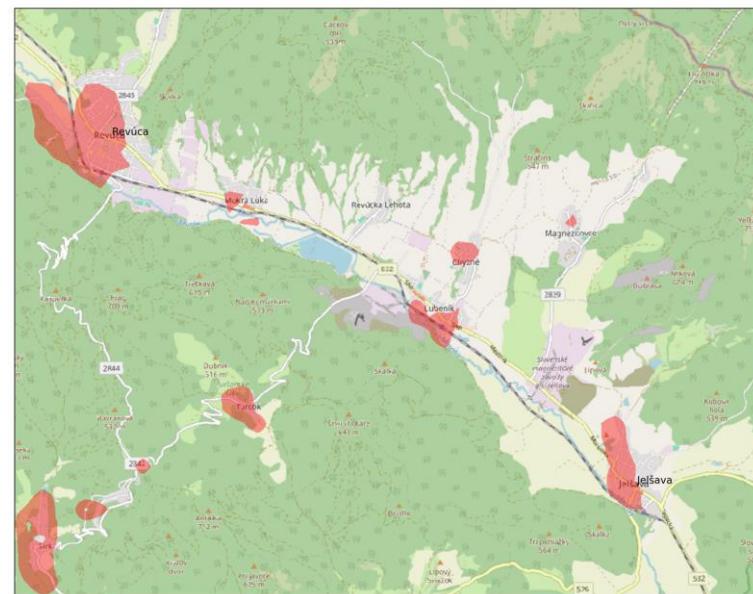
Monthly SA -PM25
Jelšava, Jesenského
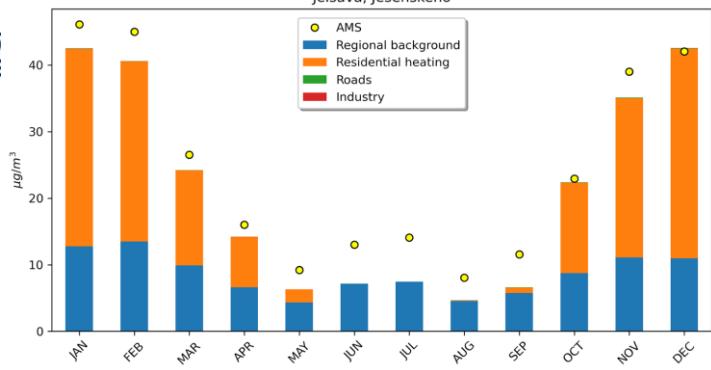
CALPUFF, PM$_{2.5}$ annual mean

UB, Jelšava,
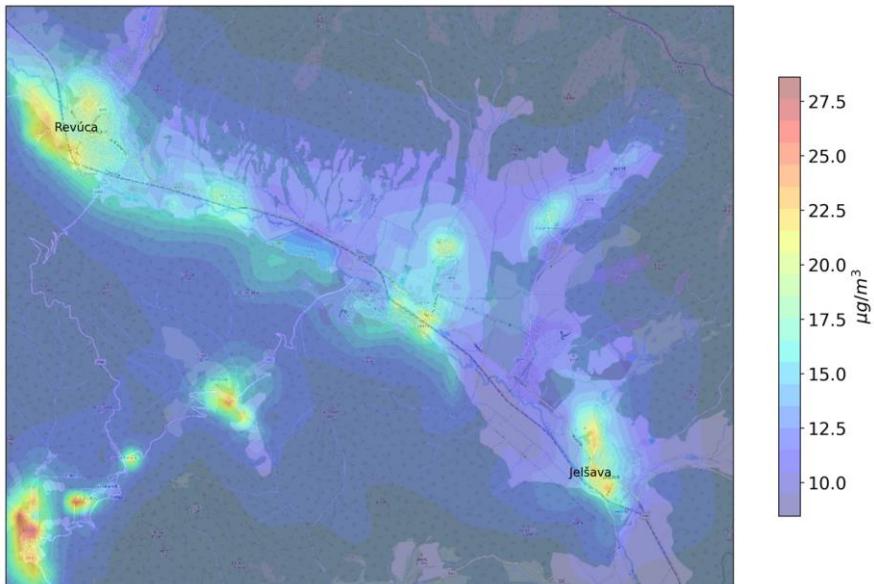
model bias – 3.2 ug/m3

	tol	SRA (km^2)
PM$_{2.5}$	10%	2.0

PM$_{2.5}$

Annual mean PM25 - 2021 - total
(c > 0 $\mu g/m^3$)

PM25 - 2021 - SR
(Tolerance 10.0%; 18.9 - 23.1 $\mu g/m^3$)
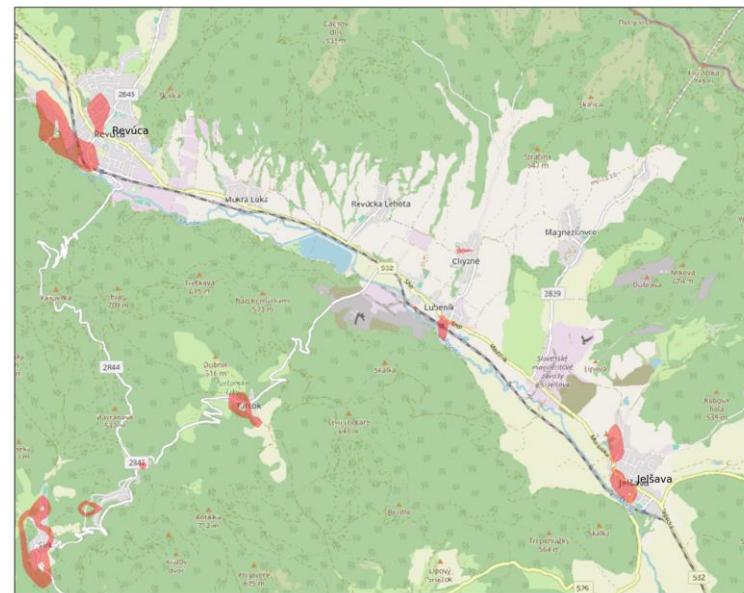
CALPUFF, PM$_{2.5}$ annual mean

UB, Jelšava,
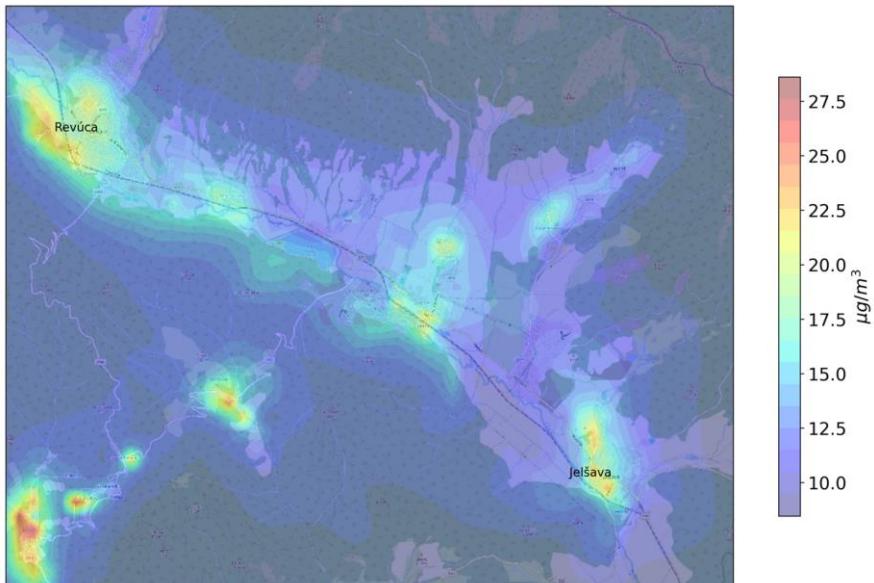
model bias – 3.2 ug/m3

	tol	SRA (km^2)
PM$_{2.5}$	15%	3.2

PM$_{2.5}$

Annual mean PM25 - 2021 - total
(c > 0 $\mu g/m^3$)

PM25 - 2021 - SR
(Tolerance 15.0%; 17.8 - 24.1 $\mu g/m^3$)
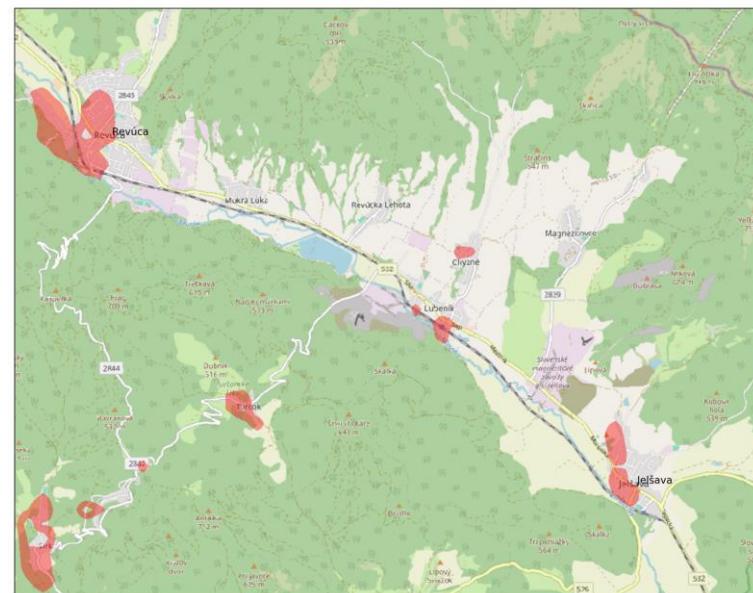
CALPUFF, PM$_{2.5}$ annual mean

UB, Jelšava,

model bias – 3.2 ug/m3
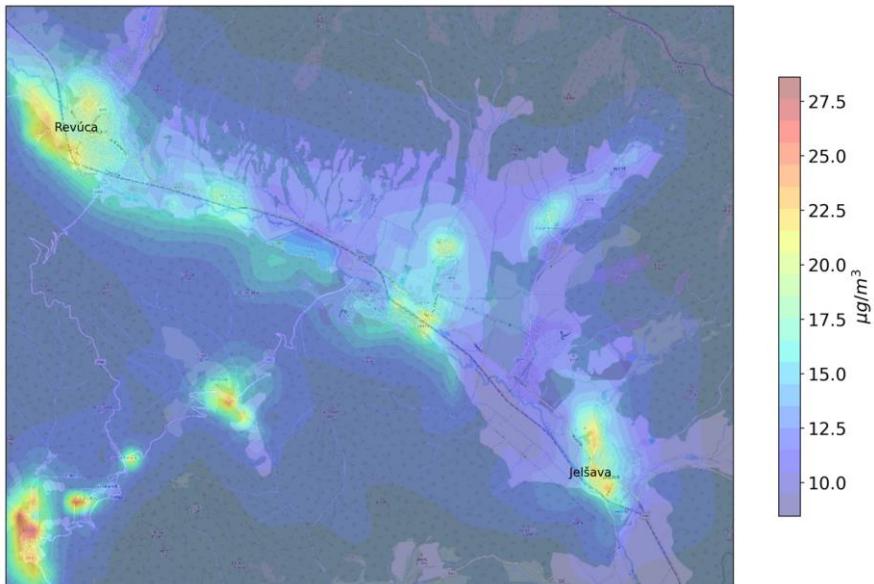
PM$_{2.5}$

	tol	SRA (km^2)
PM$_{2.5}$	20%	4.6

Annual mean PM25 - 2021 - total
(c > 0 $\mu g/m^3$)

PM25 - 2021 - SR
(Tolerance 20.0%; 16.8 - 25.2 $\mu g/m^3$)
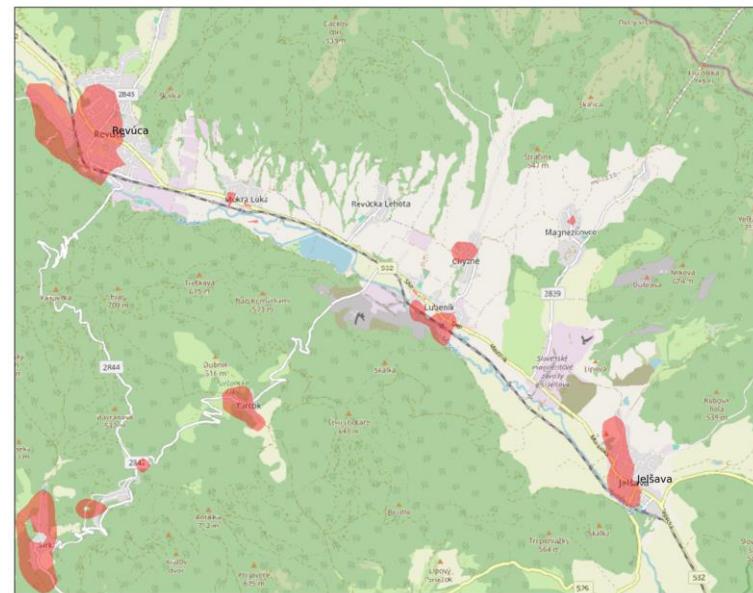
Monthly SA -NO2
Jelšava, Jesenského
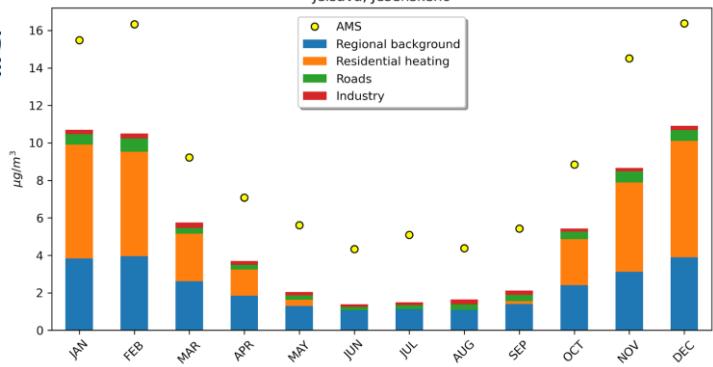
CALPUFF, NO₂ annual mean

|	tol	SRA (km²)
NO₂	10%	8.1

UB, Jelšava,

model bias – 4 ug/m3

NO₂
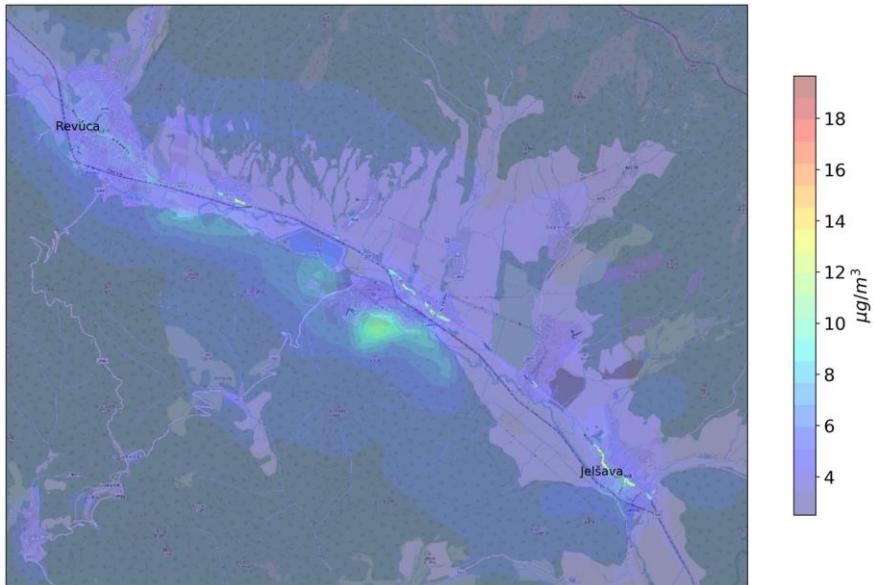
Annual mean NO2 - 2021 - total
(c > 0 $\mu g/m^3$)

NO2 - 2021 - SR
(Tolerance 10.0%; 4.8 - 5.8 $\mu g/m^3$)
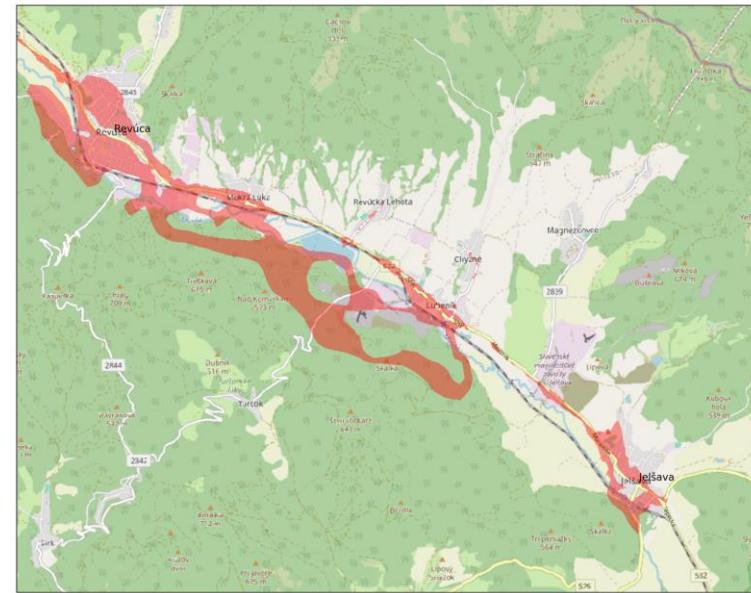
CALPUFF, NO$_2$ annual mean
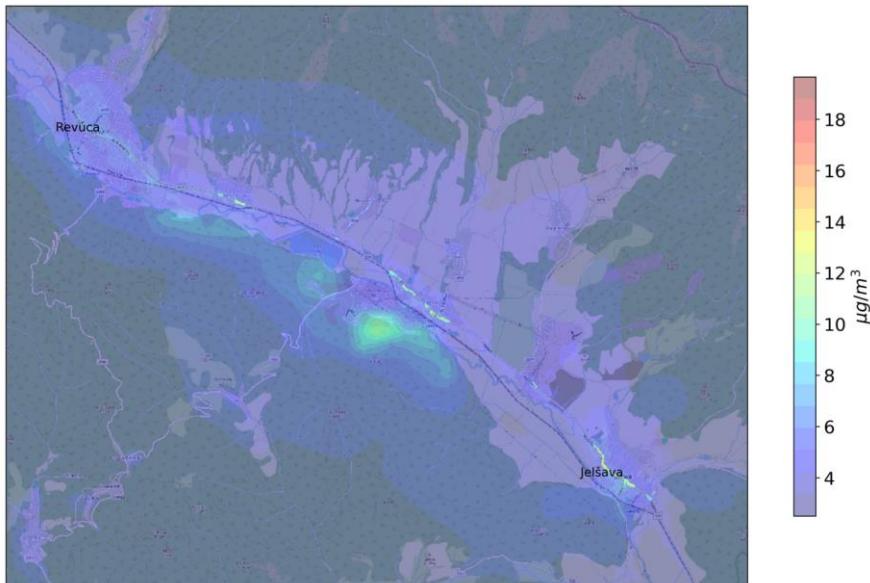
UB, Jelšava,

model bias – 4 ug/m3

NO$_2$

	tol	SRA (km^2)
NO$_2$	15%	12.2
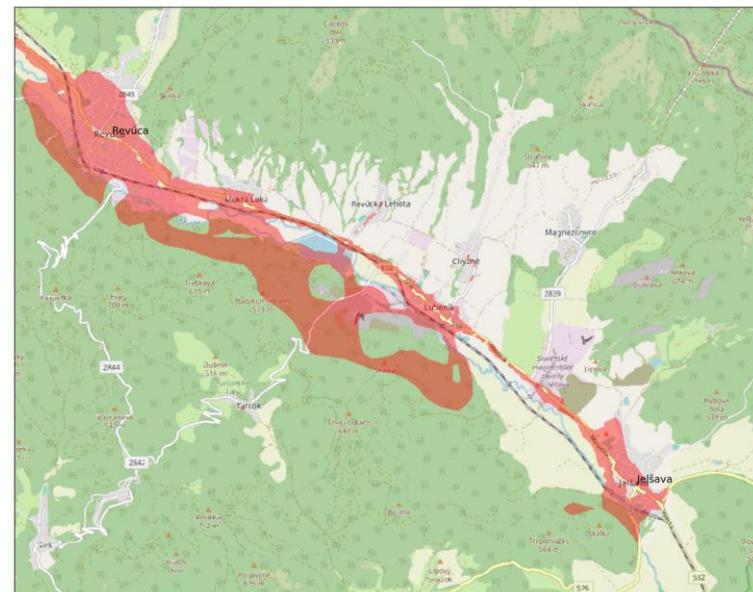
CALPUFF, NO$_2$ annual mean
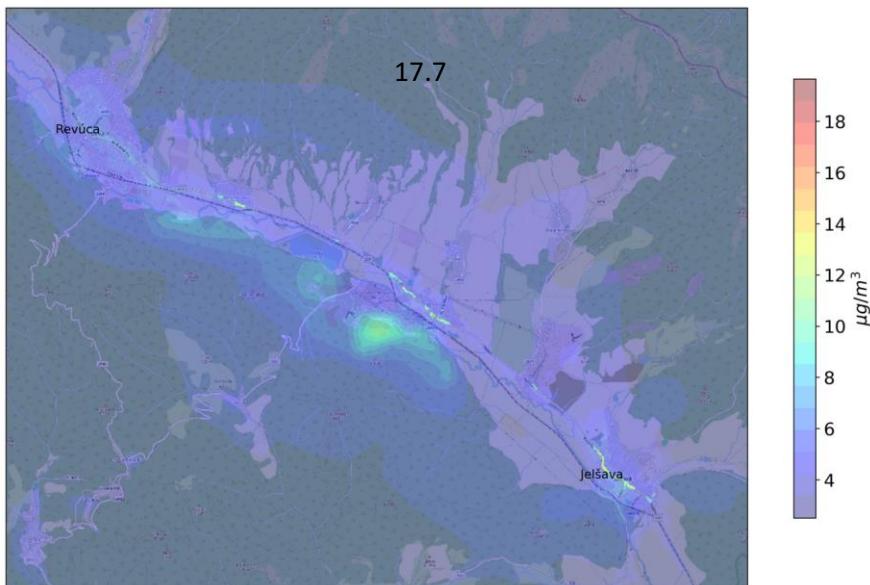
|	tol	SRA (km$^{2)}$)
NO$_2$	20%	17.7

UB, Jelšava,

model bias – 4 ug/m3

NO$_2$

Annual mean NO2 - 2021 - total
(c > 0 $\mu g/m^3$)

17.7

NO2 - 2021 - SR
(Tolerance 20.0%; 4.2 - 6.4 $\mu g/m^3$)
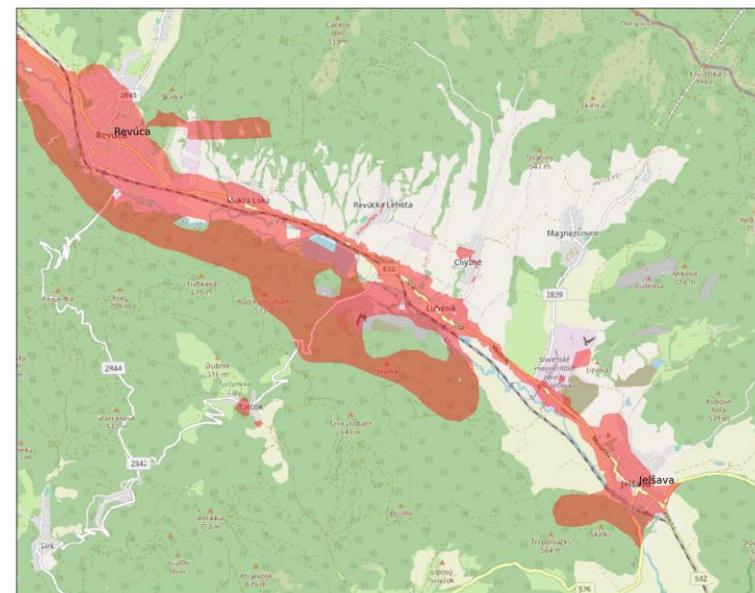
Summary

Pollutant	tol	SRA (km^2)	
		CALPUFF	RIO
PM$_{10}$	10%	2.1	5.0
PM$_{10}$	15%	3.4	9.0
PM$_{10}$	20%	5.1	12.0
PM$_{2.5}$	10%	2.0	3.0
PM$_{2.5}$	15%	3.2	10.0
PM$_{2.5}$	20%	4.6	20.0
NO$_2$	10%	8.1	2.0
NO$_2$	15%	12.2	6.0
NO$_2$	20%	17.7	10.0
BaP	10%	1.5	7.0
BaP	15%	2.5	7.0
BaP	20%	3.5	11.0

Next steps

Bias correction

Changes to the SRA during the year

SRAs for SMOG warning system

RIO - interpolation model, *resolution 1x1km,*
(used originally for whole country)

CALPUFF – *resolution 10x10m*
(combination of AtmoStreet used for roads, 10x10m
And CALPUFF for domestic heating and point sources,
resolution *250m x 250m*
interpolated to AtmoStreet resolution (10x10m) and summarized.

Computational domain 10 x 13km, Jelšava, Slovakia