

# Particulate Matter Pollution in the Hilly Rural Areas: The Case of Loški Potok

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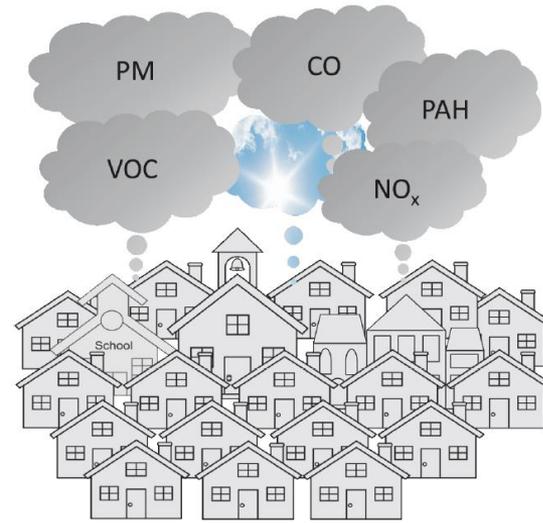
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# BIOMASS COMBUSTION IS A WORLDWIDE PROBLEM

- An increasing problem in Europe, especially in rural areas.
- Cheap fuel.
- Incomplete combustion



large quantities of  
health-damaging  
emissions



- The focus on road traffic emissions and urban air pollution.
- Lack of measuring data about air quality in the countryside.
- Approx. 50 % people in Slovenia live in rural areas (SURS, 2018).
- High emissions + topography (valleys) + local meteorology (e.g. T inversion)



particle air pollution

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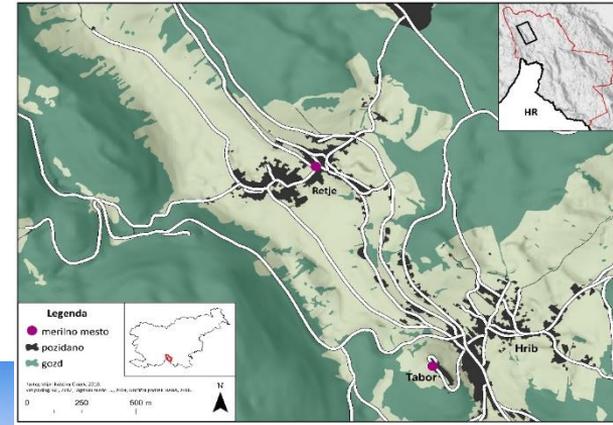


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# LOŠKI POTOK EXPERIMENT

To explore particulate matter pollution in the hilly rural areas.

The Retje hollow with the village Retje (380 inhabitants) and part of Hrib (379 inhabitants) (SURS, 2018).



Forested area.

Wood is the main fuel.



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# STATIONARY MEASUREMENTS



## Retje



## Tabor



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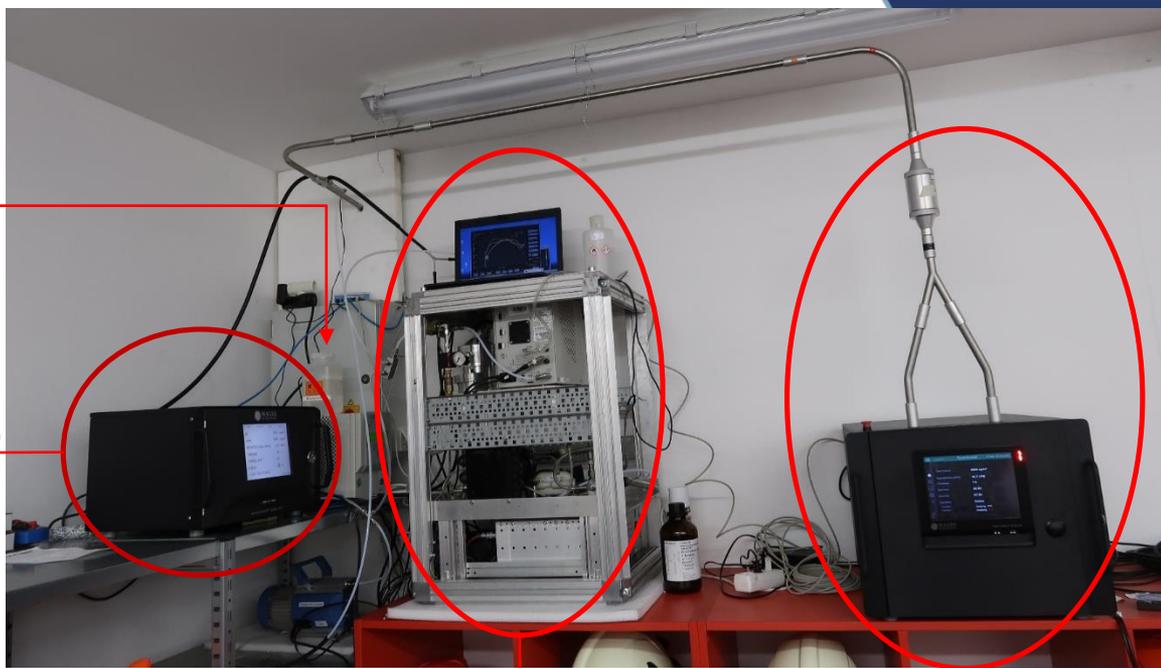
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Total Condensation Particle Counter (TCPC, model 3772)



Aethalometer (AE33)



Mobility Particle Size Spectrometer (TROPOS MPSS)

Total Carbon Analyzer (TCA08)



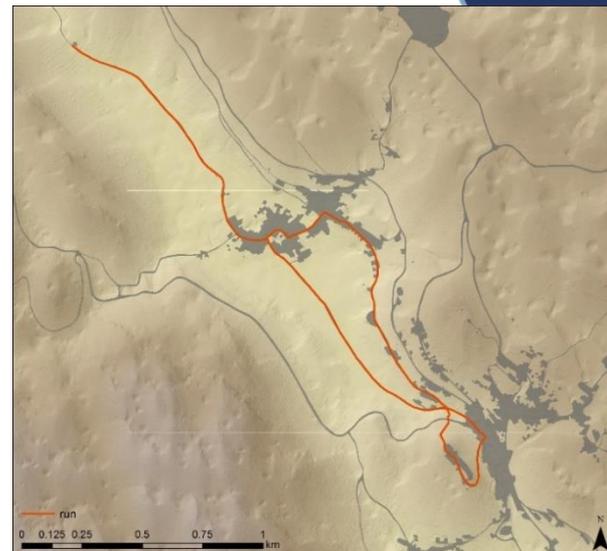
High-volume Sampler Digitel DHA-80

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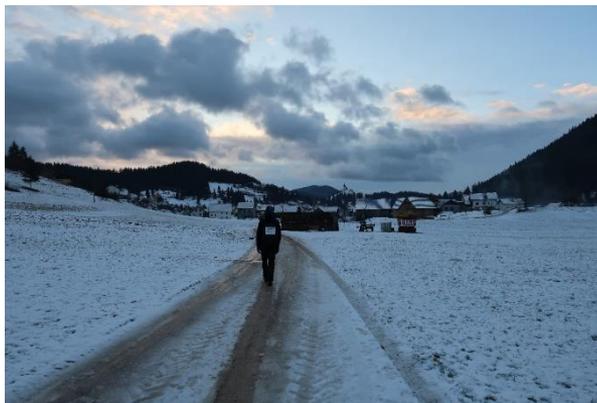


# MOBILE MEASUREMENTS



Length of the route: 6 km

Three times per day: 6:30am, 12:00pm, 5:00pm



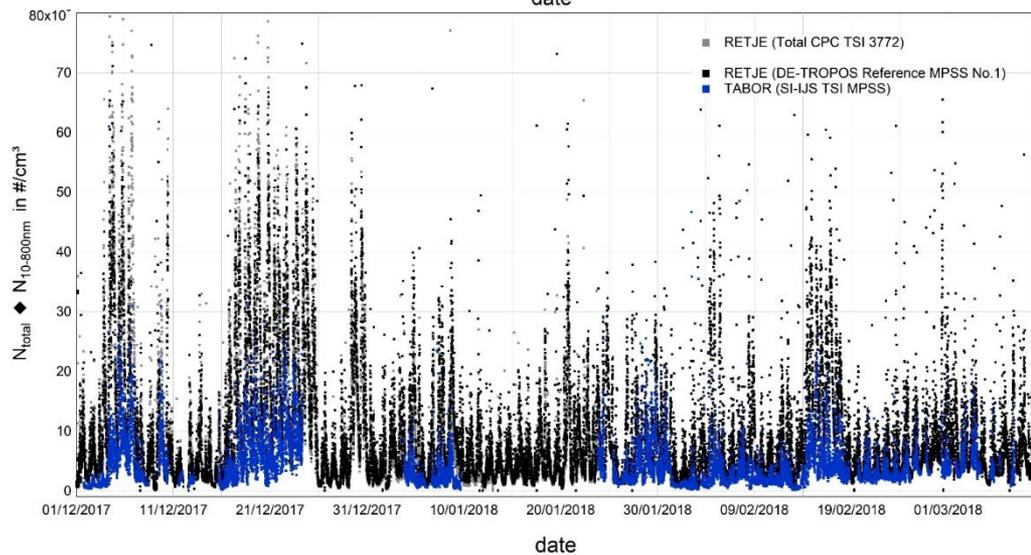
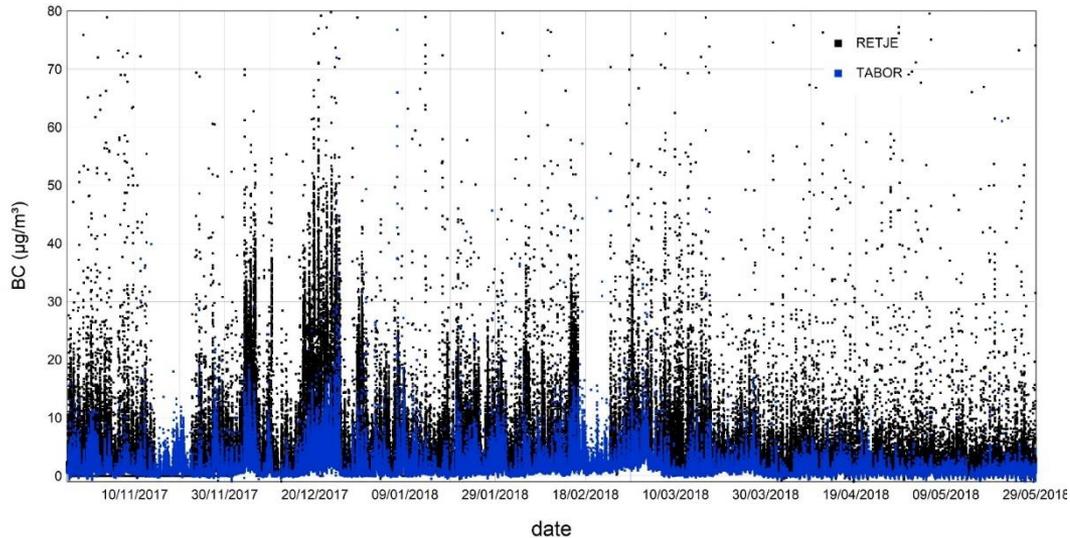
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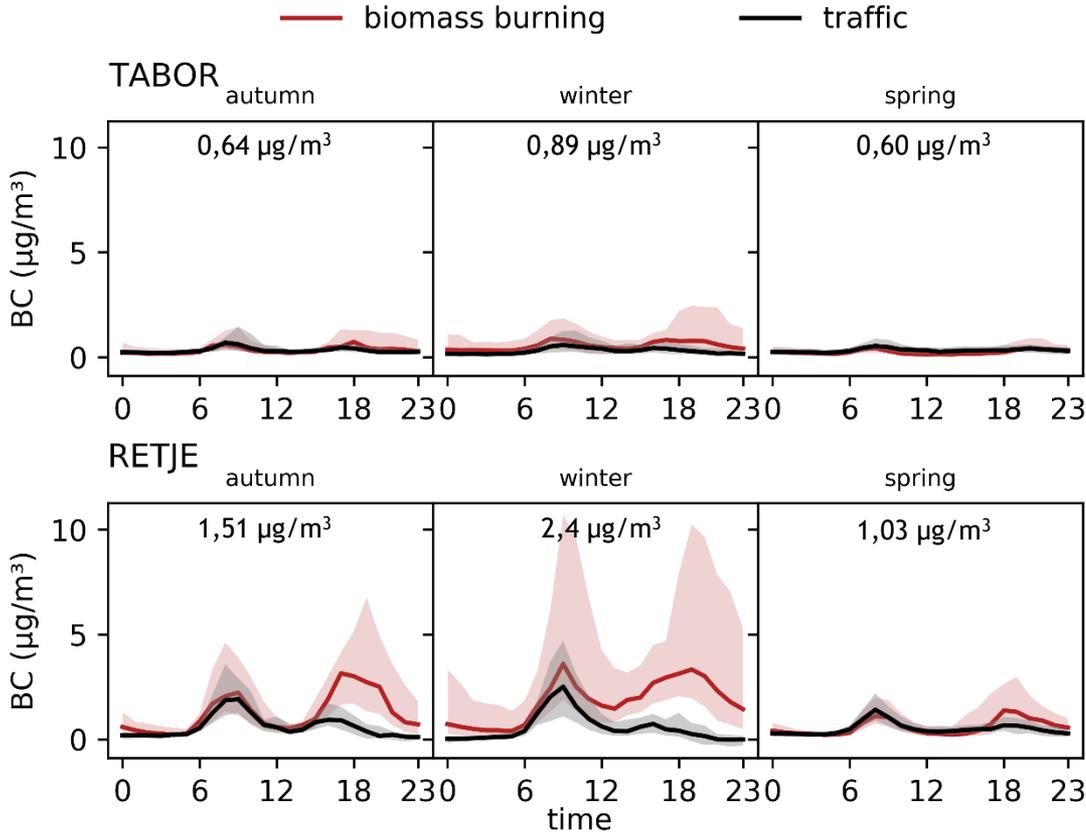


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INSTRUMENT	MODEL	STATION	PERIOD	VARIABLE
AETHALOMETER	AE-33, Magee Scientific	Retje, Tabor	S O N D J F M A M J J A	BC ( $\mu\text{g}/\text{m}^3$ )
MOBILITY PARTICLE SIZE SPECTROMETER	TROPOS MPSS ref 1 with TSI CPC 3772	Retje	S O N D J F M A M J J A	PNC & PNSD ( $\#/\text{cm}^3$ )
	TSI MPSS with TSI CPC 3785	Tabor		
TOTAL CONDENSATION PARTICLE COUNTER	TSI TCPC, model 3772	Retje	S O N D J F M A M J J A	PNC ( $\#/\text{cm}^3$ )
METEO. SENSOR	TPR 159, AMES	Retje, Tabor	S O N D J F M A M J J A	T, RH, p
HIGH-VOLUME SAMPLER	Digital DHA-80	Retje	S O N D J F M A M J J A	PM10, EC/OC, Levoglucosan, IONS
TOTAL CARBON ANALYZER	TCA-08	Retje	S O N D J F M A M J J A	TC
MOBILE MEASUREMENTS	TROPOS backpack	/	S O N D J F M A M J J A	BC, PNC & PNSD



# BC SOURCES AND DIURNAL VARIATION

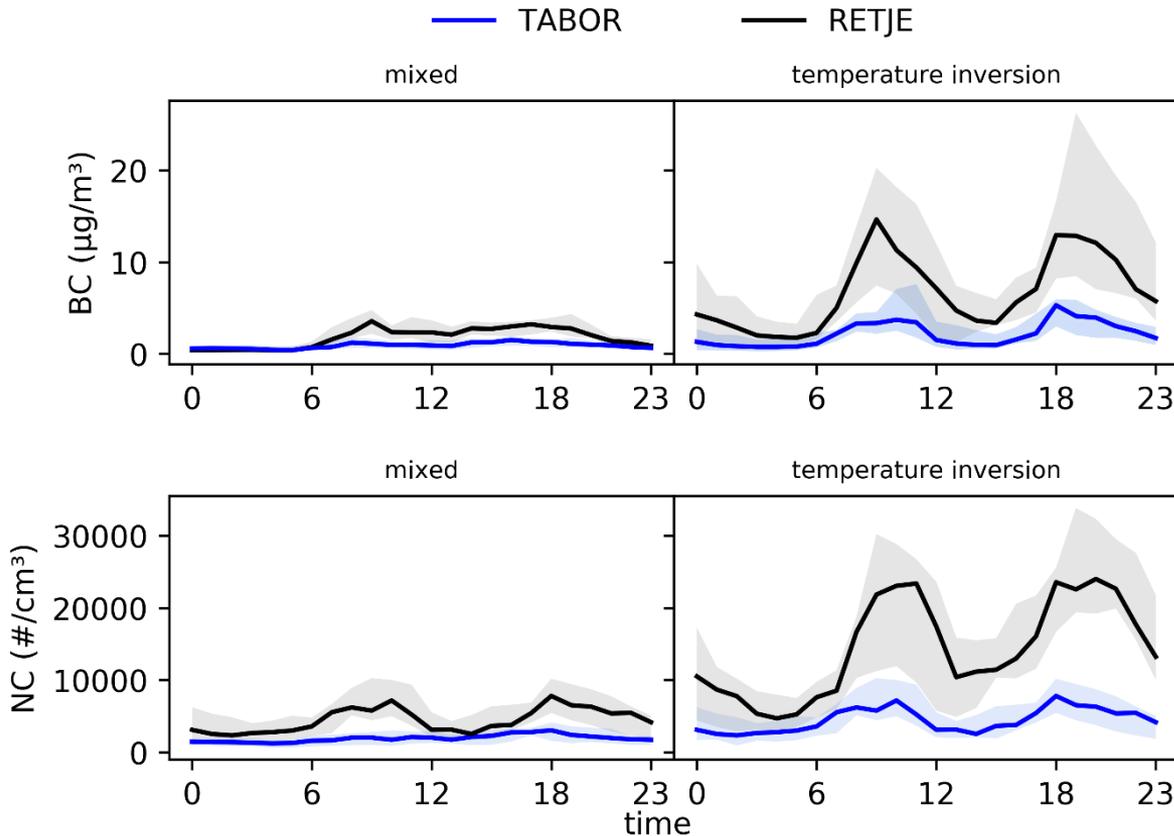


Winter 2017/18

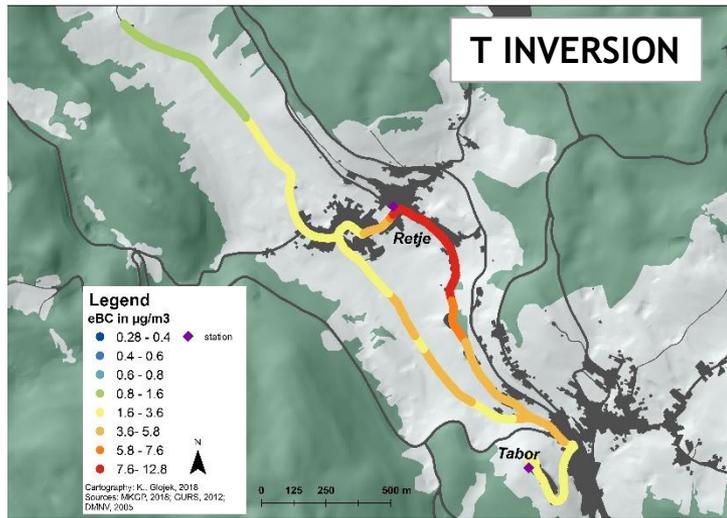
- Retje: 79 %



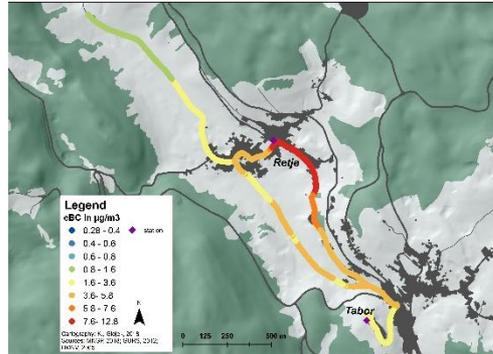
# DIURNAL VARIATION



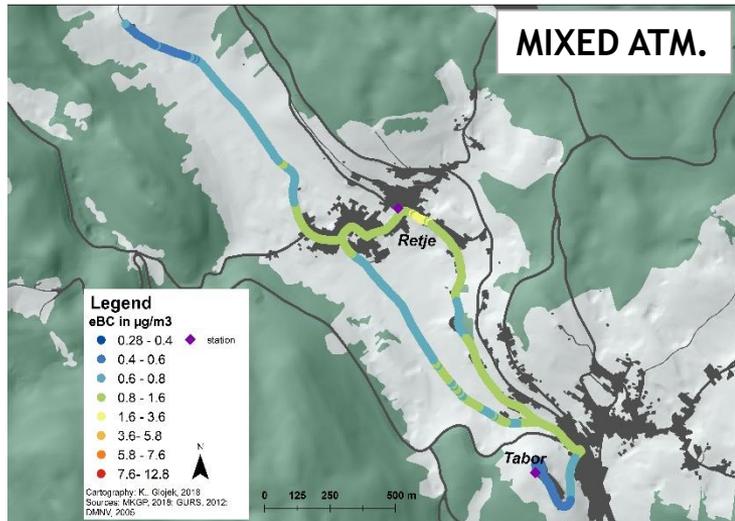
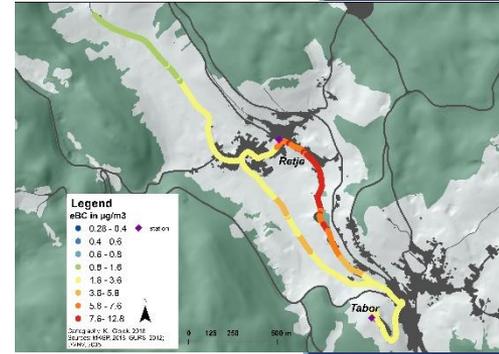
# BC SPATIAL VARIABILITY



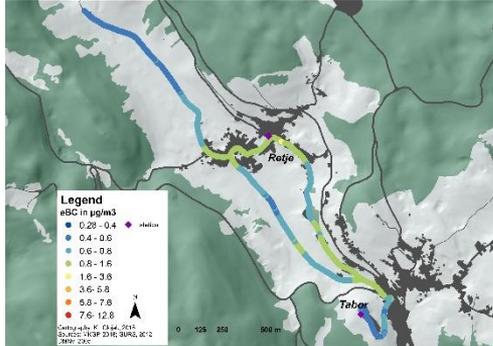
Working days



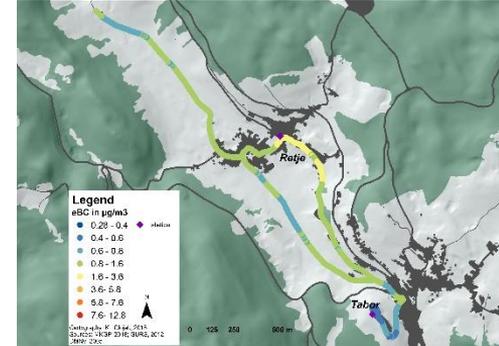
Weekend

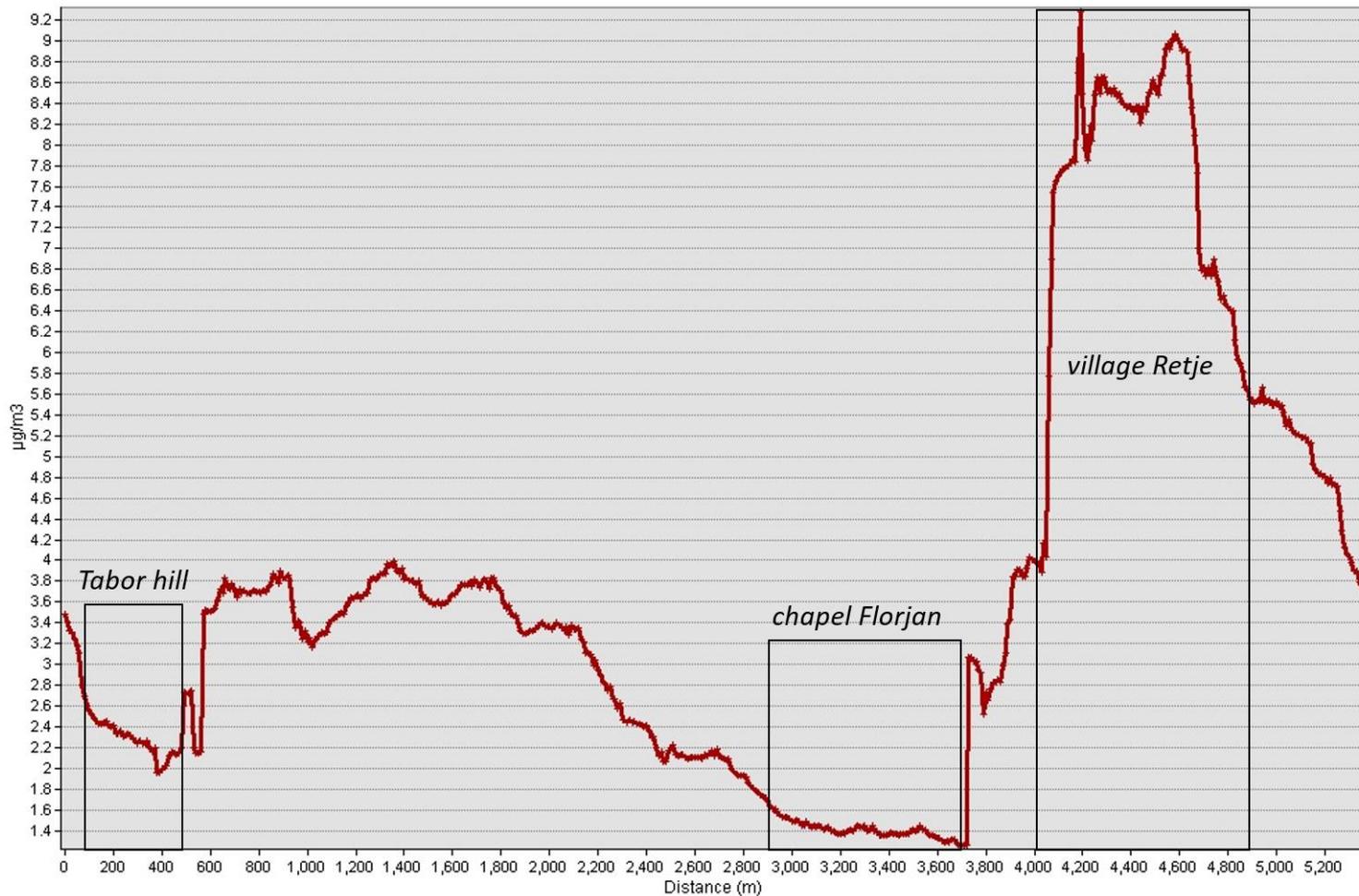


Working days



Weekend





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# SUMMARY

- The levels of particle concentrations are influenced by local emissions and the position in relief depression (T inversion).
- 3 times higher concentrations on T inversion days than on the days of mixed atmosphere.
- Wood combustion is the dominating source of particle pollution.
- BC and PNC levels comparable with Central European cities.
- Similar conditions expected in other mountainous rural areas in Slovenia and Europe, where biomass is used for domestic heating.
- The problem of biomass combustion needs to be dealt in its entirety, especially in rural areas.

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(photo: M. Markelj)