Vpliv prometa, kurjenja lesa in industrije na sestavo in toksičnost delcev PM

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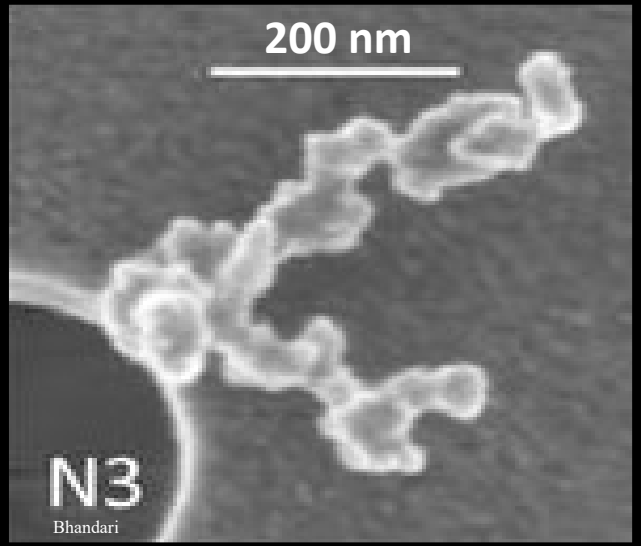
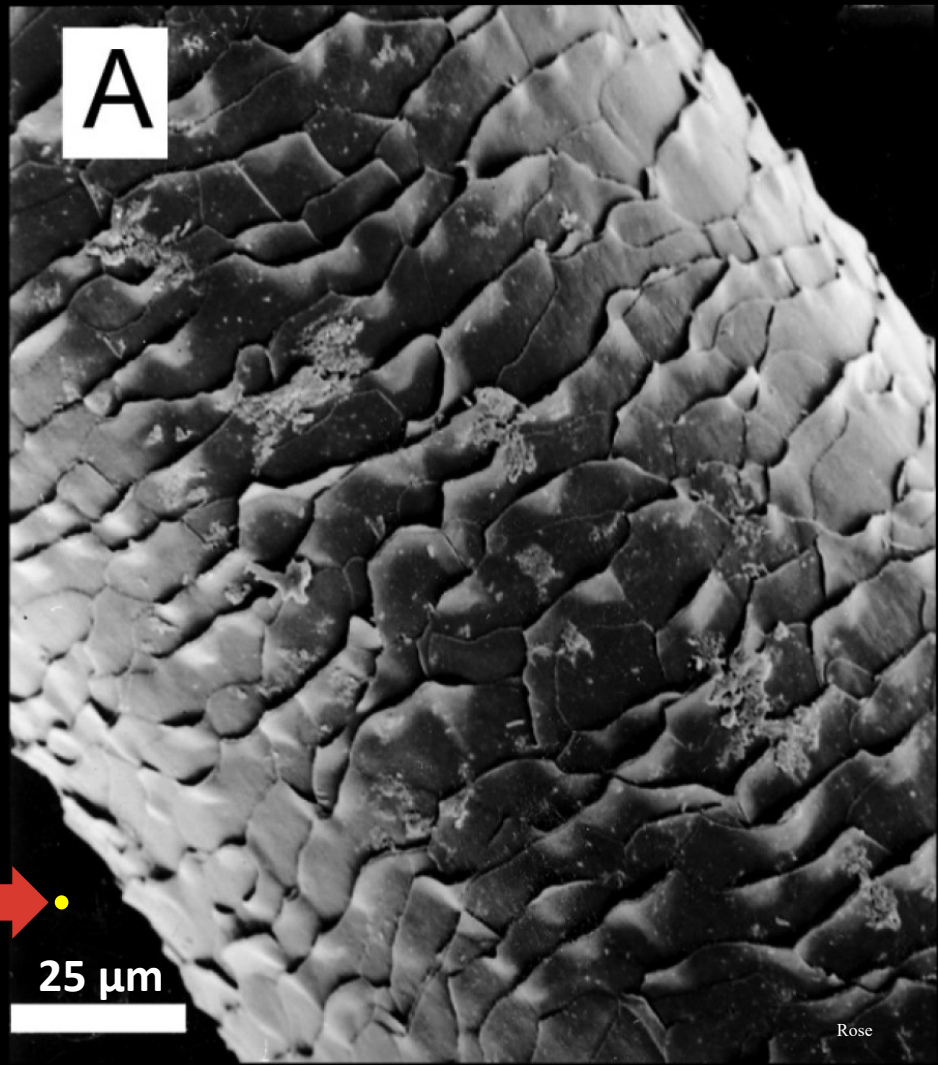
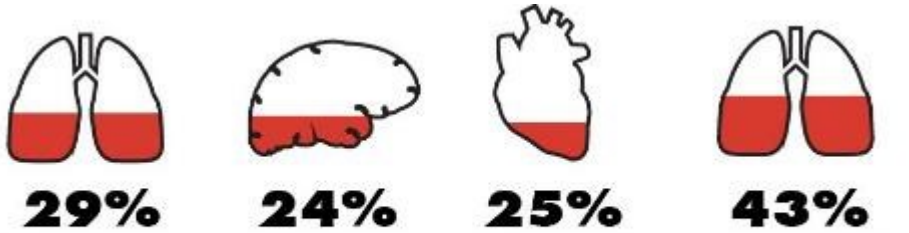
Foto: Občina Kanal ob Soči


200 nm
N3
Bhandari


A
25 µm
Rose

Onesnažen zrak:

največja okoljska grožnja zdravju



Največji negativni učinki zaradi delcev. → Št. prezgodnjih smrti:

SVET **3,5> M**

EVROPA **240.000**

SLOVENIJA **1.300** → **13-krat > letno št. smrti v prometu**

Viri: EEA, 2021; WHO, 2020.

Official Journal
of the European Union

EN
L series

2024/2881

20.11.2024

DIRECTIVE (EU) 2024/2881 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 23 October 2024

on ambient air quality and cleaner air for Europe

(recast)

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

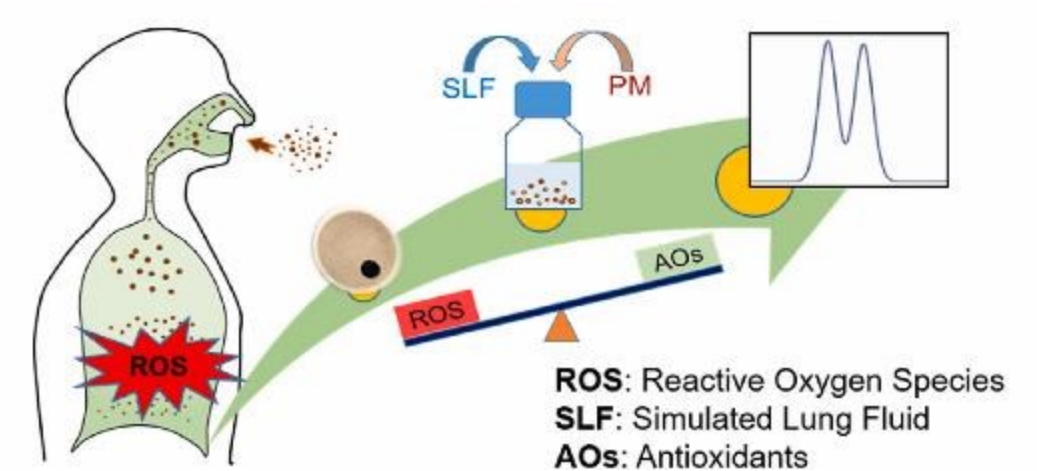
Table 3 – Pollutants recommended to be measured at monitoring supersites at urban background locations and rural background locations if not covered by the requirements of Tables 1 and 2

Pollutant	Type of measurement
Size distribution of UFP	Fixed or indicative measurements
Particulate matter oxidative potential	Fixed or indicative measurements

Merilo vpliva na zdravje: Oksidativni Potencial (OP)

PM delci kot povzročitelji oksidativnega stresa (Weber et al, 2021).

Kvantifikacija OP :



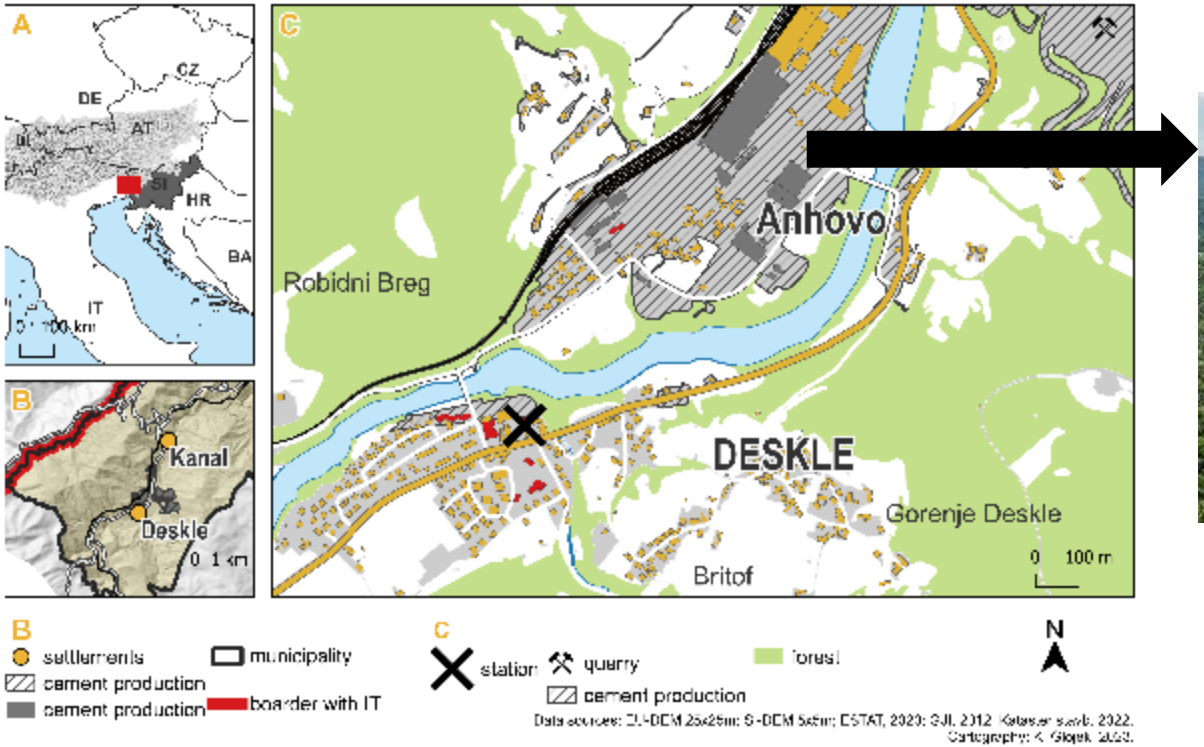
Absorbcijske meritve porabe oksidantov

Različna občutljivost na kemijske spojine in velikost PM.

- Dithiothreitol (**DDT**)
- Askorbinska kislina (**AA**)

Vir: Shahpoury et al., 2022.

Območje proučevanja: Kanal ob Soči



Meritve na strehi OŠ Deskle

zima 2020/21 pomlad 2021 poletje 2021 jesen 2021

PM_{10} & črni ogljik

PM_{10}

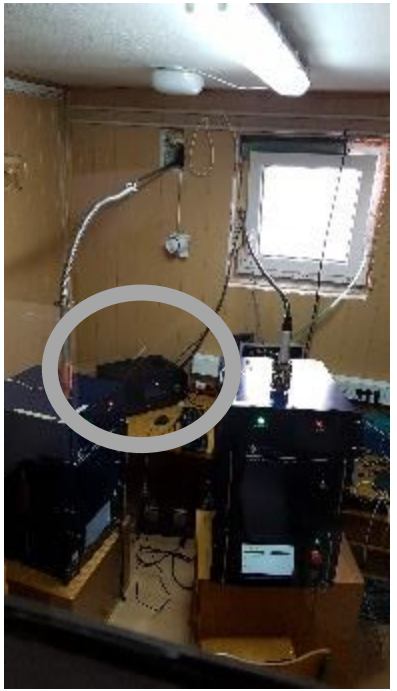
Digitel DHA-80

24-urni filtri

Črni ogljik

Aethalometer AE33:

1-min meritve



Merjeni parametri

parameter	metoda
organski ogljik	analiza OC/EC, EN 16909:2017 in Cavalli et al. (2010)
črni ogljik, BC	meritve z Aethalometrom, Drinovec (2015), Sandradewi (2008)
ioni in lahke organske spojine $NO3^-$, NO2-, $SO4^{2-}$, Cl^-, $NH4^+$, Na^+, K^+, Mg^{2+}, Ca^{2+} glukonat, glikolat, propionat, format, MSA, propionat, piruvat, cis-pinonska kislina, 2-ketobutirična kisl., gliksolat, pinska kisl., butirat, 4-oksoheptanojska, glutarična, adipična, sksinična, malična kislina, tartarat, malonična, maleična kislina, oksalat, pinonat, azelaična, ftalična, vanilična kislina, 3-MBTCA, sebakična kisl., citrat	ionska kromatografija IC-MS v PM10, drugače enako kot EN 16913:2017 Chevrier (2016a), Chevrier et al., (2016b)
kovine Ag Al As Bi Cd Cs Cu Fe Mn Mo Ni Pb Rb Sb Sc Se Sn Ti V Zn	masni spektrometer z induktivno sklopljeno plazmo ICP-MS Chevrier (2016a), Chevrier et al., (2016b)
polioli in sladkorji oksalat, eritriol, ksilitol, arabitol, sorbitol, manitol, trealoza, levoglukozan, manozan, galaktozan, glukoza	tekočinska kromatografija visoke ločljivosti s pulzno amperometrično detekcijo HPLC-PAD Chevrier (2016a), Chevrier et al., (2016b)
oksidativni potencial	ditiotreitiol - DTT, askorbinska kislina - AA Weber et al. (2018) in reference tam

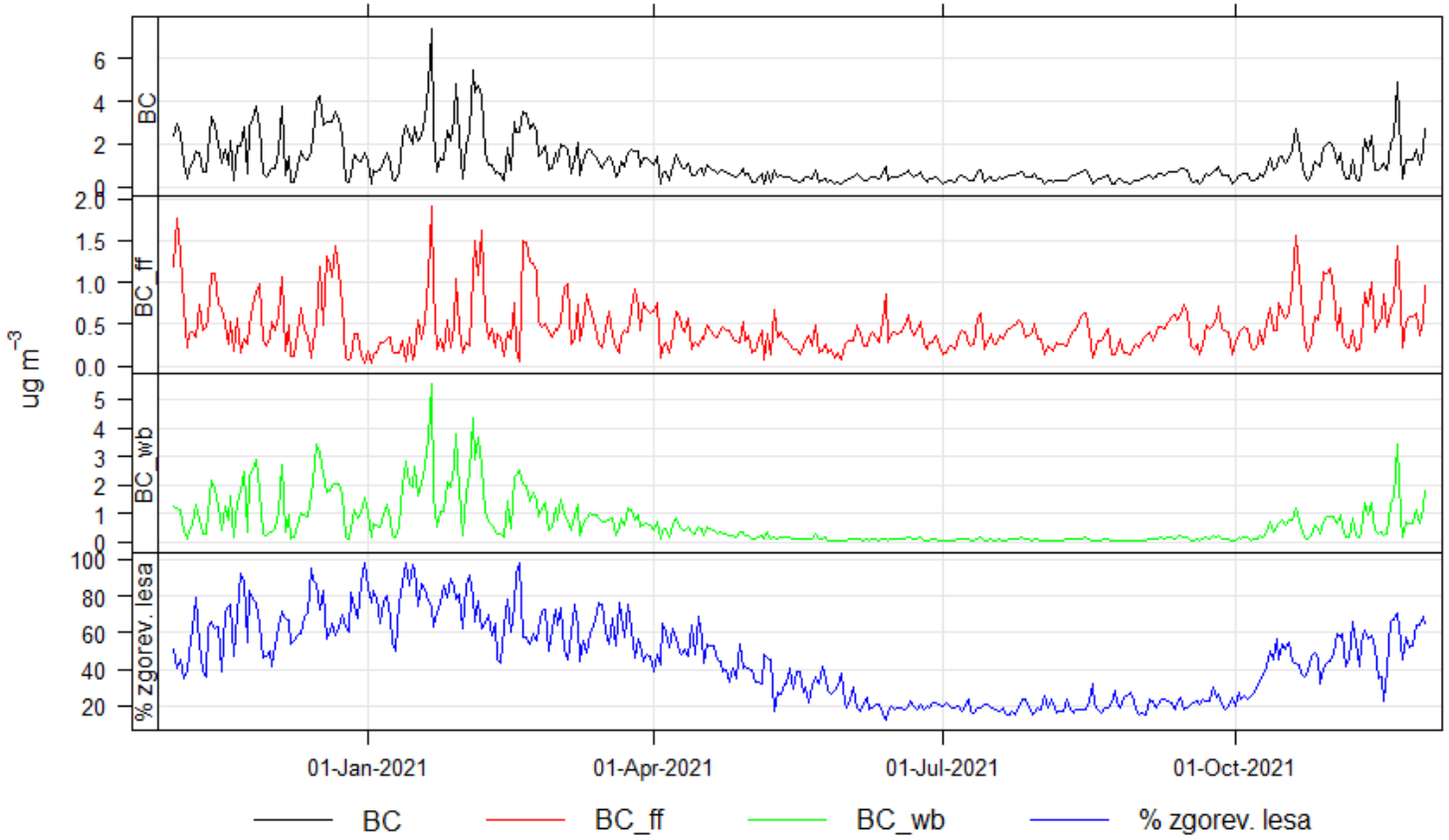
Določanje virov

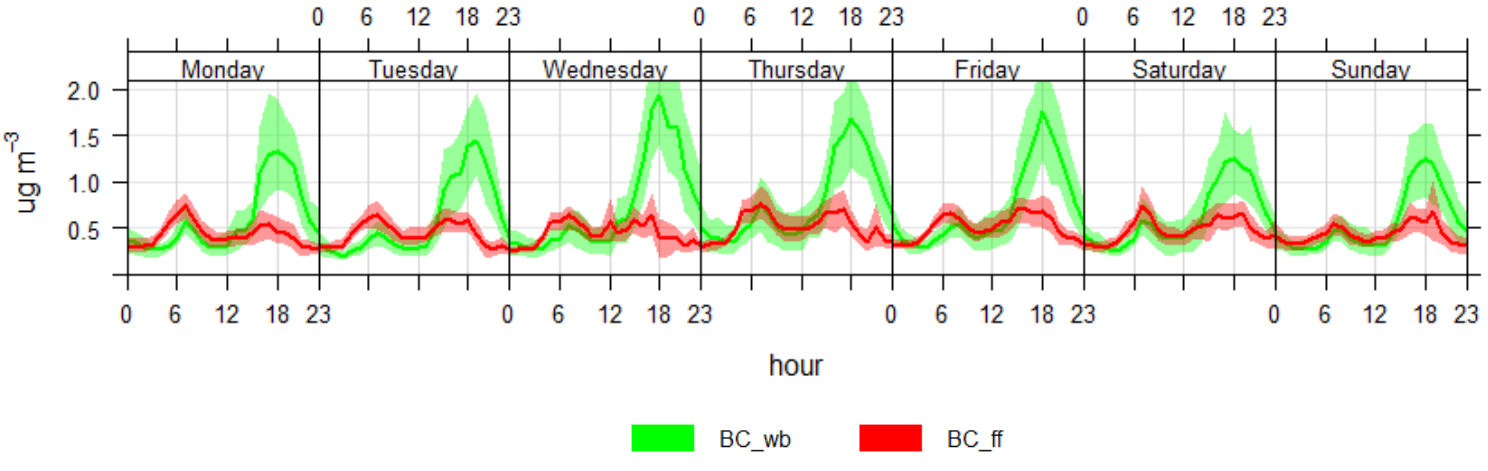
Kemijska sestava filtrov PM_{10}

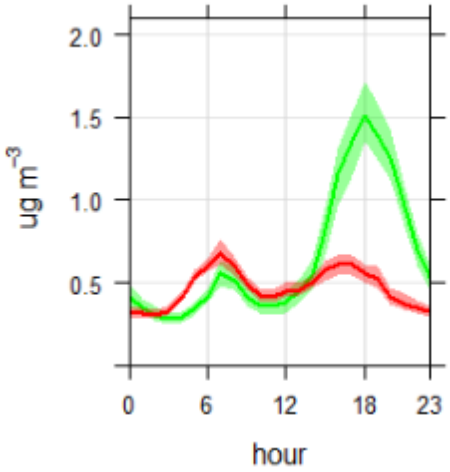
Črni ogljik

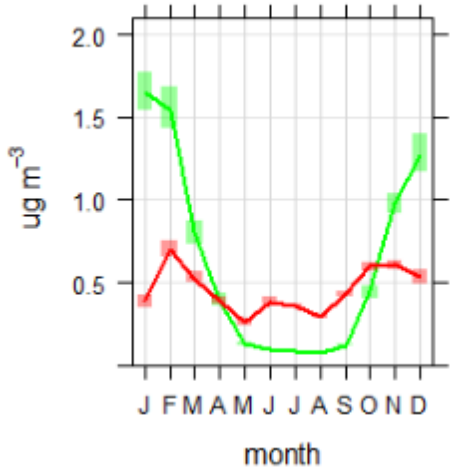
Pozitivna Matrična Faktorizacija (PMF)

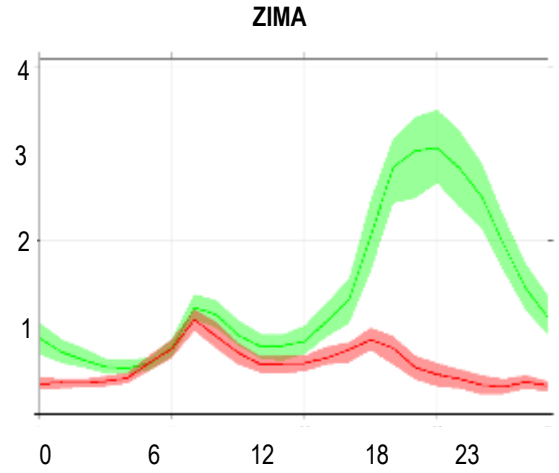
Viri črnega ogljika



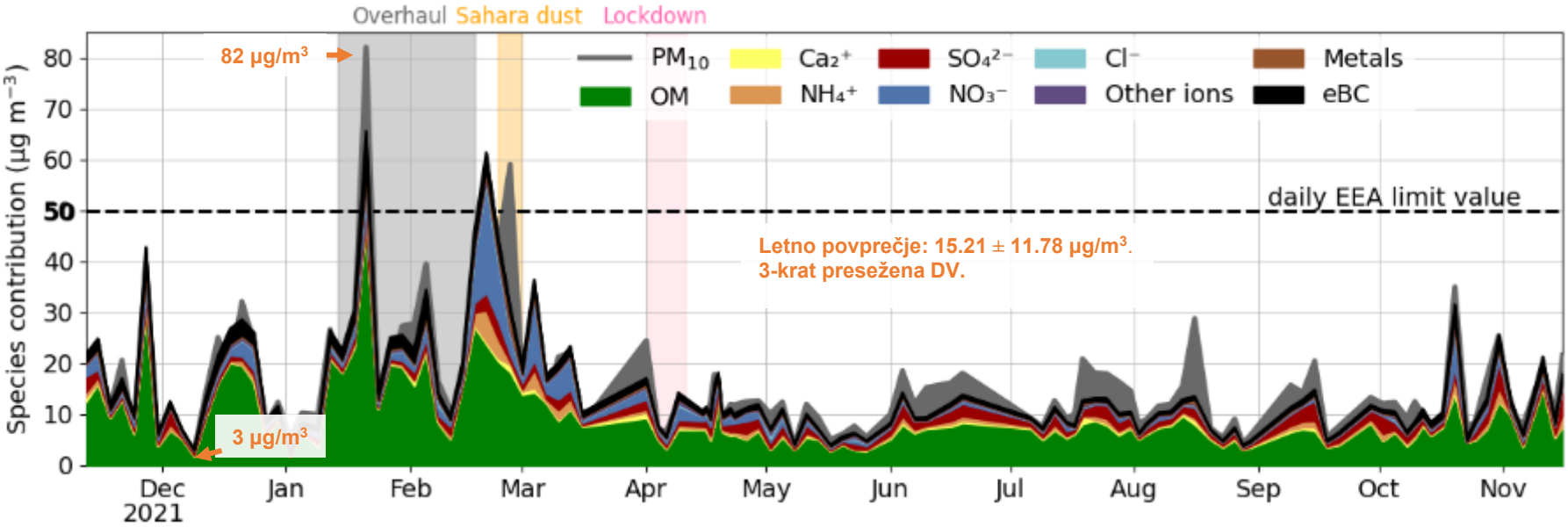

Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Sunday
ug m-3
hour
BC_wb
BC_ff


ug m-3
hour

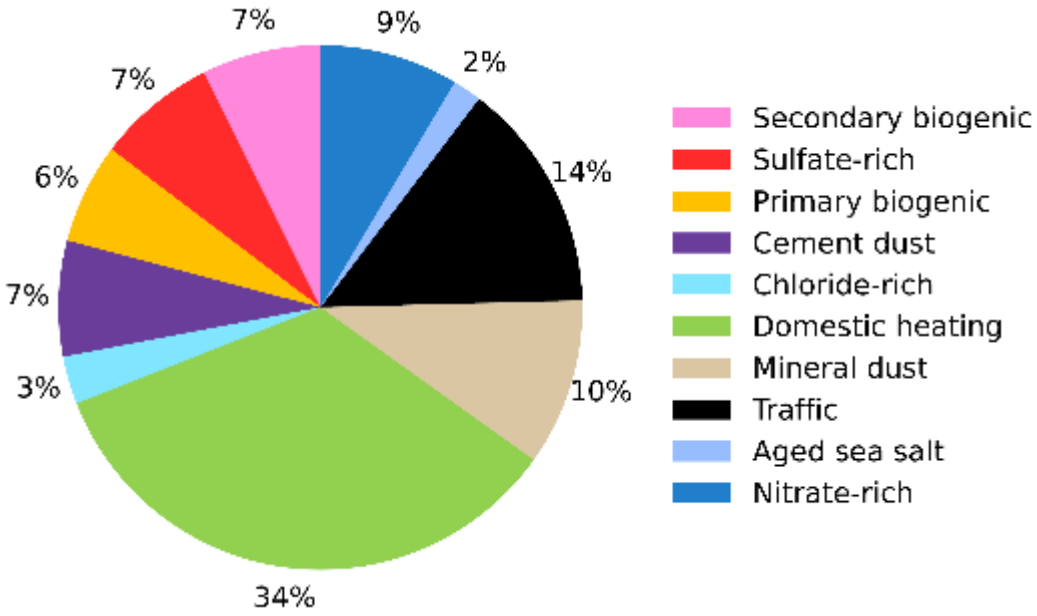

ug m-3
J F M A M J J A S O N D
month


ZIMA

PM_{10} in kemijska sestava

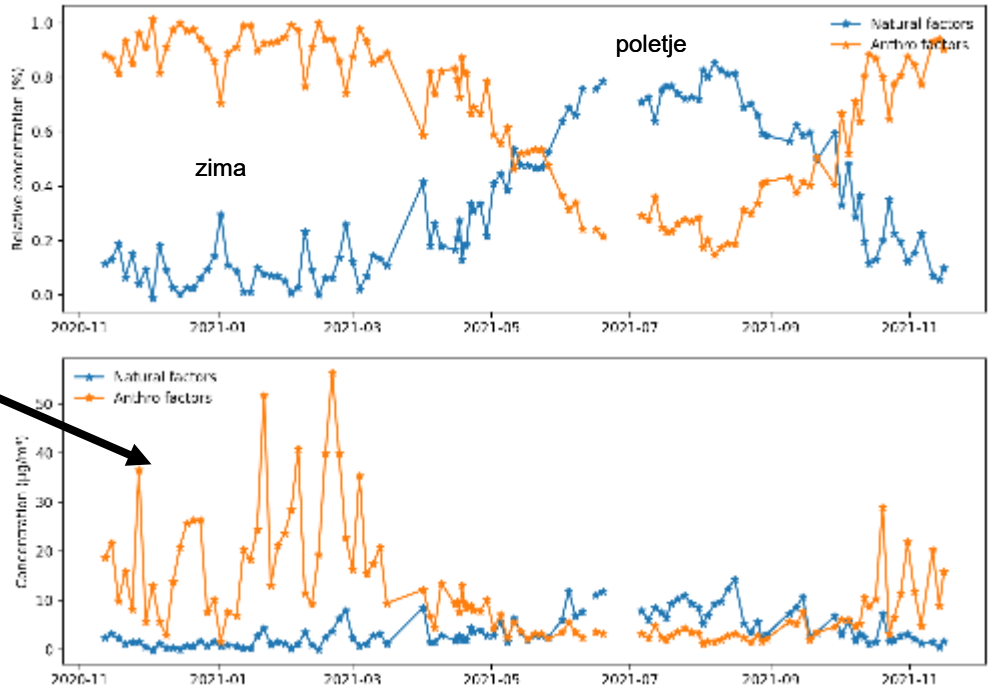


PMF: viri PM_{10}



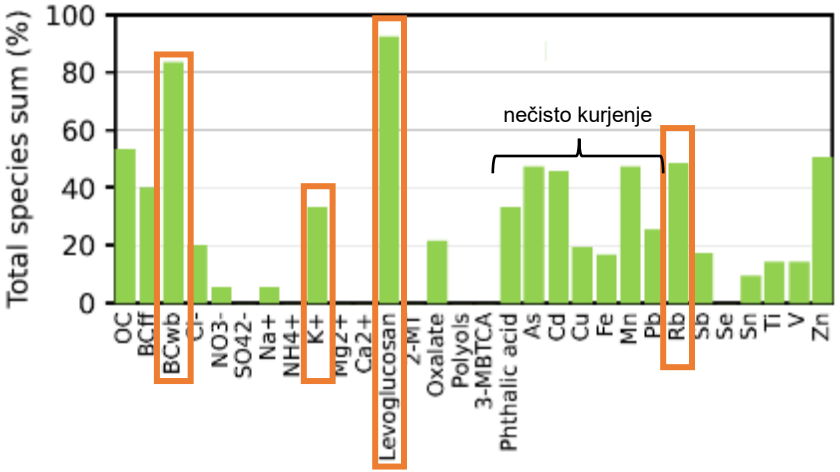
Naravni proti antropogeni viri

Antropogeni > > naravni.

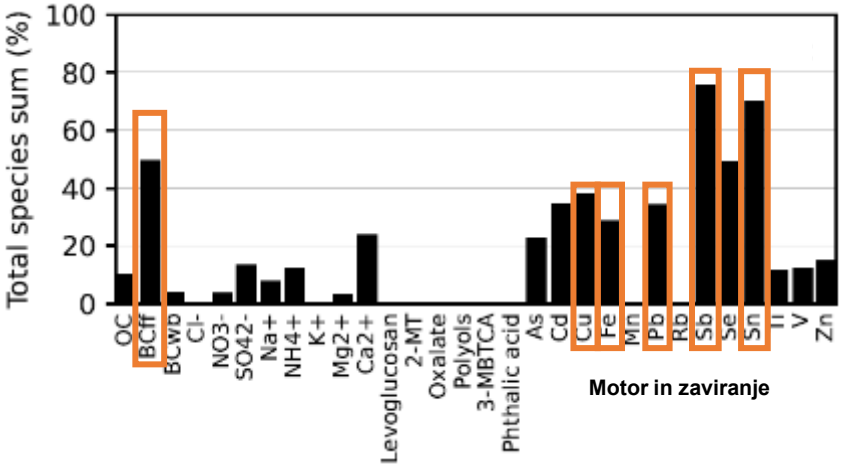


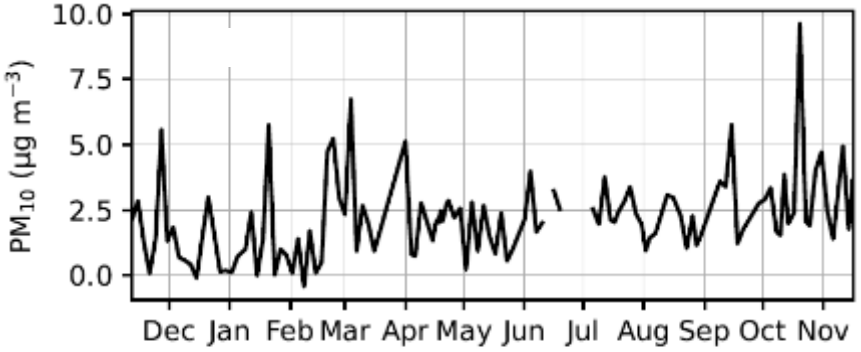
Antropogeni viri

Zgorevanje biomase



Promet



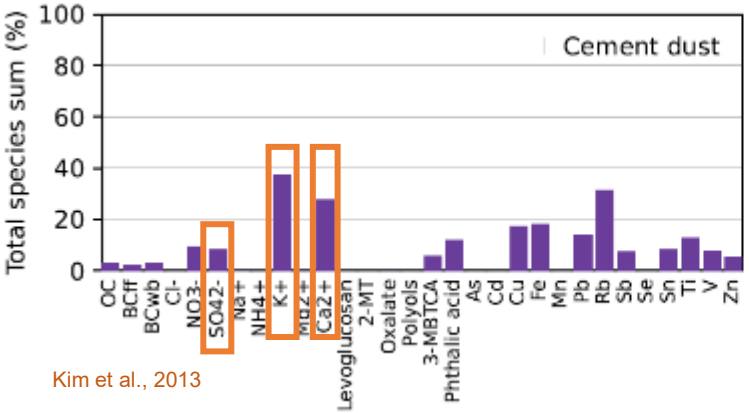


47%

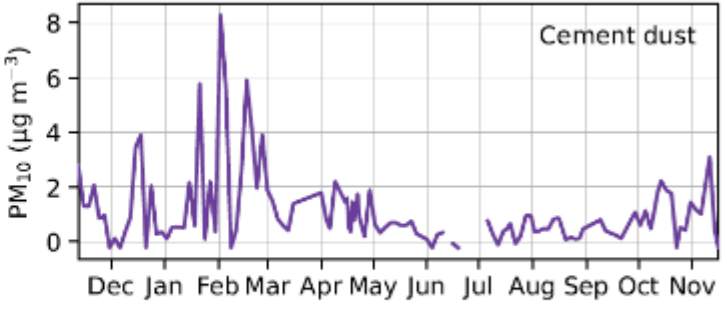
v industrijsko cono Anhovo

85%

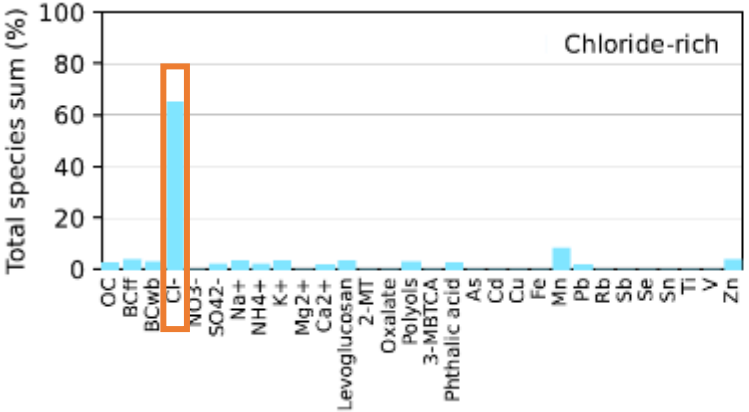
Industrijska vira

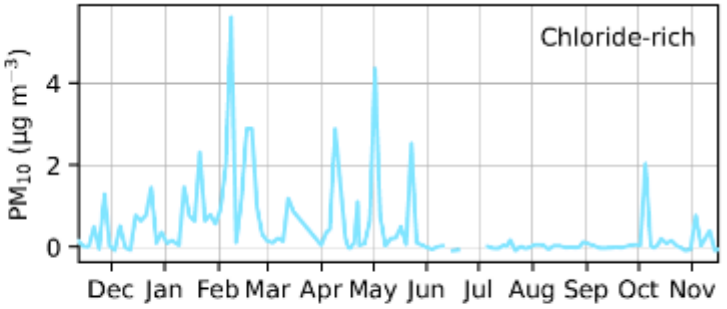


Kim et al., 2013

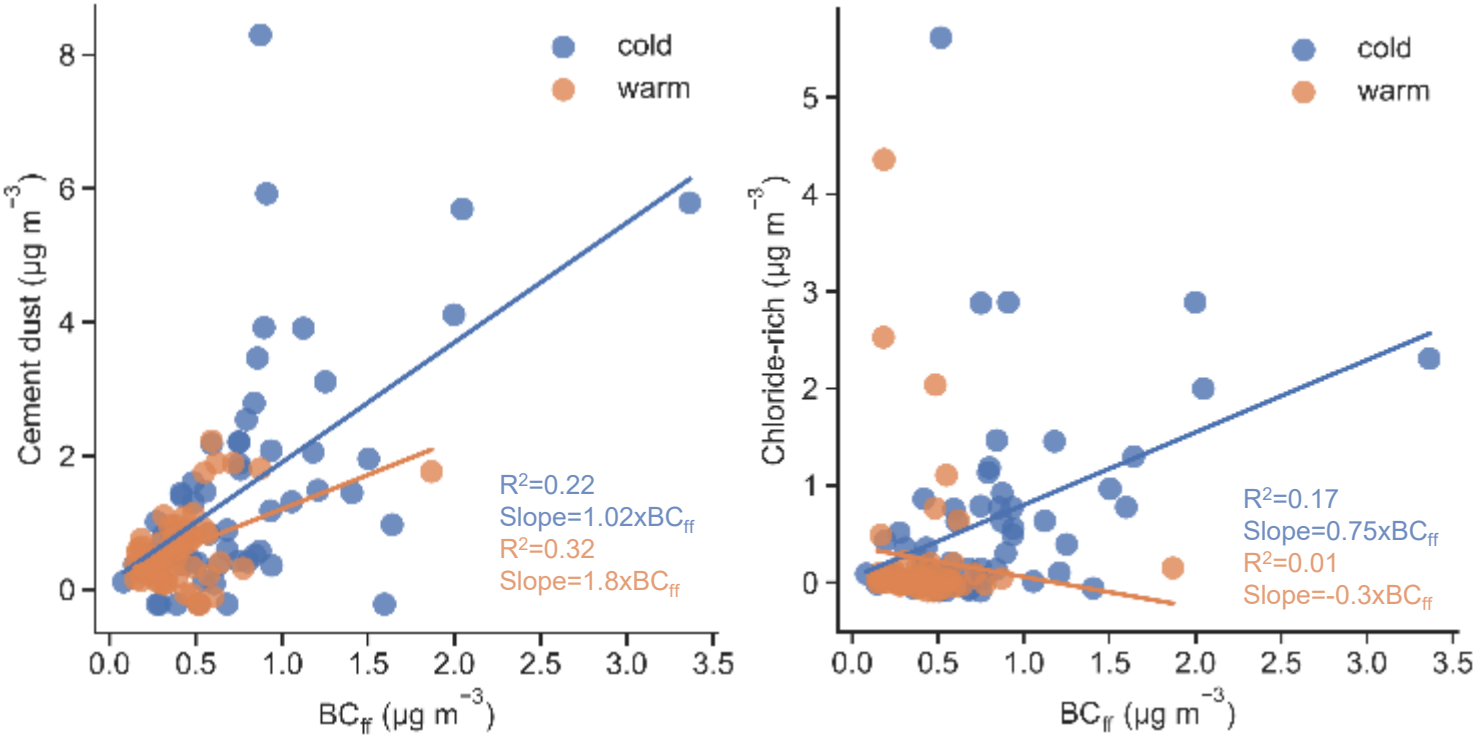


Kim et al., 2013

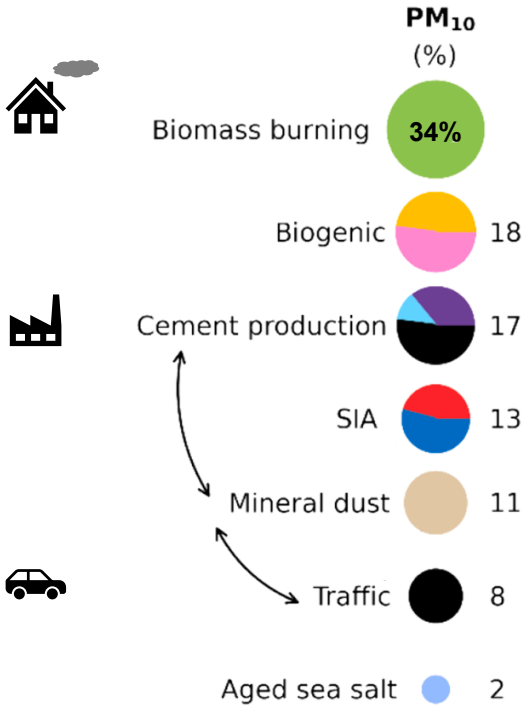




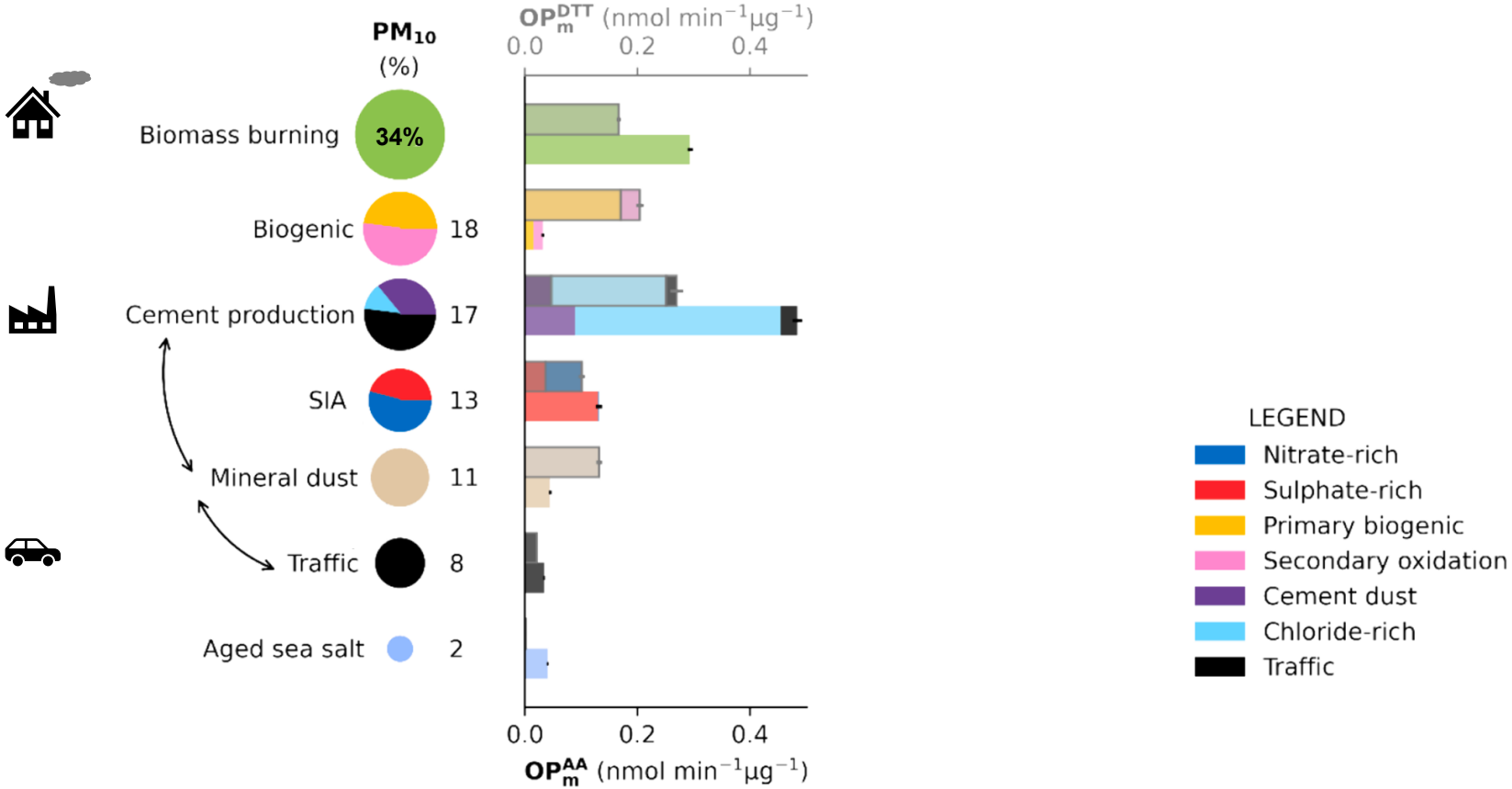
Vir: mehanski procesi



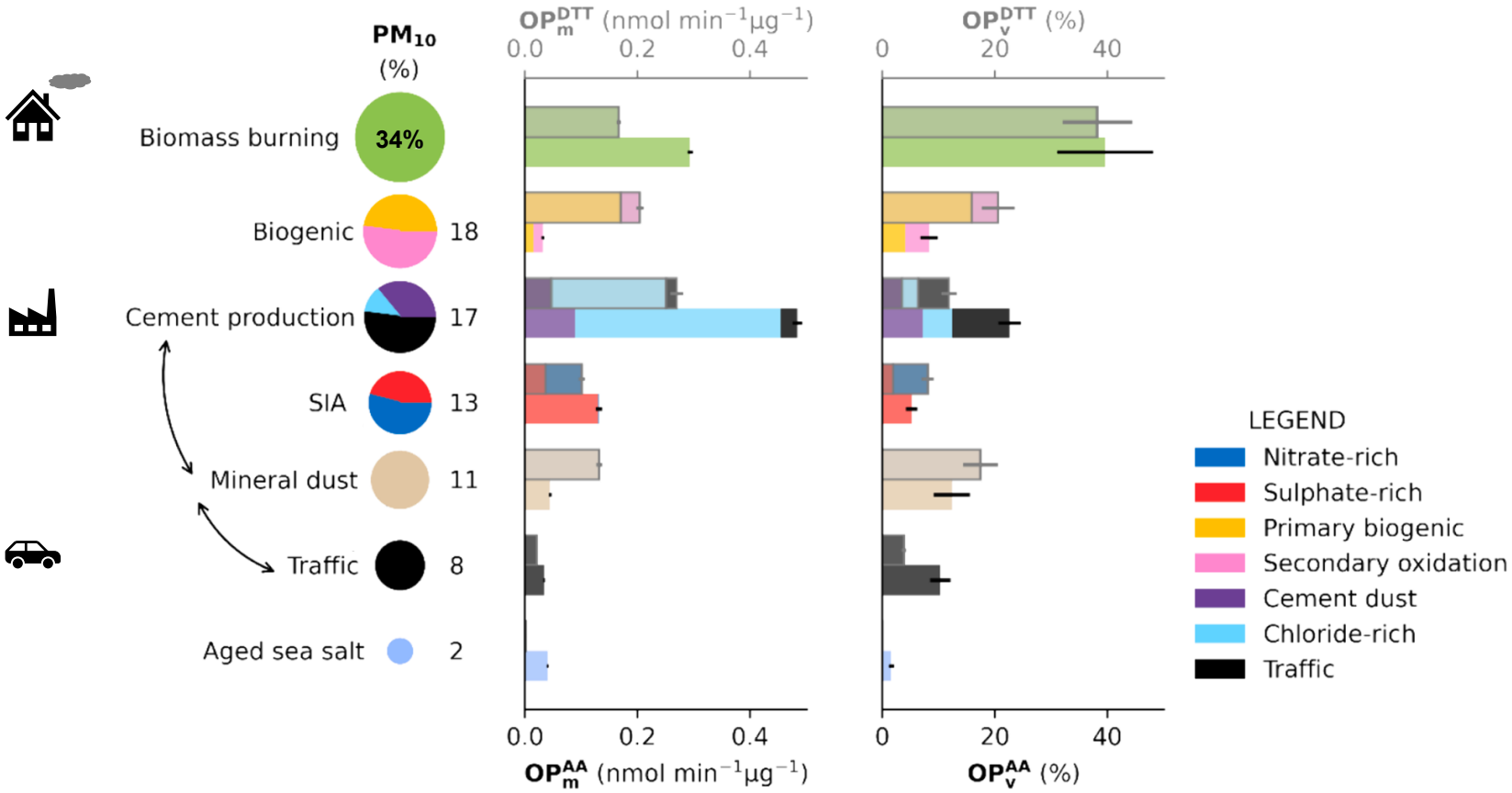
Skupni prispevek virov k PM_{10}



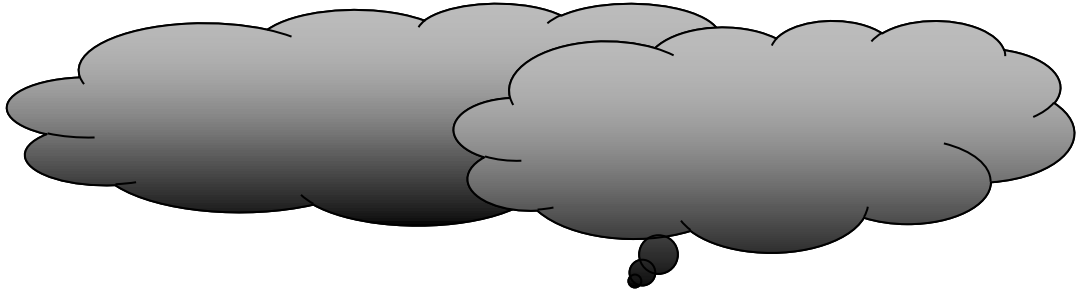
Skupni prispevek virov k OP_m



Skupni prispevek virov k OP_V



Povzetek



- **PM_{10} ≈ druga alpska območja.** (Herich et al., 2014)
- Najpomembnejši viri:
- **OP ≈ med najvišjimi v Evropi.** (Daellenbach et al., 2020; Weber et al., 2021; Borlaza et al., 2021b)
- Nenavaden vir bogat **s kloridi,** z **visokim OP_m.**
- Nadaljne raziskave:
  - primerjava rezultatov z drugimi uporabljenimi metodami;
  - vzorčenje resuspendiranega prahu na različnih lokacijah po dolini.

Hvala!

OBČINA KANAL OB SOČI

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HAZE INSTRUMENTS

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