WP1. Task.1.1 PM chemical composition offline

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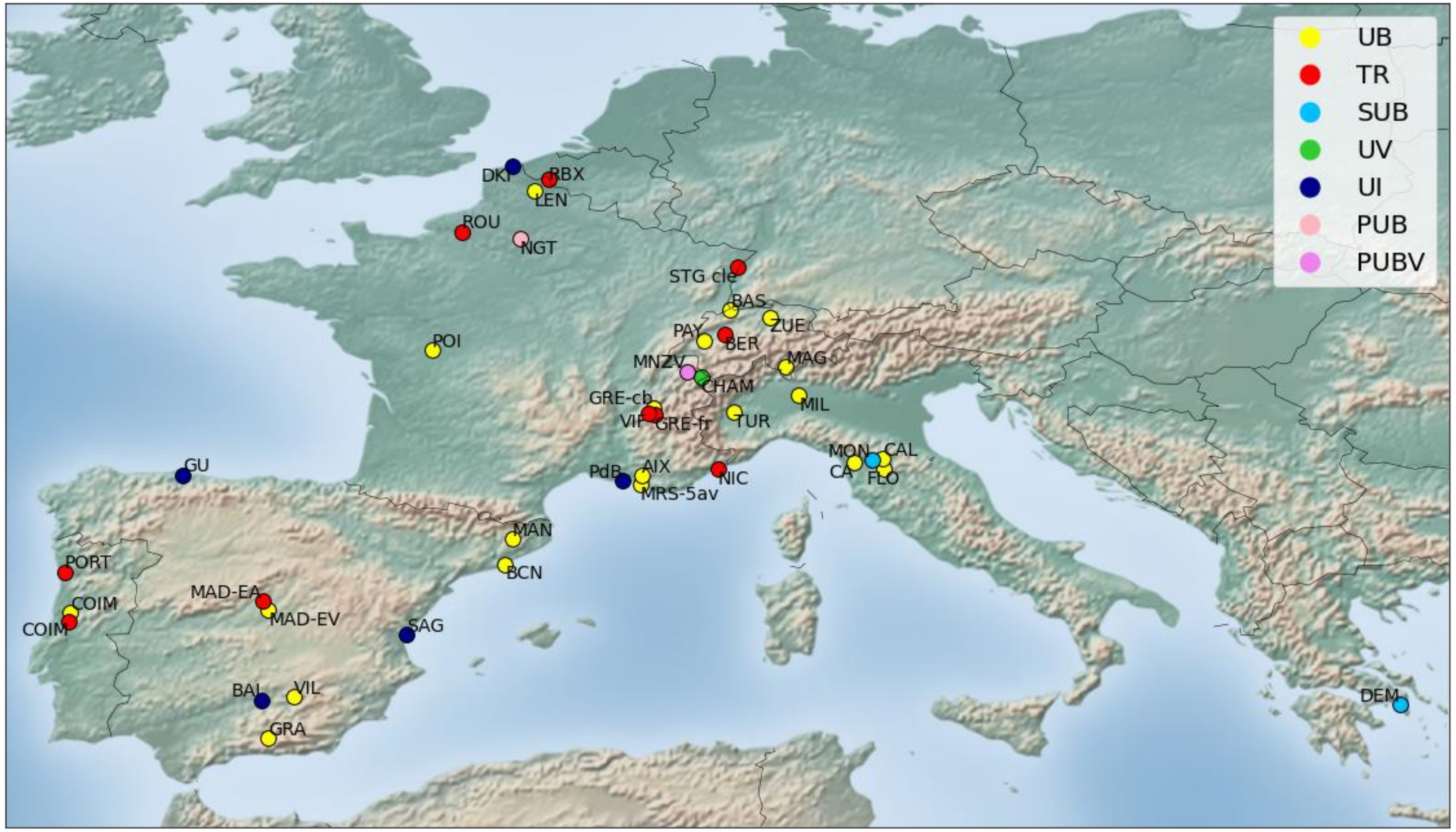
RI-URBANS (101036245)

RI-URBANS Science meeting, 19-20 October 2022

Data collection



Ctry.	UB	TR	SUB	PUB/ PUBV	UI	UV
FR	7	4	-	2	2	1
GR	-	-	1	-	-	-
IT	5	5	1	-	-	-
PT	1	1	-	-	-	-
ES	5	1	-	-	3	-
CH	4	1	-	-	-	-

Urban Background, Traffic and Industrial areas

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Data collection

- High and low volume samplers for determination PM_{10} and $PM_{2.5}$
- Quartz fibre filters mainly used (other depending on the chemical analysis)
- Samples collected at variable frequency (daily, 1 day out of 3...)
- Short sampling campaigns (seasonal)
- Few sites cover 2-3 years of sampling

Data collection

Station	2013 w s s a	2014 w s s a	2015 w s s a	2016 w s s a	2017 w s s a	2018 w s s a	2019 w s s a	2020 w s s a	2021 w s s a	Ions	OCEC	Metals	Sugars	Polyols	Others
CHAM_UV										√	√	√	√	√	
DKI_UI										√	√	√	√	√	
GRE-cb_UB										√	√	√	√	√	
GRE-fr_UB										√	√	√	√	√	
VIF_UB										√	√	√	√	√	
LEN_UB										√	√	√	√	√	
MNZ_PUBV										√	√	√	√	√	
MAR_UB										√	√	√	√	√	
AIX_UB										√	√	√	√	√	
PdB_UI										√	√	√	√	√	
NIC_TR										√	√	√	√	√	
NGT_PUB										√	√	√	√	√	
POI_UB										√	√	√	√	√	
RBX_TR										√	√	√	√	√	
ROU_TR										√	√	√	√	√	
STG_TR										√	√	√	√	√	
ATH_SUB										√	√	√	√		
FLO_UB										√	√	√	√		
CAL_UB										√	√	√			√
MON_SUB										√	√	√			√
CA_UB										√	√	√	√		√
MIL_UB										√	√	√	√		
TUR_UB										√	√	√	√	√	

Station	2013 w s s a	2014 w s s a	2015 w s s a	2016 w s s a	2017 w s s a	2018 w s s a	2019 w s s a	2020 w s s a	2021 w s s a	Ions	OCEC	Metals	Sugars	Polyols	Others
COIM_UB										√	√	√	√	√	
COIM_TR										√	√	√	√	√	
PORT_TR										√	√	√	√		
BAI_UI										√	√	√	√		√
BCN_UB										√	√	√	√		√
GIJ_UI										√	√	√	√		√
GRA_UB										√	√	√	√		
MAD-EV_UB										√	√	√	√		√
MAD-EA_TR										√	√	√	√		√
MAN_UB										√	√	√	√		√
SAG_UI										√	√	√			
VIL_UB										√	√	√	√		√
BAS_UB										√	√	√	√	√	
BER _TR										√	√	√	√	√	
MAG_UB										√	√	√	√	√	
PAY_UB										√	√	√	√	√	
ZUR_UB										√	√	√	√	√	

PM main components

- Metals: Inductively coupled plasma mass spectrometry (ICP-MS) and ICP - optical emission spectrometry (OES); Particle-induced X-ray emission (PIXE); Energy dispersive X-ray fluorescence (EDXRF)
- Ions: Ion chromatography (IC)
- OC/EC: Thermal-optical offline analysis with transmittance correction (TOT) (EN 16909)
- Organic tracers: Gas chromatography (GC), with mass spectrometry (MS) or flame ionization detector (FID)

Data treatment

PM components covering the period 2013-2021, ~ 10,000 samples

- Secondary inorganic aerosols, SIA: (SO_4^{2-} + NO_3^- + NH_4^+)
- Organic matter, OM: (OC × 1.8) (Minguillon et al., 2011)
- Calculation of mineral components according to Alastuey et al., 2016
- Sea-salt, Cl^- + Na_{ss} + Ca_{ss} + Mg_{ss} + K_{ss} + $SO_4^{2-}{}_{ss}$

Na_{ss} = Na - Na_{dust} , Na_{dust} = Al × 0.12 (Moreno et al., 2006)

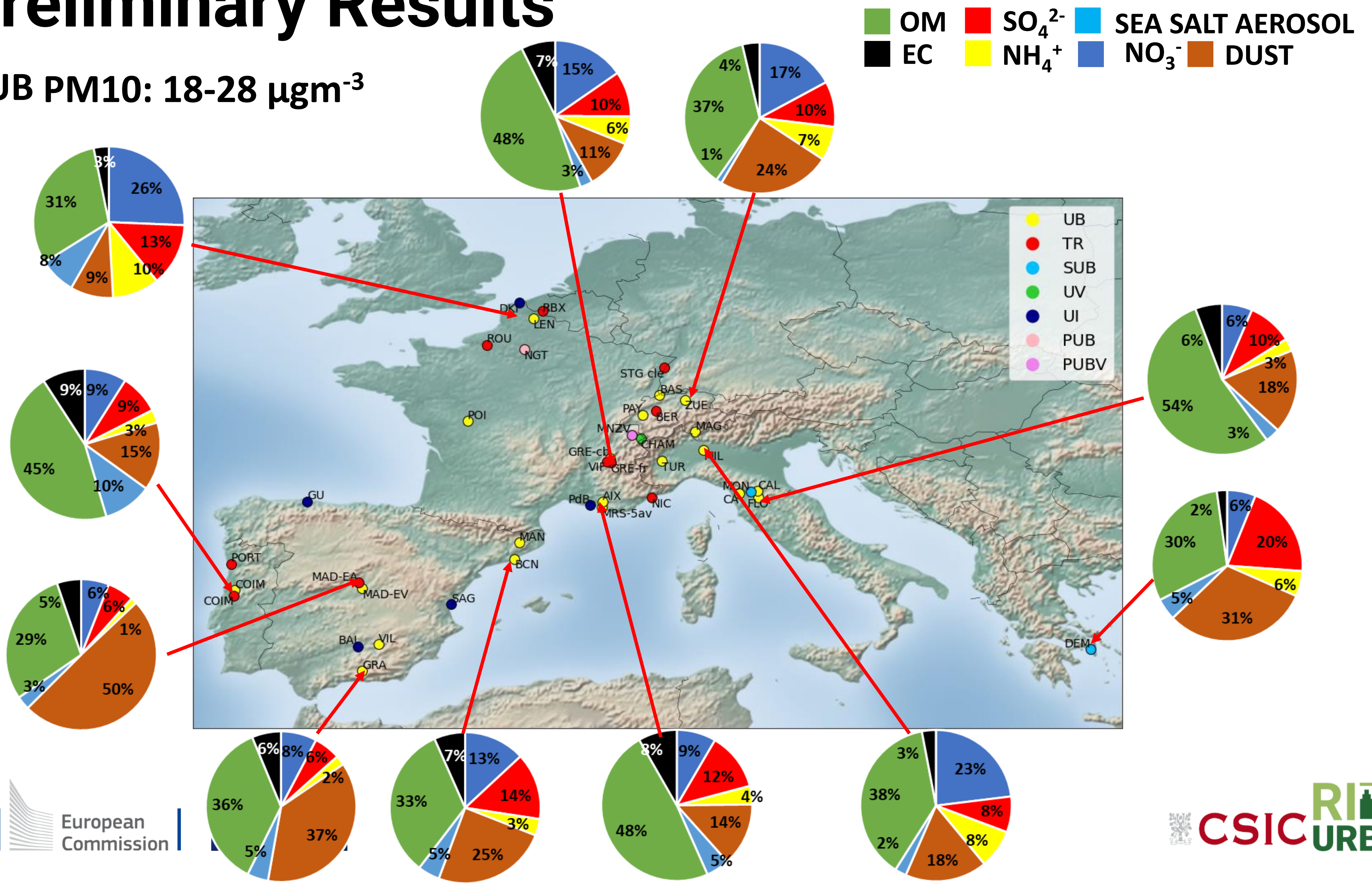
- Mineral dust Al_2O_3, SiO_2, Fe_2O_3, TiO_2, P_2O_5, CaO_{dust}, MgO_{dust}, Na_2O_{dust}, K_2O_{dust}

K_{dust} = 0.31 × Al, K_{bb} = K - K_{ss} - K_{dust}

underestimation when analyzed the water soluble content of Ca, Mg, K

Preliminary Results

UB PM10: 18-28 μgm^{-3}



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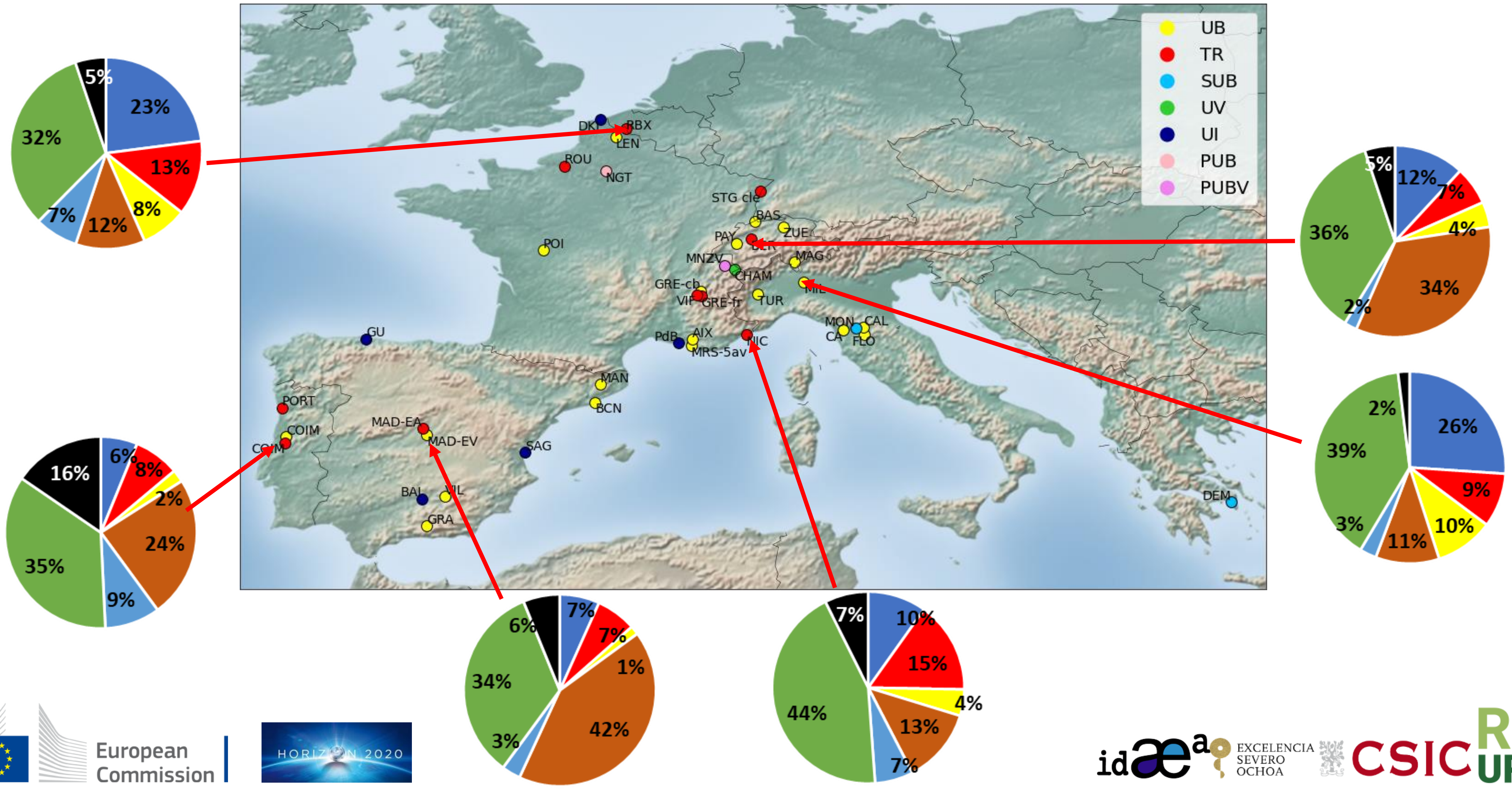
Preliminary Results

TR PM10: 23-34 µgm^{-3}

OM | SO_4^{2-} | SEA SALT AEROSOL
EC | NH_4^+ | NO_3^- | DUST



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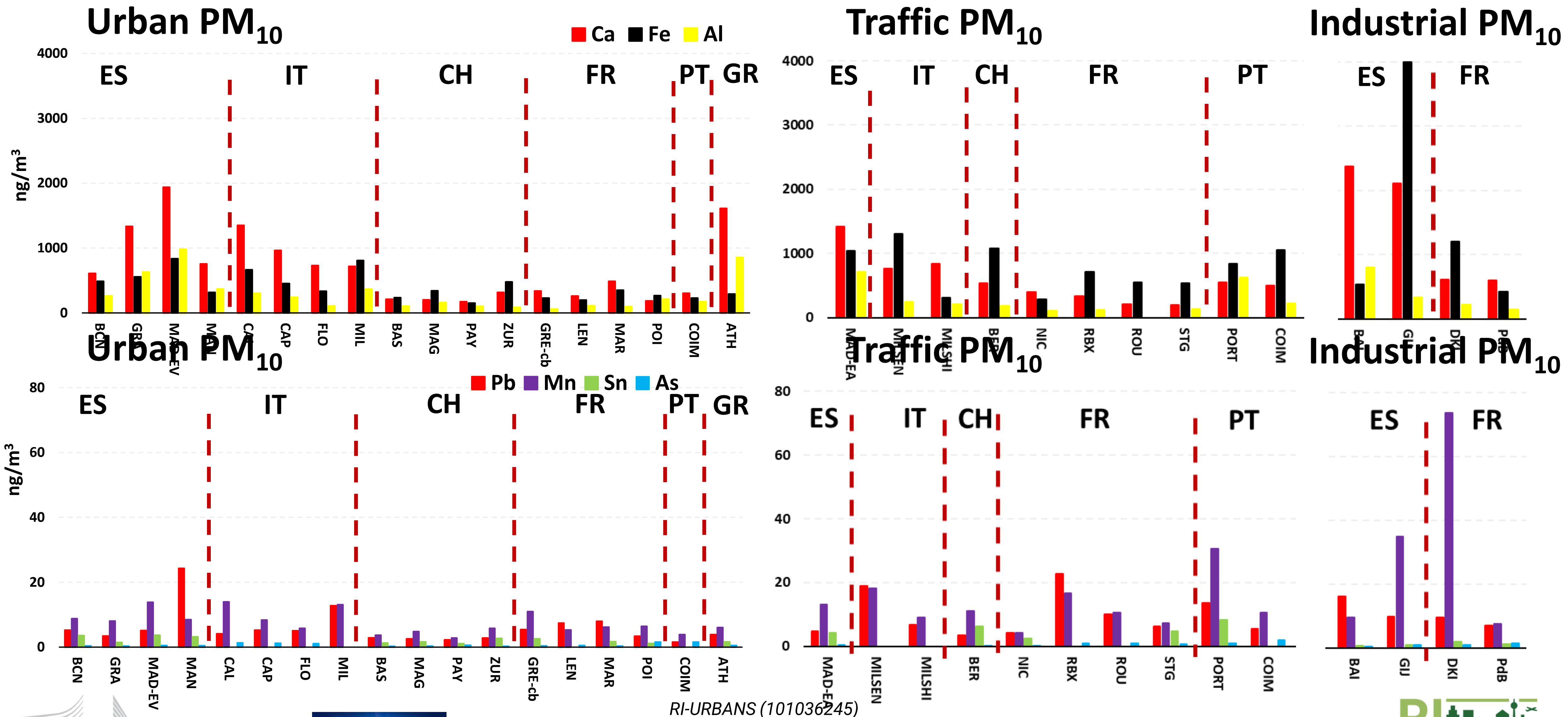
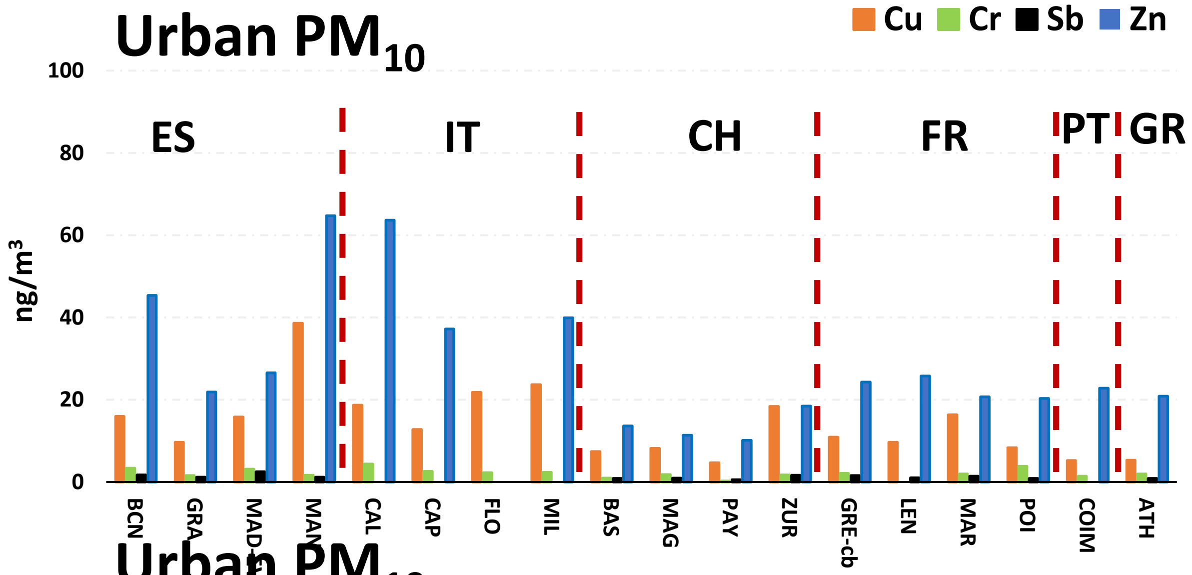
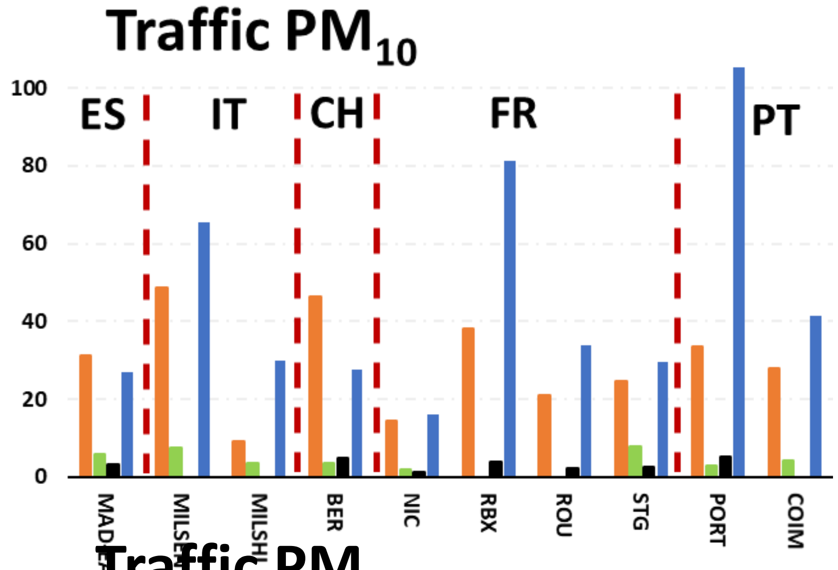
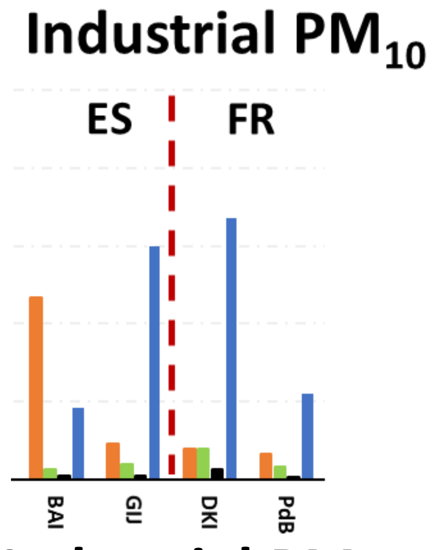
Preliminary Results

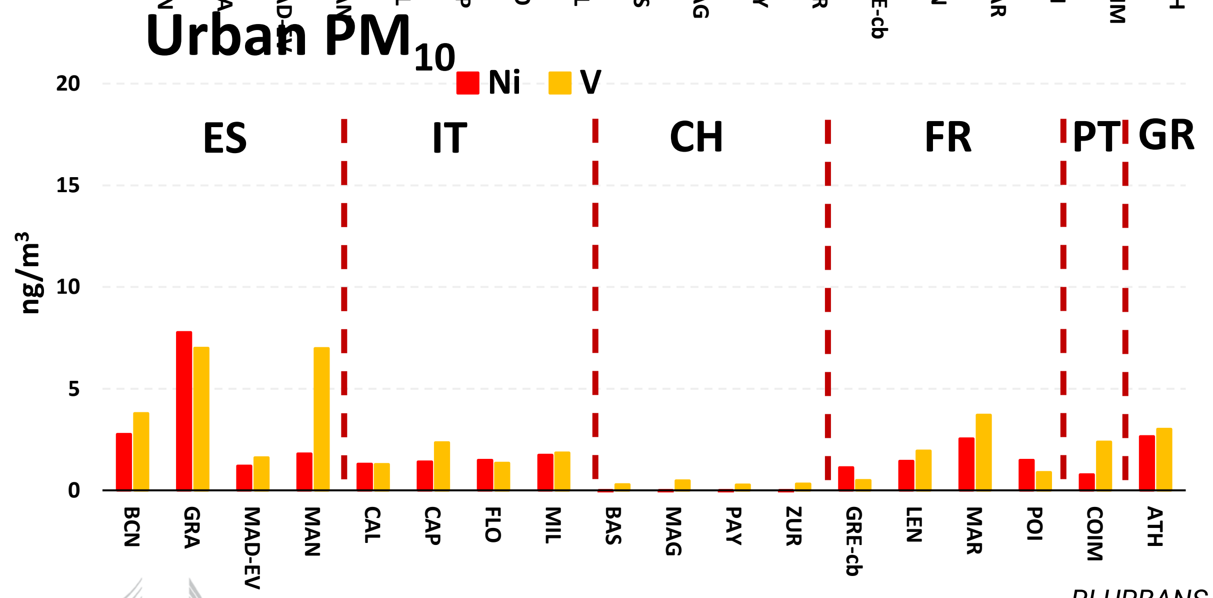


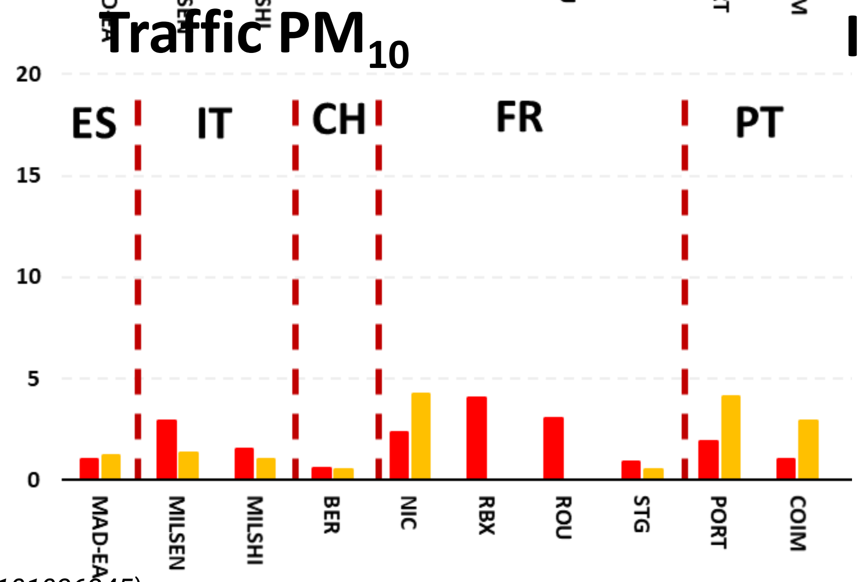
Preliminary Results

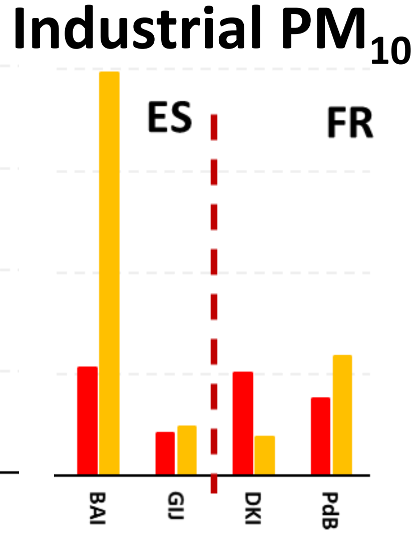












Conclusions and Further Steps

- OM important in all sites
- Mineral dust higher in Spain
- Industrial tracers

Future steps

- ➢Trends in selected sites
- ➢Overview of PM chemical composition in EU
- ➢Preparation of 2 publications

Acknowledgments