

# Aerosolizirani črni ogljik kot parameter za kvantitativno določanje uspešnosti omejevanja virov onesnaženja zraka

Griša Močnik, G. Invernizzi, A. Rupecht, D. Westerdahl, C. De Marco, C. Sioutas, G. Titos, L. Alados-Arboledas, A. Gregorič, I. Ježek, N. Marchand, J.L. Jaffrezo, J. Alard, J.L. Bescombes, F. Chevrier, L. Drinovec

# Black Carbon as a Parameter for Quantification of Effectiveness of Abatement Actions to Improve Air Quality

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# Black Carbon – did we do anything useful?

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# Black Carbon and Particulate Matter



≠



- BC – primary
- BC – direct to sources

- PM dominated by secondary
- well mixed

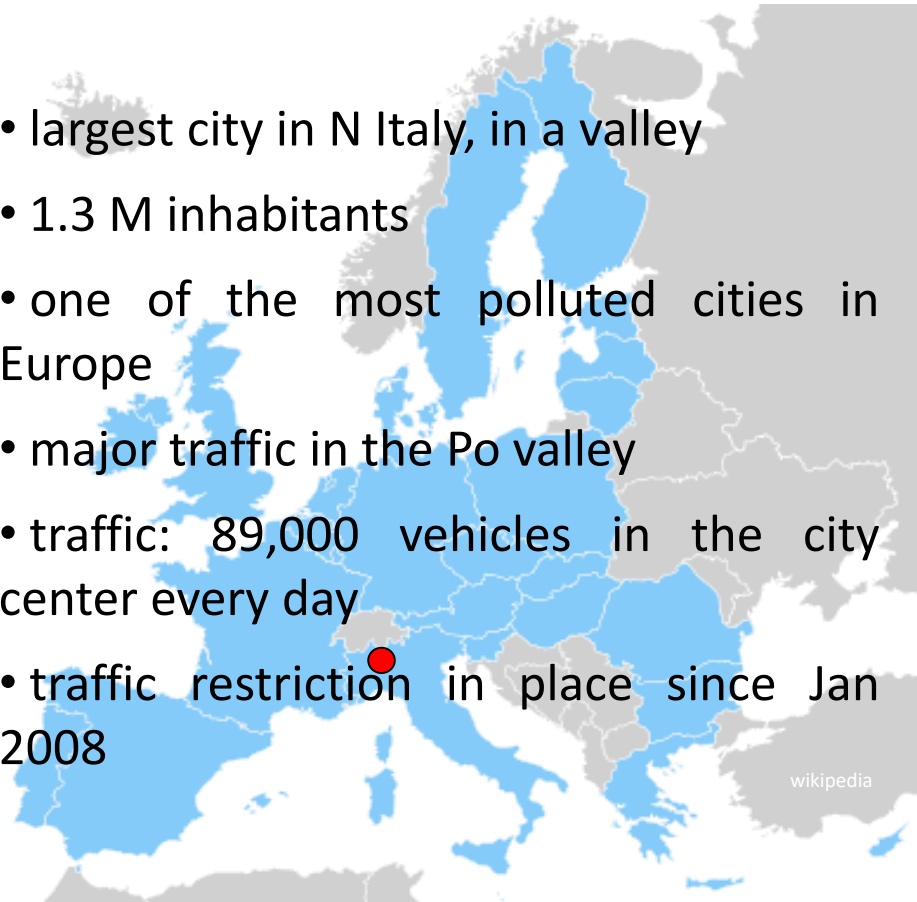
# Traffic

- visible source of air pollution
- „easy“ to control
- first to be regulated

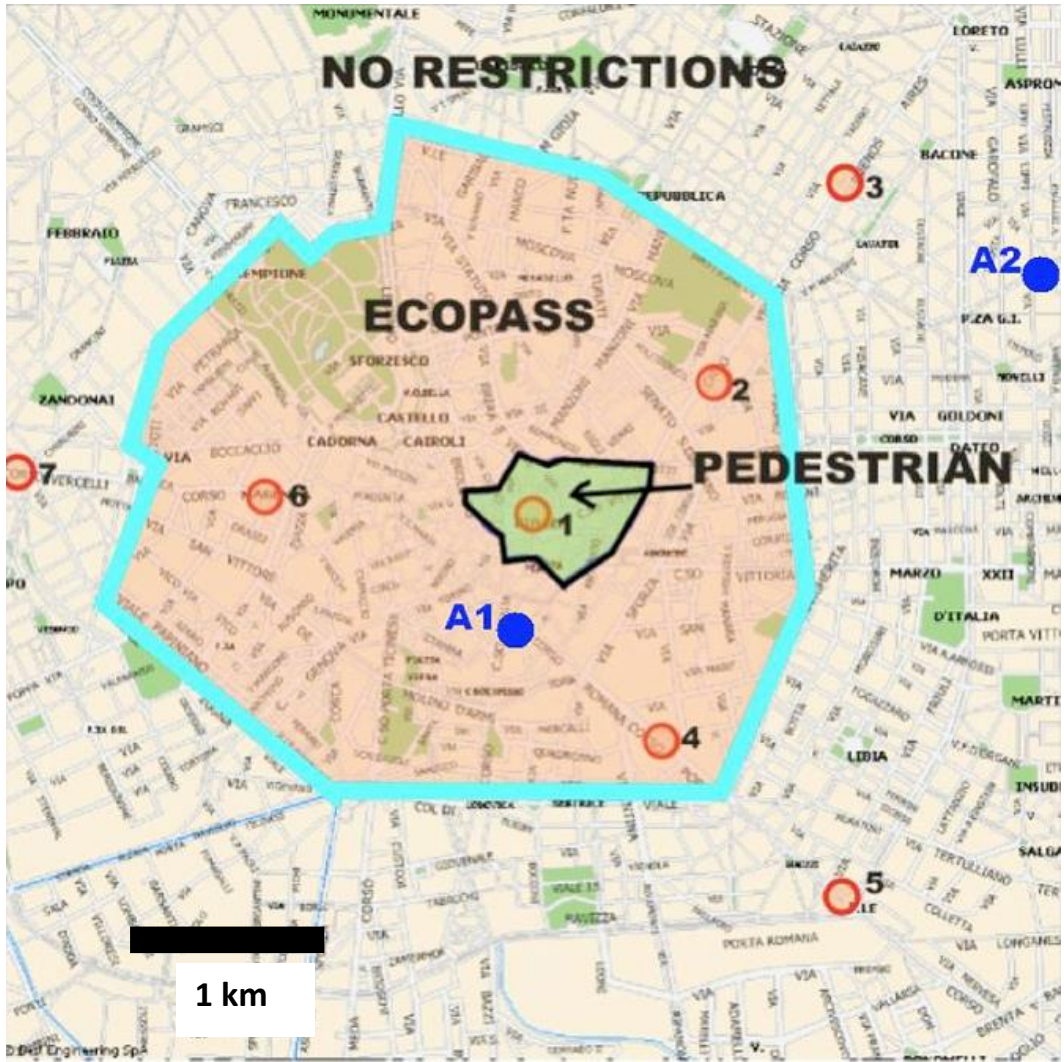


# Milano, Italy

- largest city in N Italy, in a valley
- 1.3 M inhabitants
- one of the most polluted cities in Europe
- major traffic in the Po valley
- traffic: 89,000 vehicles in the city center every day
- traffic restriction in place since Jan 2008







# Radial measurements

Each site:

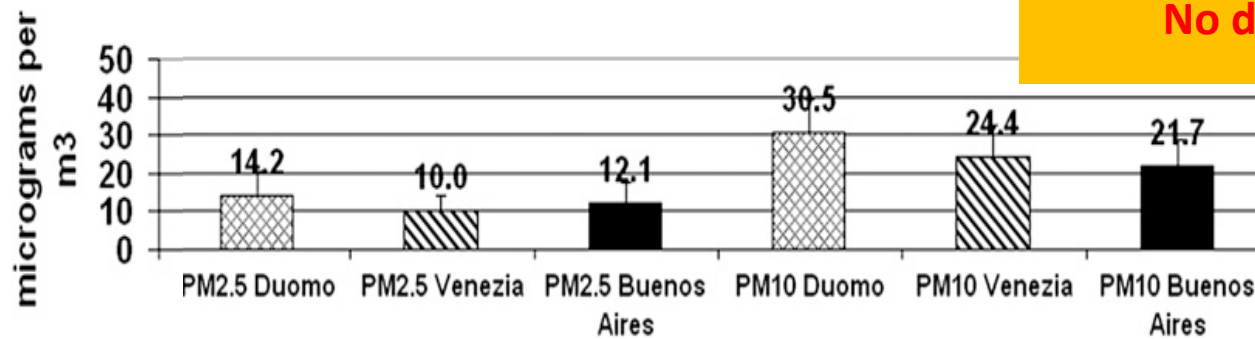
- PM10, PM2.5, PM1
- Black Carbon
- RH, T

08:30 – 19:30

Summer:  
July 2010

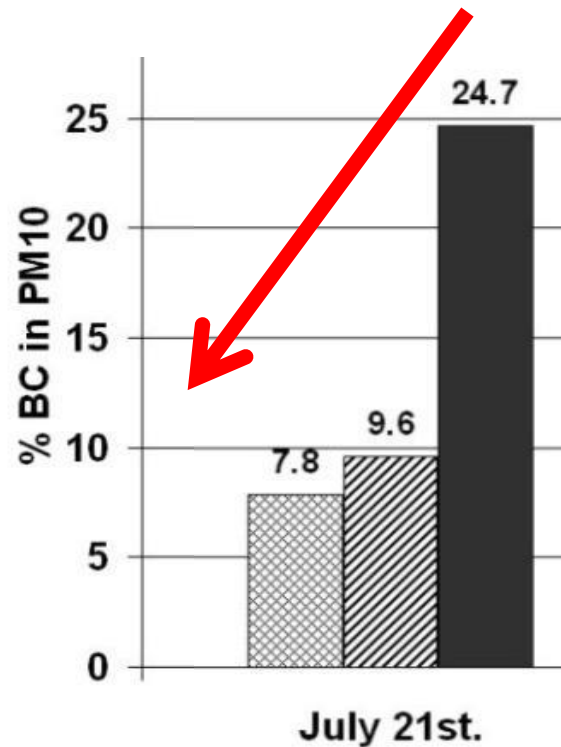
T = 30 C

# Results



**PM**

**Big difference!**



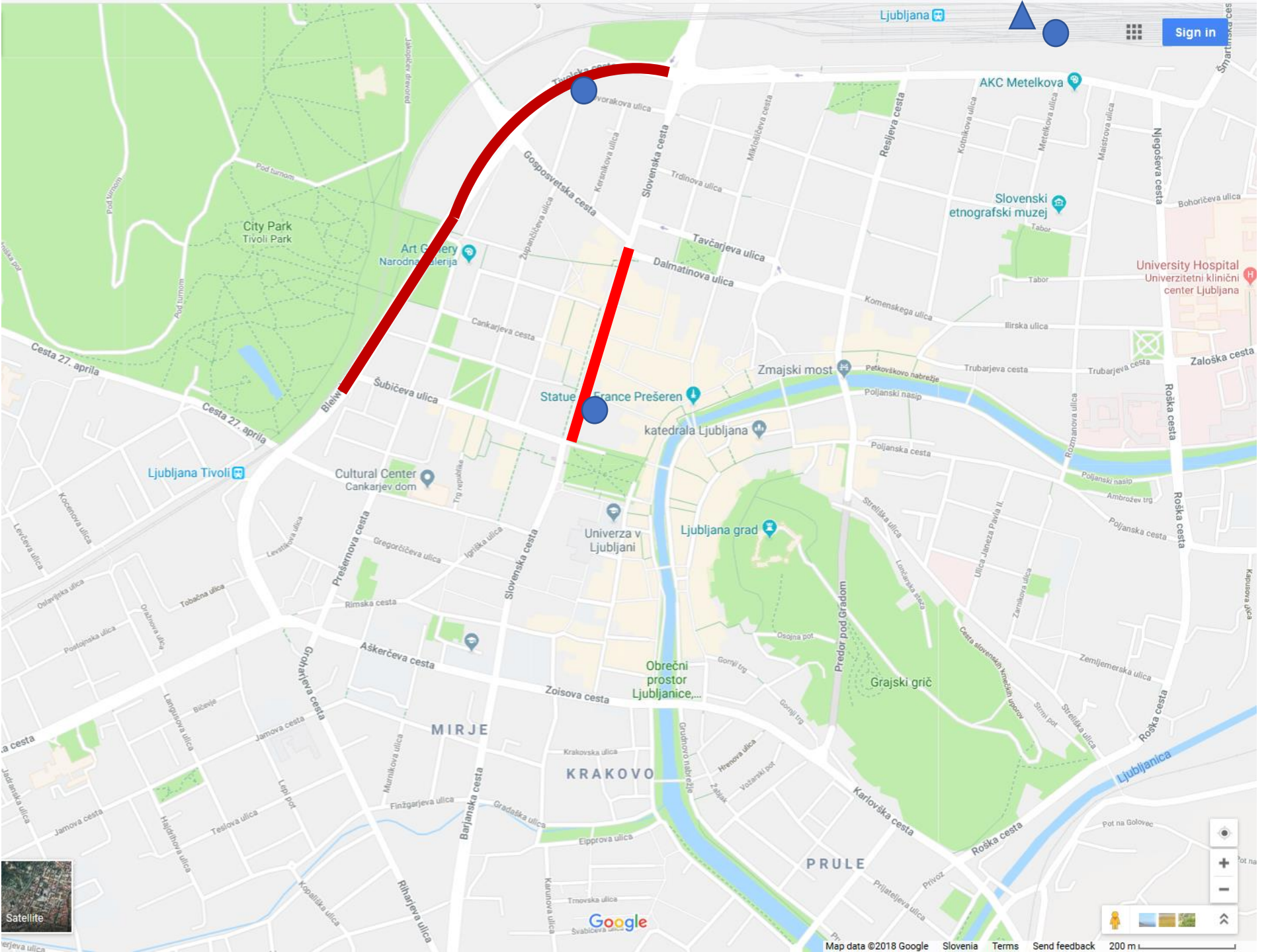
**BC/PM**



# Ljubljana, Slovenia



- largest city in Slovenia, in a basin
- 350k inhabitants
- traffic: 120,000 vehicles into the city every day
- traffic restriction in place since Sept 2013



Sign in

Ljubljana Tivoli

Statue of France Prešeren

katedrala Ljubljana

Univerza v Ljubljani

Ljubljana grad

Obrečni prostor Ljubljanice

Grajski grič

MIRJE

KRAKOVO

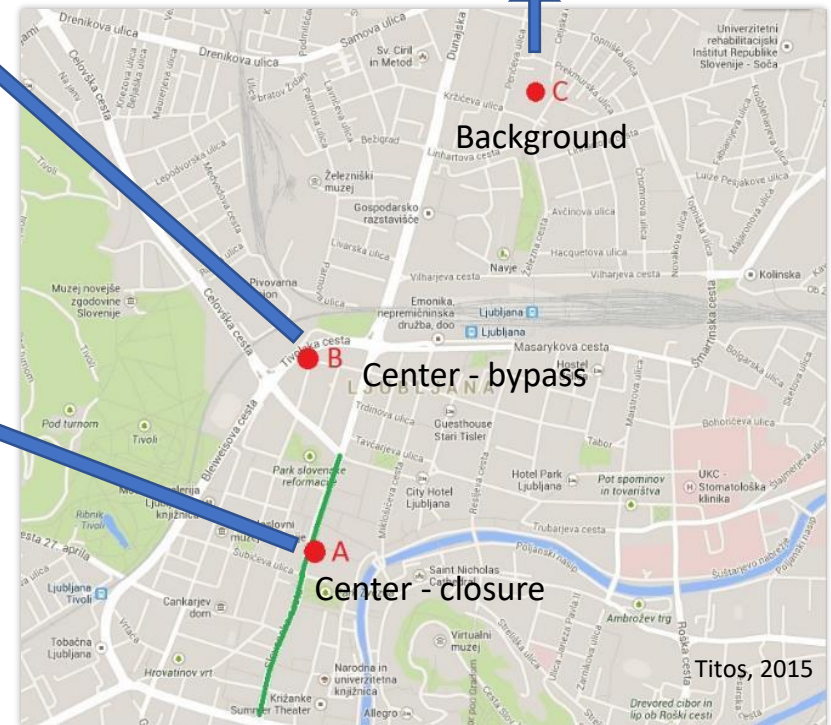
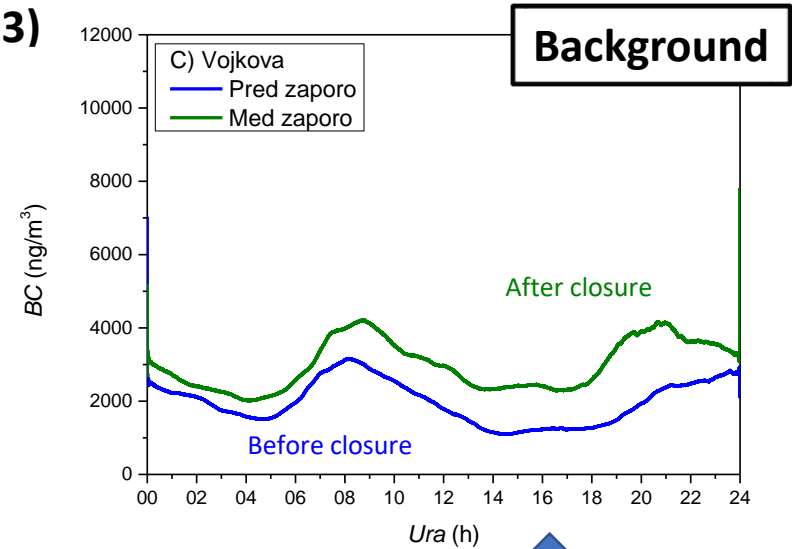
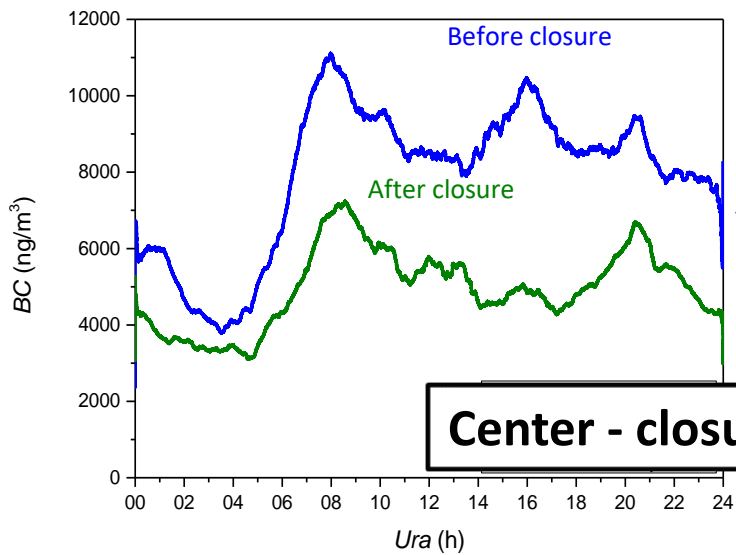
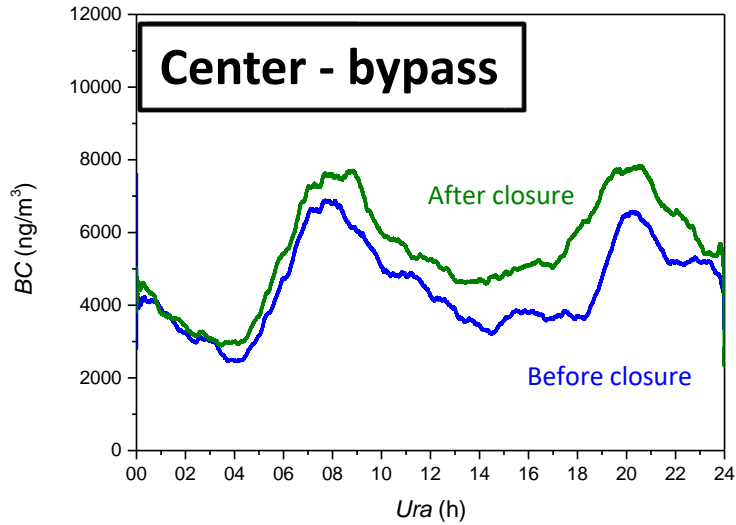
PRULE

Google

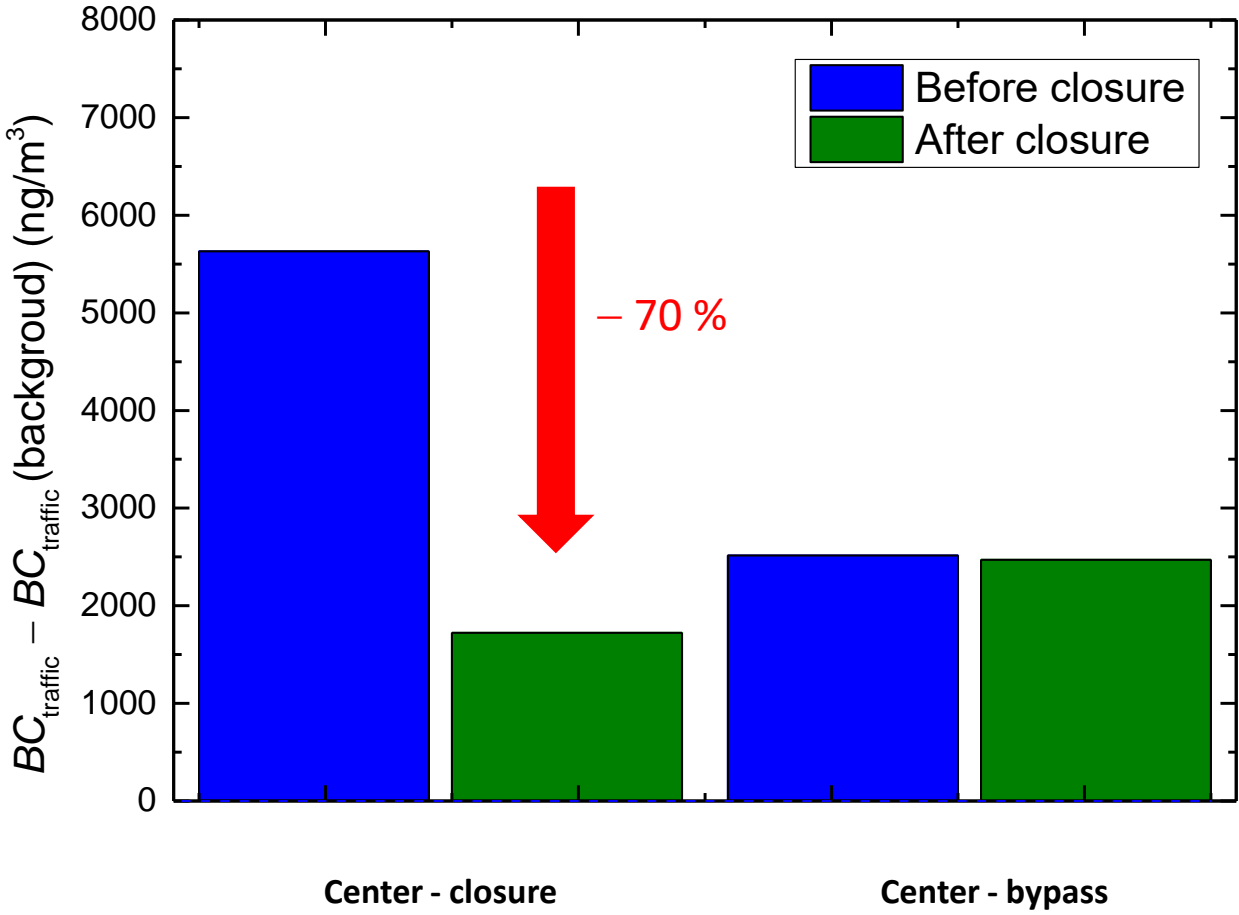


Satellite

# Ljubljana (August – October 2013)



# Ljubljana ( $BC_{\text{traffic}}$ city – background)

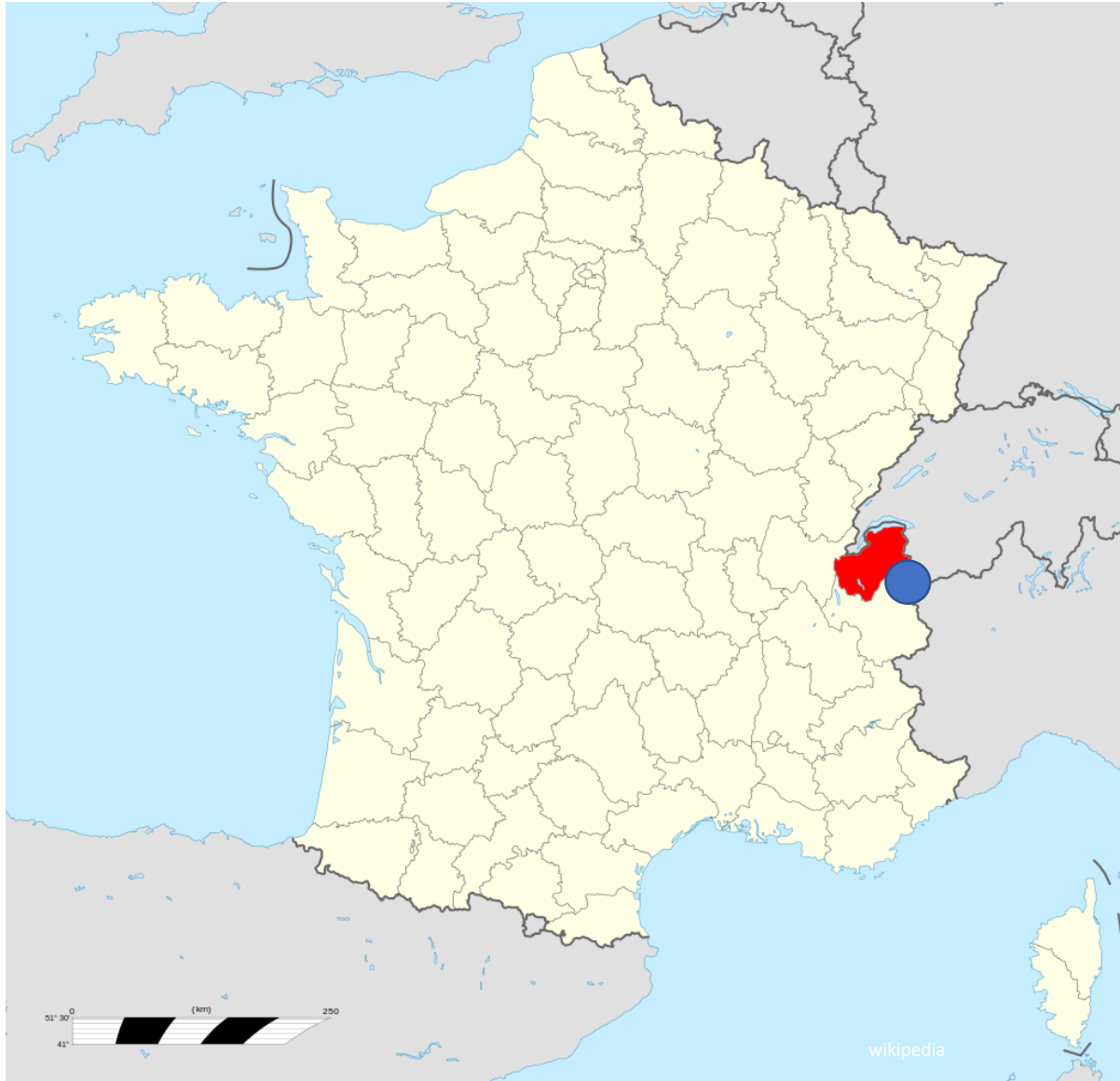


# Domestic heating with wood

- visible source of air pollution
- not so „easy“ to control
- difficult to regulate



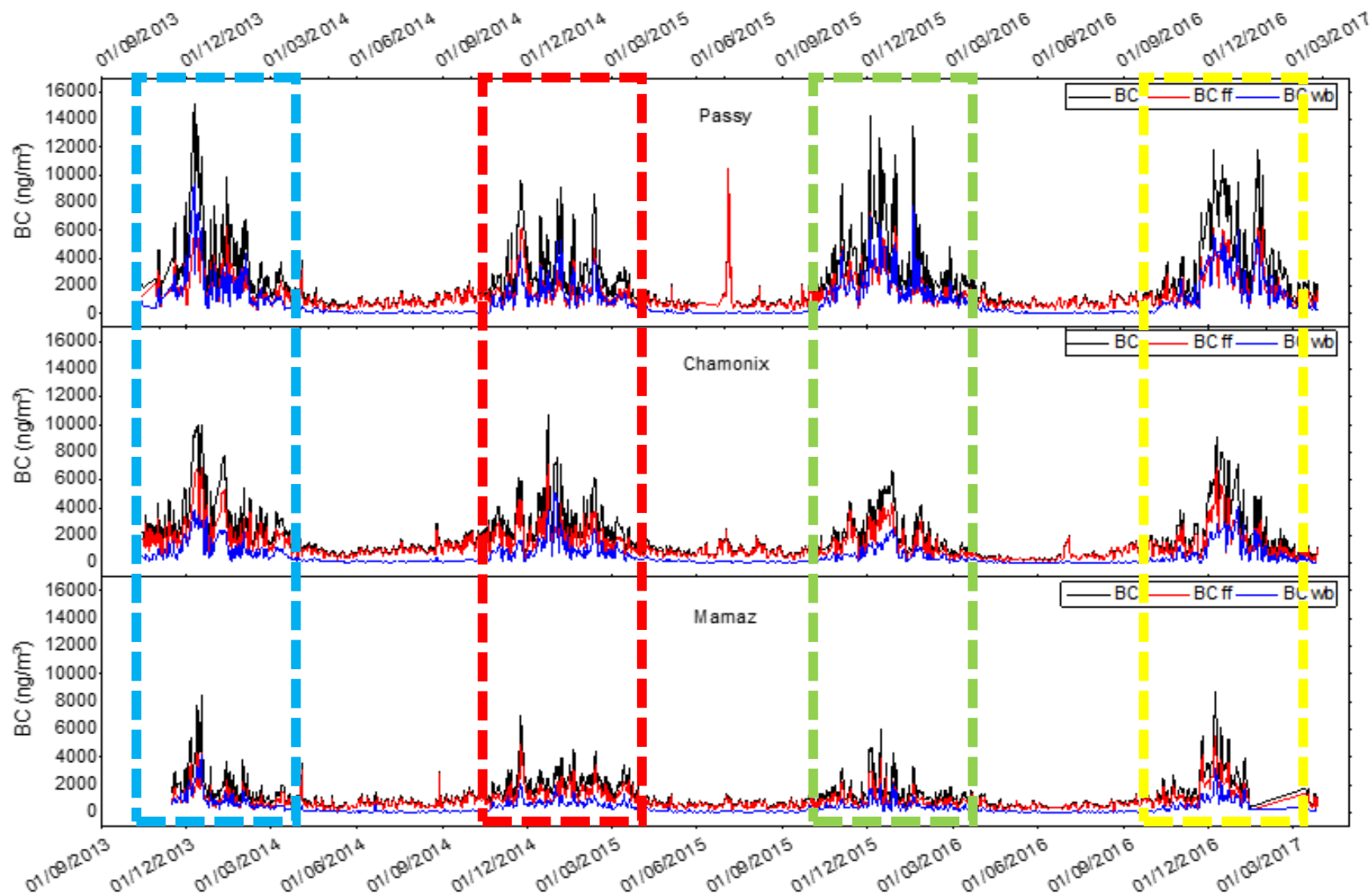
# Vallée d'Arve, France – 7000 stoves!



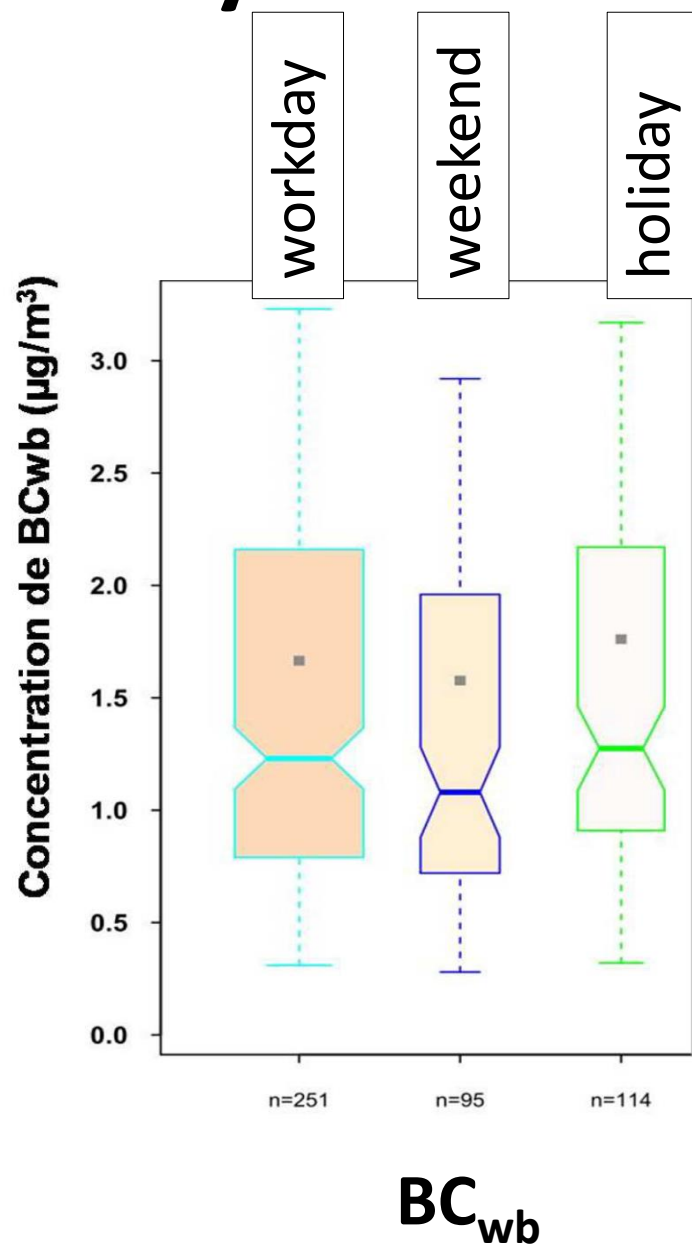
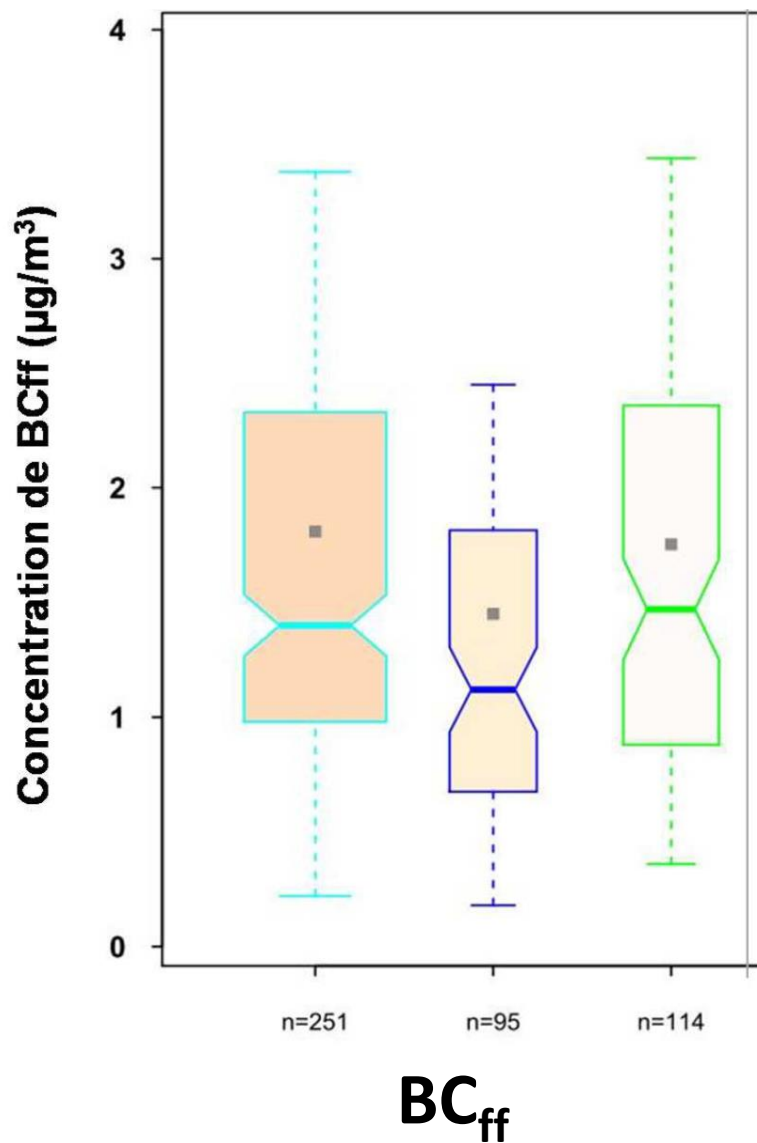


# Vallée d'Arve, France

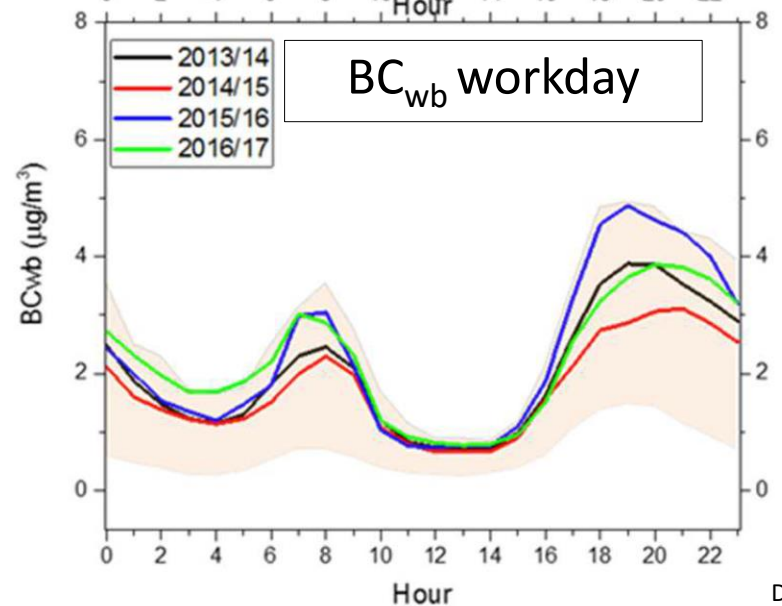
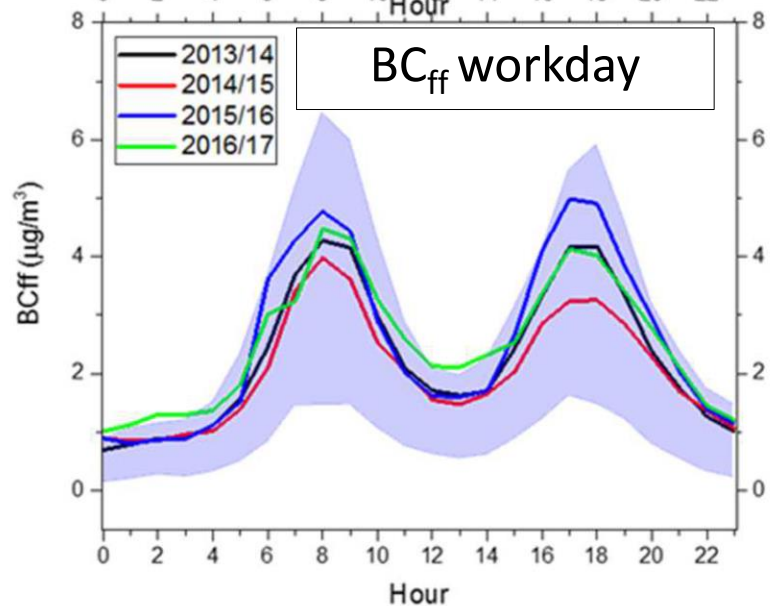
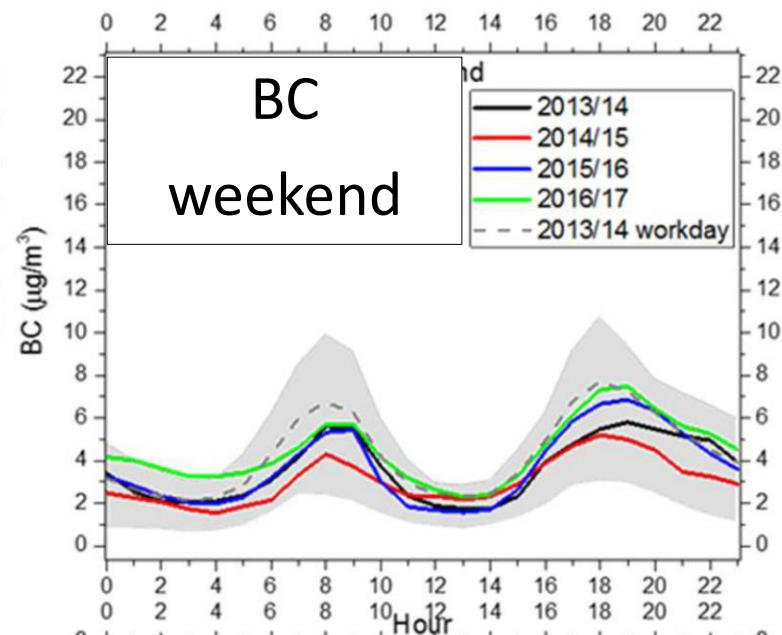
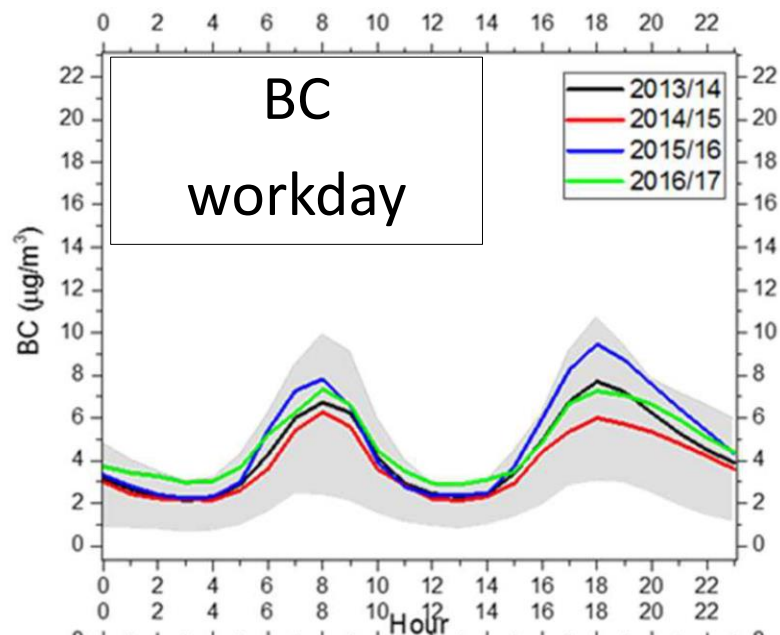
Nov – Mar



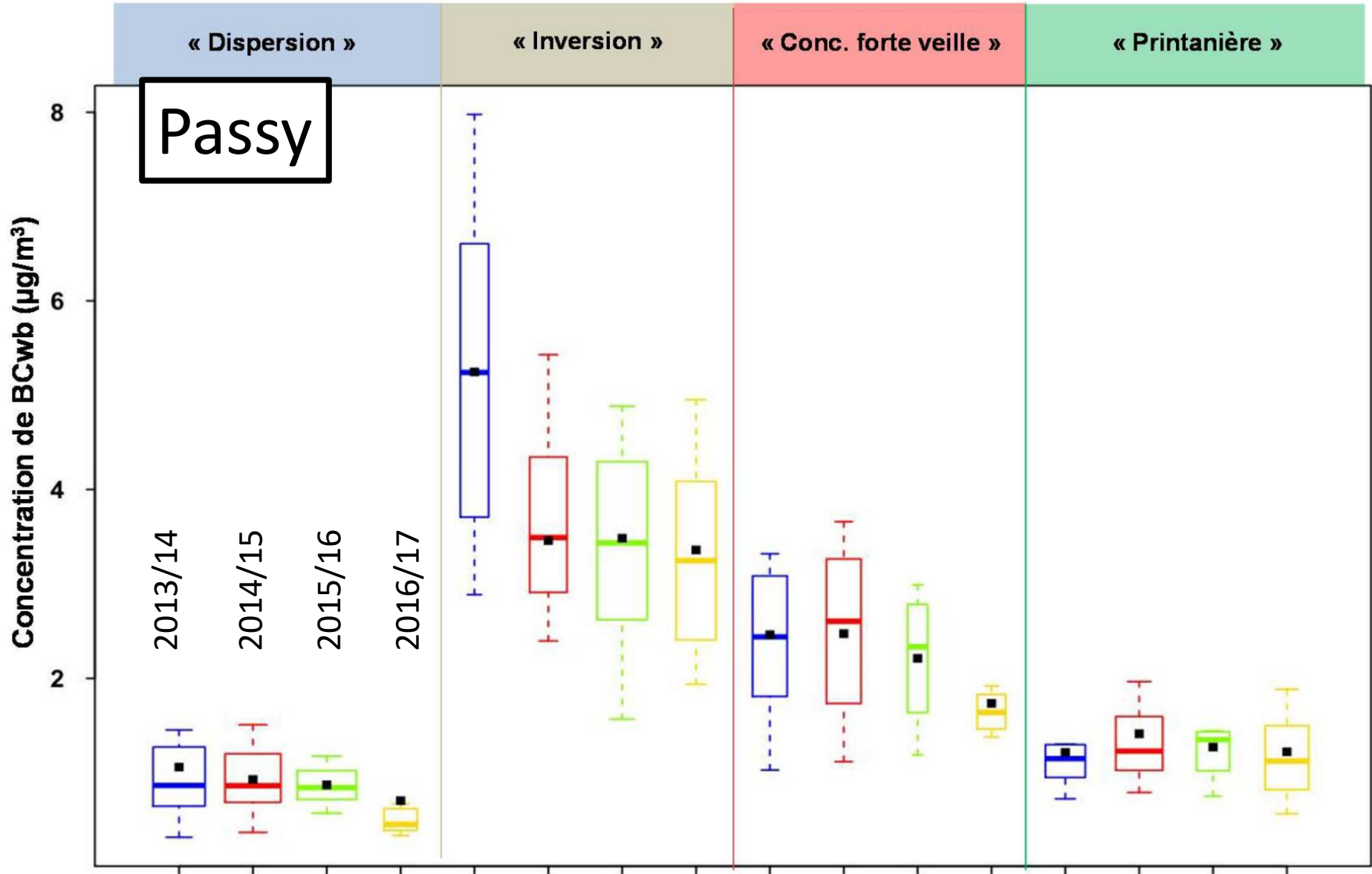
# Vallée d'Arve, France - Passy



# Vallée d'Arve, France - Passy

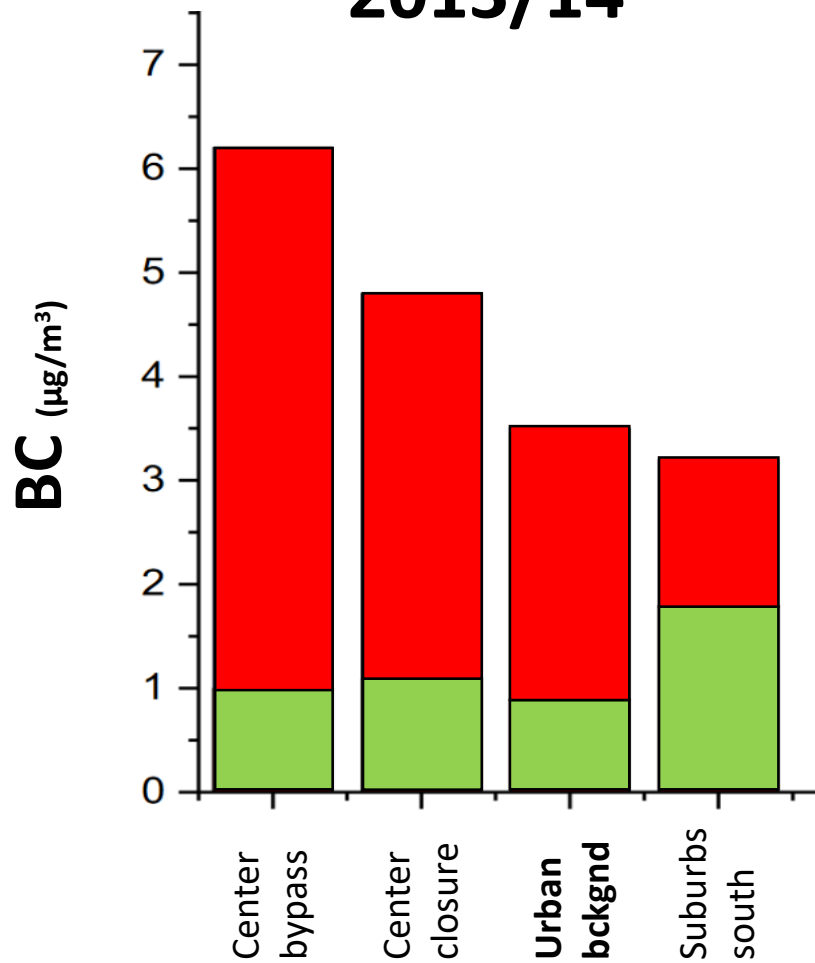


# BC<sub>wb</sub> Nov – Mar

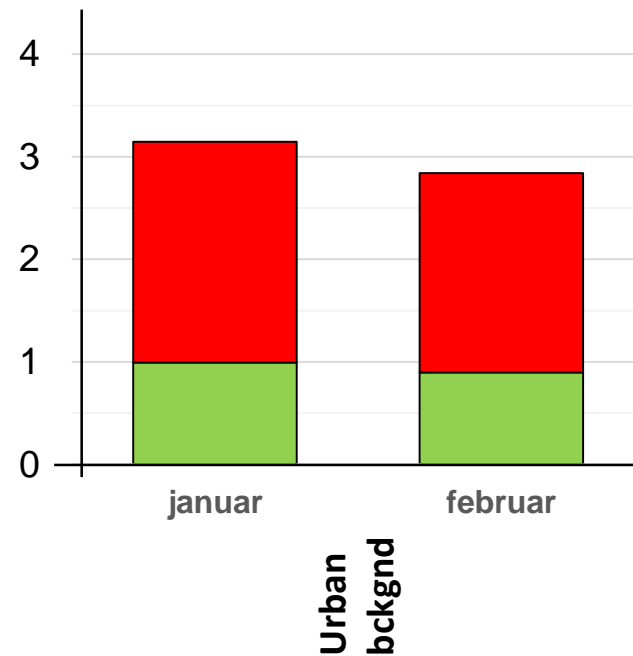


# Ljubljana

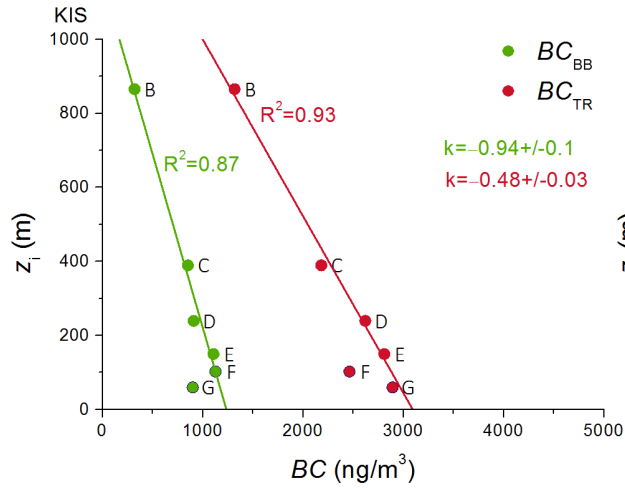
## 2013/14



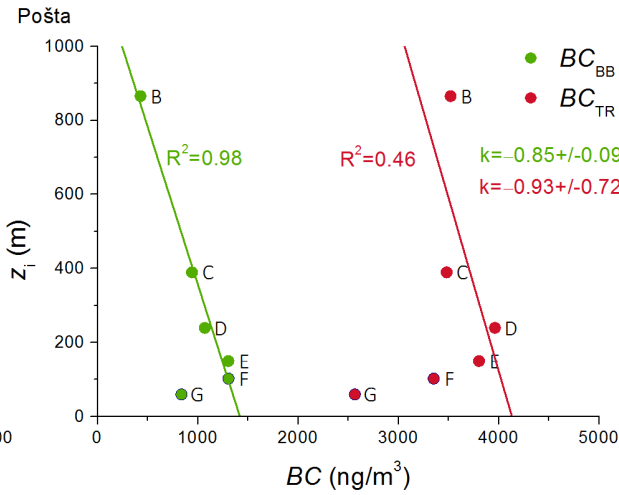
## 2018



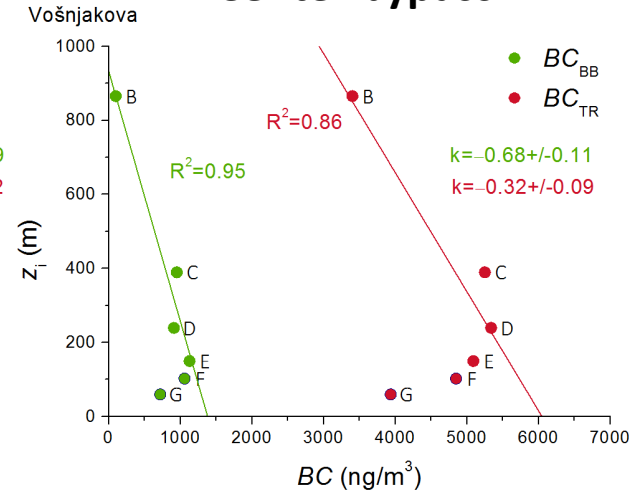
### Urban background



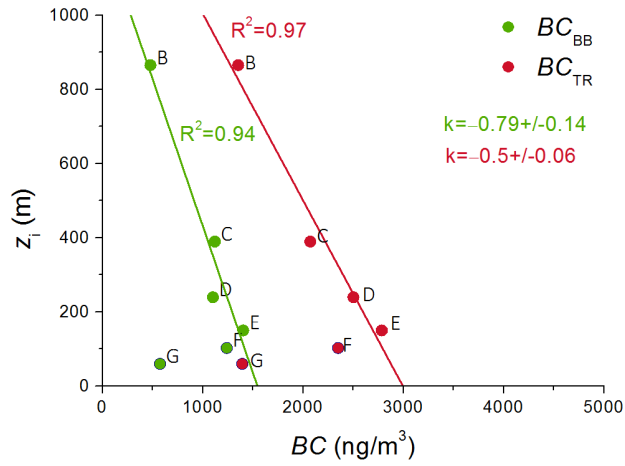
### Center closure



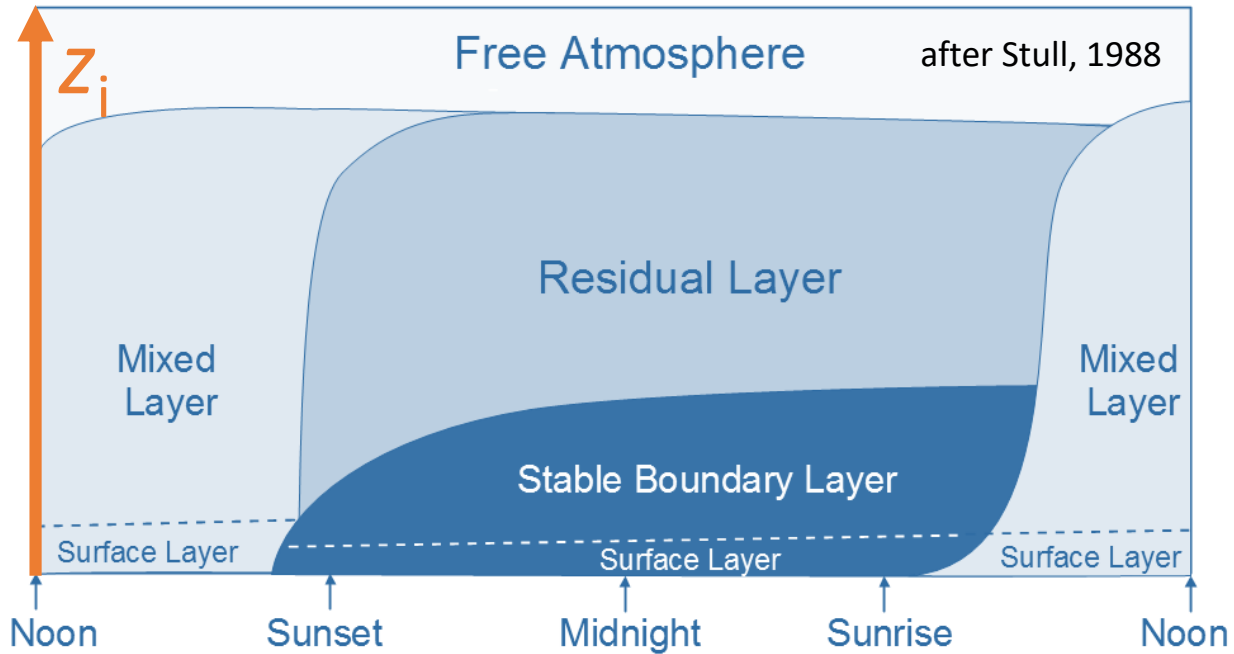
### Center bypass



### Barje - skedenj



### HWY-2





# Conclusions

- **BC** - good parameter to **quantify efficiency**
- **source apportionment**
- role of **weather** – different environments
- **long term measurements**
- **extend to PM**

**Thank you!**

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