CHARACTERISTICS OF THE URBAN CO_2 PLUME FROM MARSEILLE (SOUTHERN FRANCE) : VARIABILITY AND SOURCES IDENTIFICATION USING ISOTOPIC RATIO

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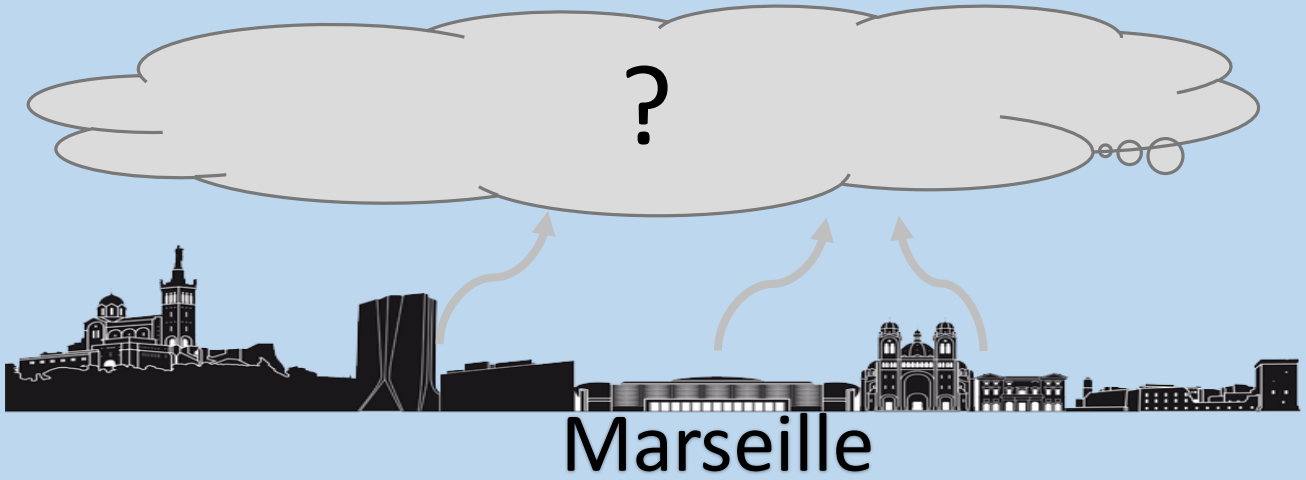
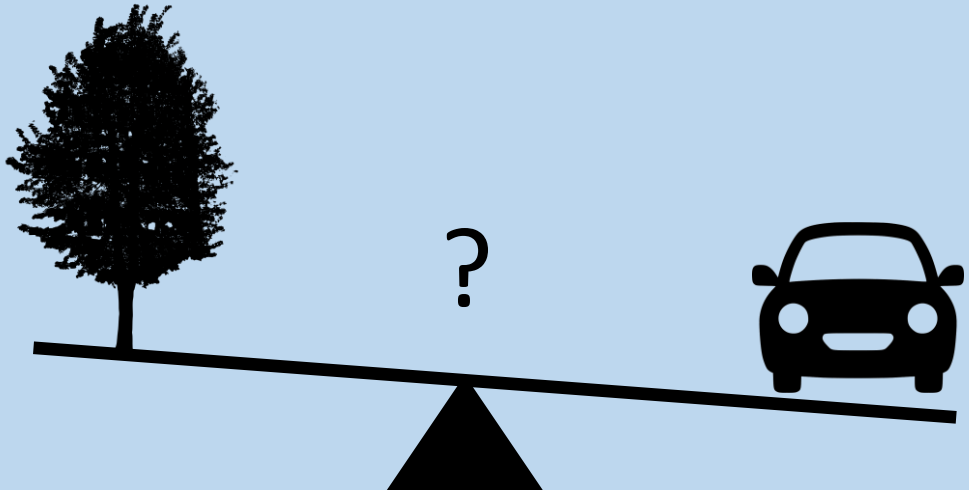
- What are the characteristics of the CO_2 urban plume ?



- What are the anthropogenic sources of CO_2 in Marseille ?



- What is the contribution of the fossil fuel combustion / biogenic emission on the CO_2 in Marseille?

Site location (Google)

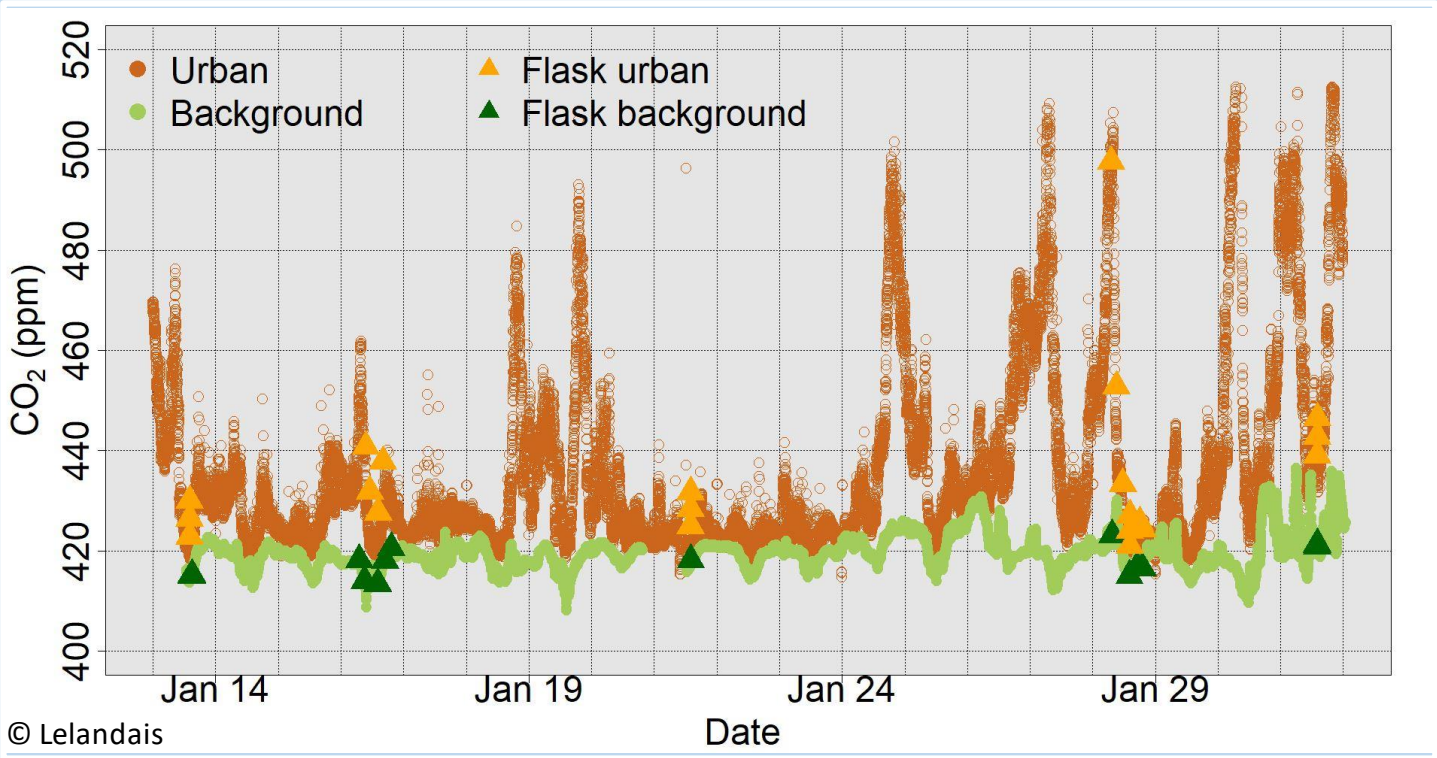
2 measurements sites

- Urban : Marseille
- Suburban : Fontblanche
- CRDS analyser (Picarro G2401) CO_2 concentration
- Other tracers measurments
  NOx, CO, PM, BC

Winter field campaign from 01/13/2020 to 01/31/2020

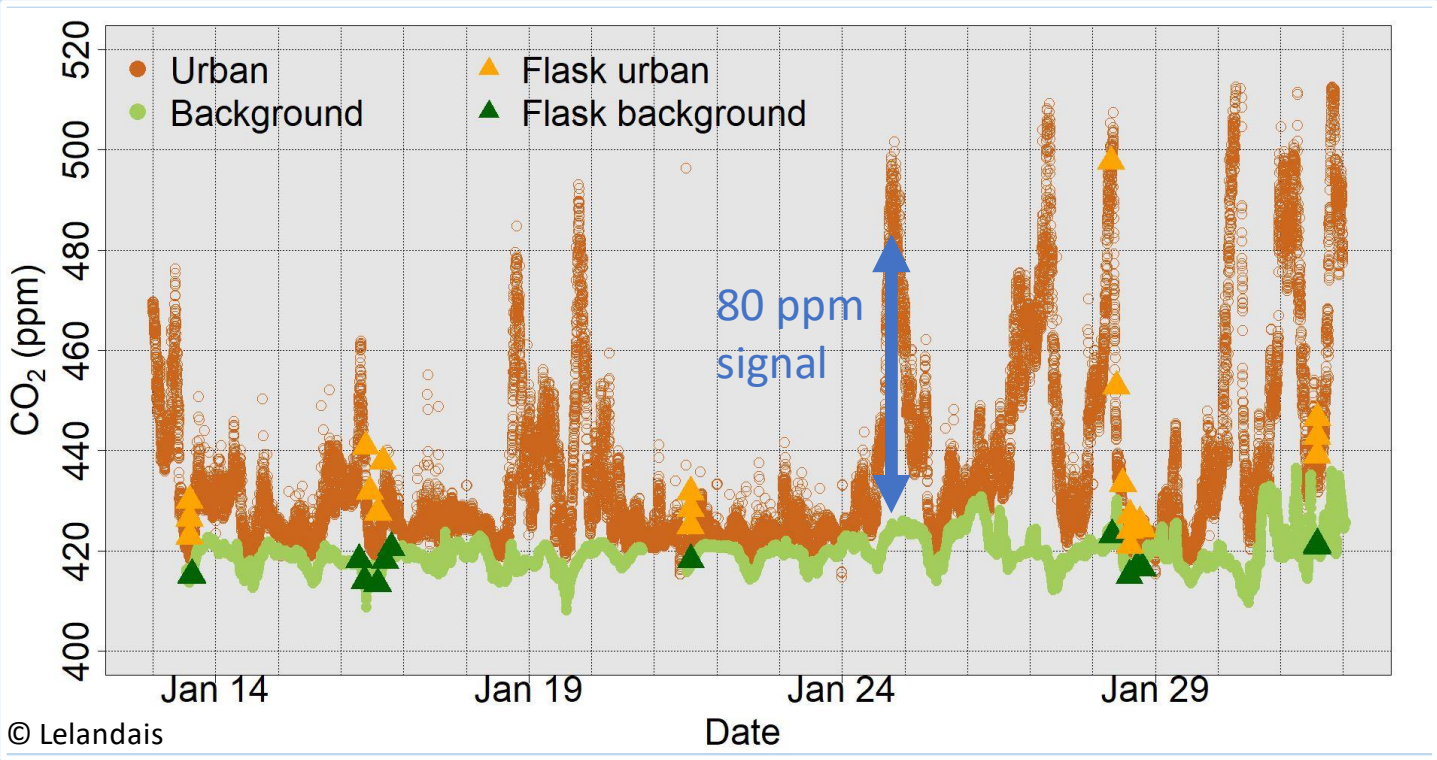
- 40 flasks
- mass spectrometer for radiocarbon content and δ13C composition (SICAS)
- VOC's analyser (TD-GC-2FID - TD-GC-FID)

$CO_{2meas} = CO_{2back} + CO_{2ff} + CO_{2bio}$



CO_2 timeserie recorded at urban site : Marseille Longchamp (Brown) and background site : Fontblanche (green) from 01/13/2020 to 01/31/2020 (L. Lelandais et al in prep)

$CO_{2meas} = CO_{2back} + CO_{2ff} + CO_{2bio}$



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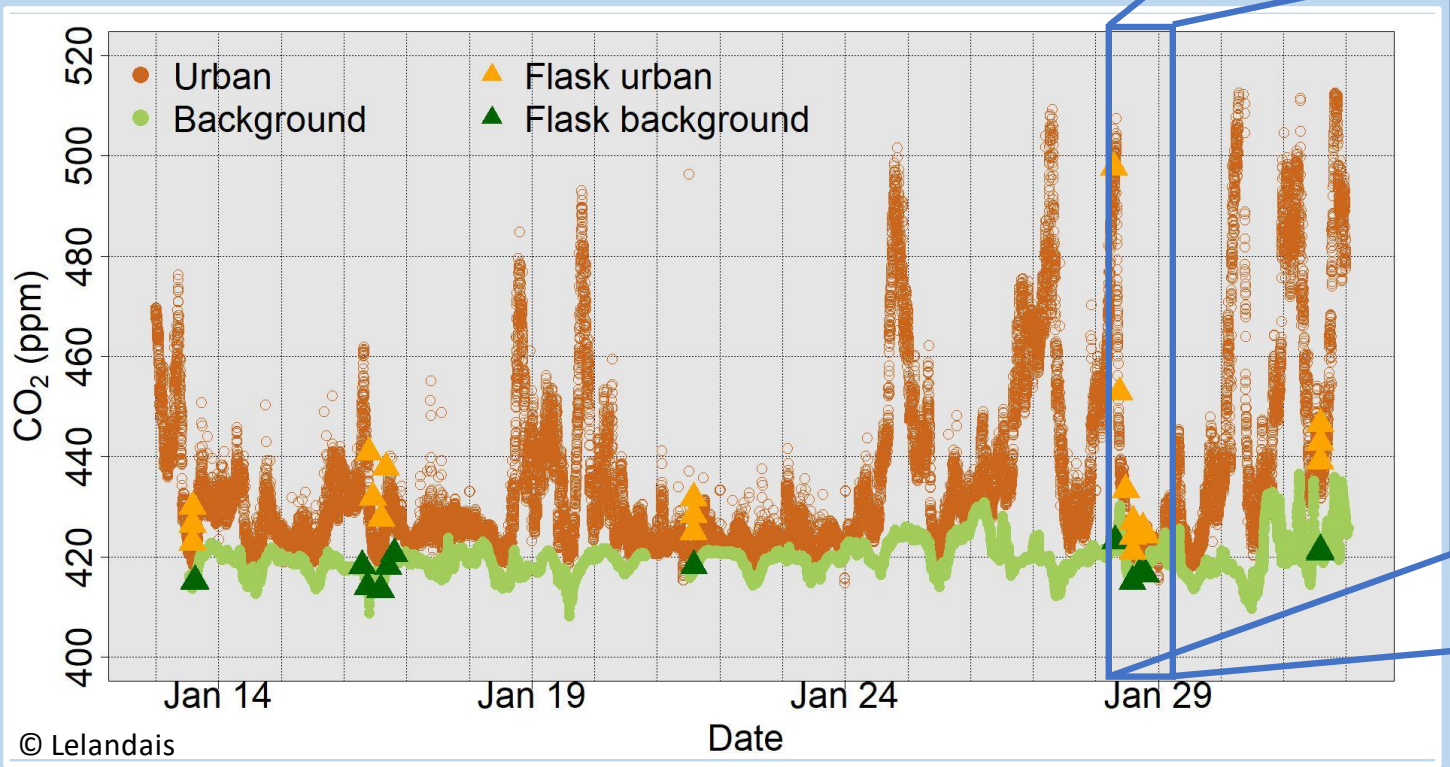
$CO_{2meas} = CO_{2back} + CO_{2ff} + CO_{2bio}$

$$CO_2ff = CO_2meas \times \frac{\Delta^{14}Cbg - \Delta^{14}Cmeas}{\Delta^{14}Cbg + 1000}.$$

(M.Lopez et al 2013)



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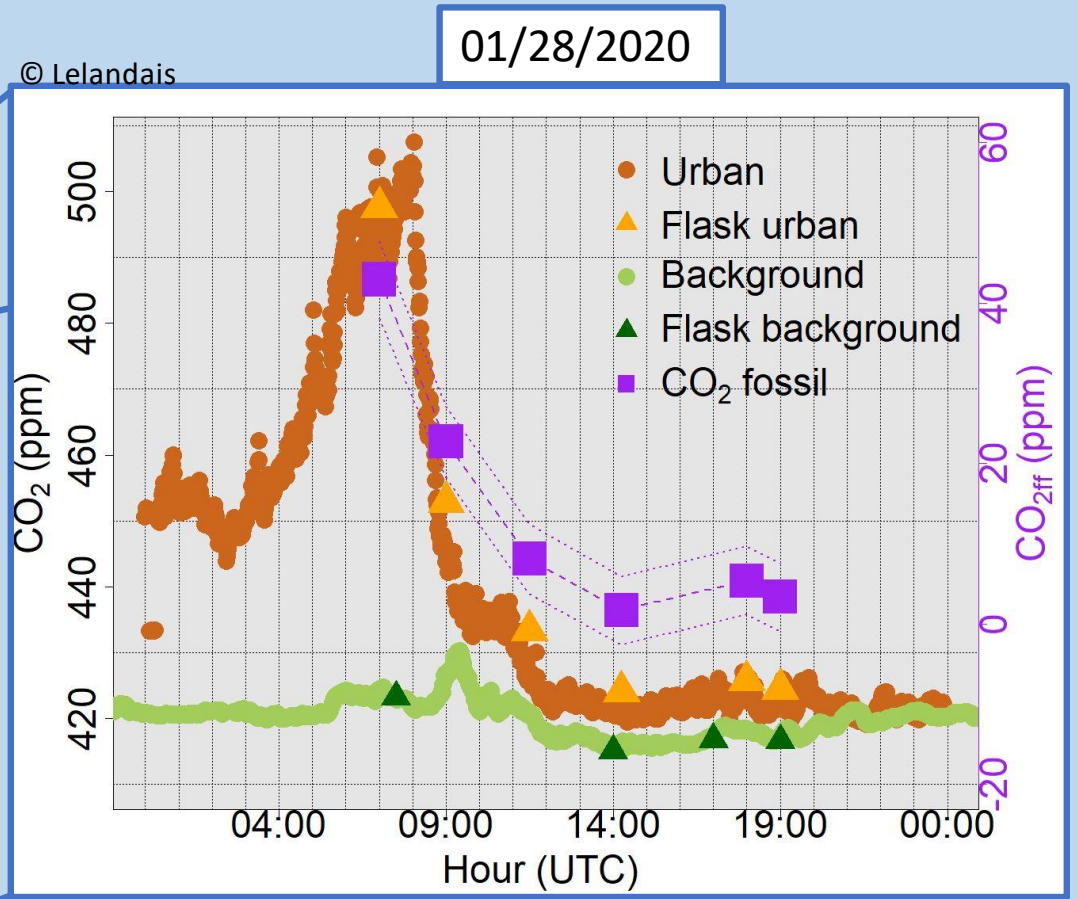

CO_2 variation recorded at Marseille the 01/28/2020 and fossil fuel contribution based on radiocarbon content (purple) (L. Lelandais et al in prep)

Take home messages

- Mean background signal : 420 ppm
- Urban signal amplitude : from 20 to 80 ppm
- Fossil contribution : from 20% to 90%
- $\delta^{13}C$ signature : from -29,13 to -38,94 ‰ ± 1,4 (not shown)

Perspectives

- Compare to others tracers NOx, CO, PM, BC, VOCs
- Extrapolate fossil fuel contribution over the month

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