



7th International Symposium on Ultrafine Particles

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Monitoring of ultrafine particles in French regional air quality network

Shouwen ZHANG
(Atmo Hauts-de-France)

T. Aleixo, F. Chevrier, A. Thomasson, P. Y. Guernion, F. Pin, B. Mesbah, F. Roze, V. Pouchain, M. Dalle and O. Le Bihan



Summary

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**French
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Instrumentation

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**Inter-
comparisons
UFP-3031**

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**Urban and
traffic stations**

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**Source
identification**

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**Conclusion and
perspectives**

19 French regional air quality networks : monitor and study atmospheric pollution

- There is **one** network per French administrative region

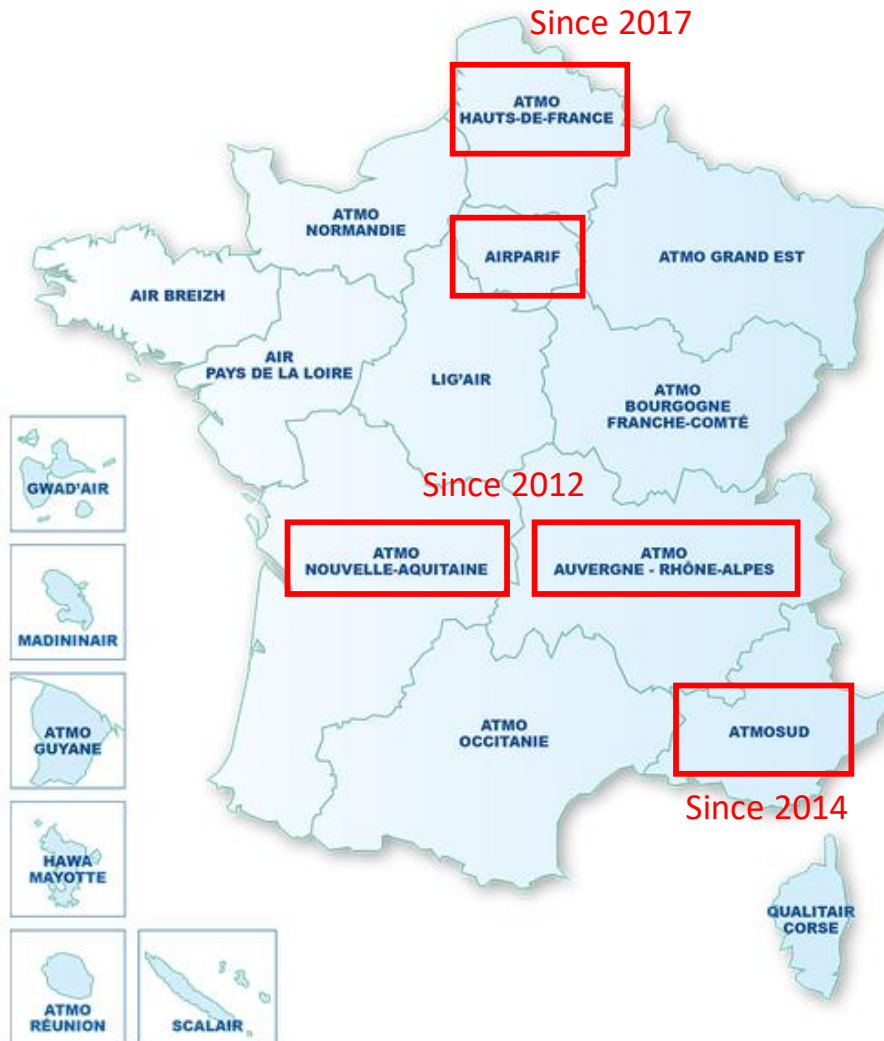
- **5 regions measure ultrafine particles currently (+ new potential networks)**

- ~10 UFP 3031 (TSI) : core instrumentation
- ~3 CPC : emerging instrumentation
- 1 SMPS

- **Site environment**

- Urban background
- Traffic
- Industrial
- Rural

...





Instrumentation

- UFP-3031 (TSI/TOPAS)
 - Size range: 20 to 800 nm (with six size channels)
 - No working fluids; no radioactive source

- CPC (ENVI-CPC PALAS)
 - Size range : 7 nm to 5 μ m
 - Working fluid : butanol
 - Normalization : CEN-TC264 WG 32

Type of monitoring station

Fixed station



Temporary station



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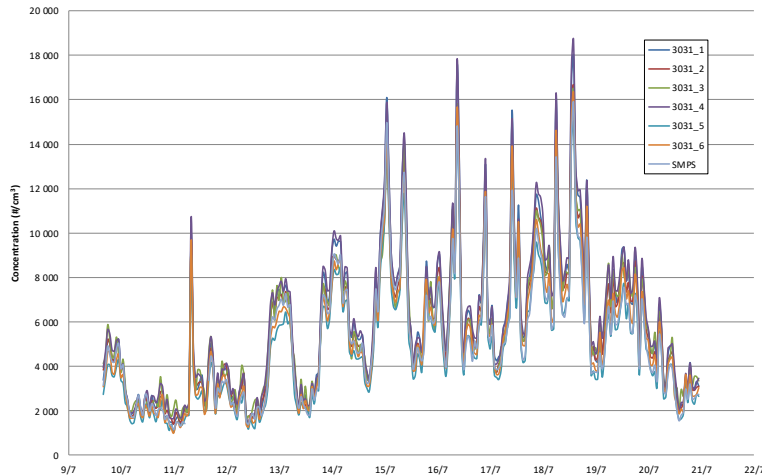
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Intercomparisons of UFP-3031

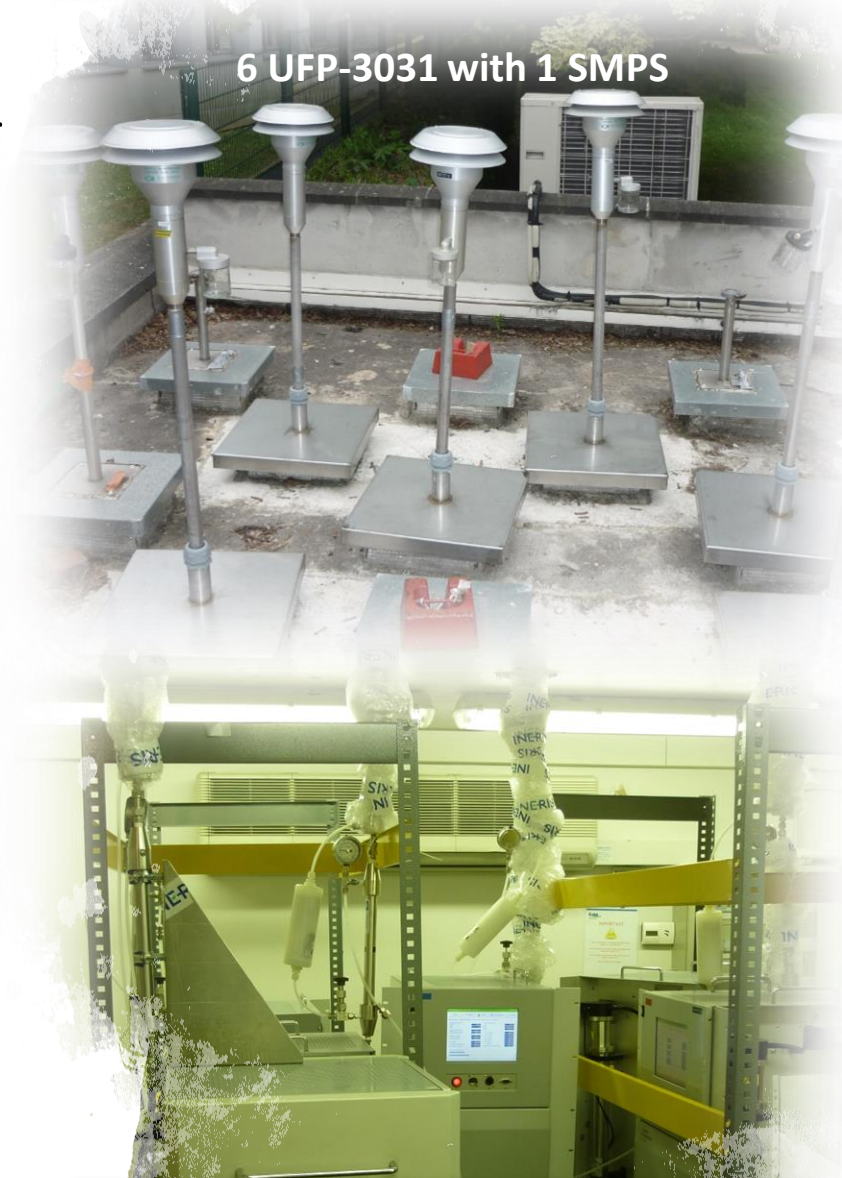
- Total number concentration



- Relative uncertainty (%) calculated

channel		%		Trend (*)
		2014	2015	
1	20 - 30 nm	19	23	21%
2	30 - 50 nm	22	25	14%
3	50 - 70 nm	23	17	-26%
4	70 - 100 nm	15	13	-13%
5	100 - 200 nm	33	23	-30%
6	200 - 800 nm	150	90	-40%
Total	Total	20	24	20%

Quality code: $\leq 25\%$: **green**]25%-50 %] : **orange** $>50\%$: **red**
 (*) relative change in 2015 compared to 2014



6 UFP-3031 with 1 SMPS

- ☐ Satisfaction for each of the 5 channels of the 20 - 200 nm range
- ☐ 200-800 nm channel should be considered only as indicative

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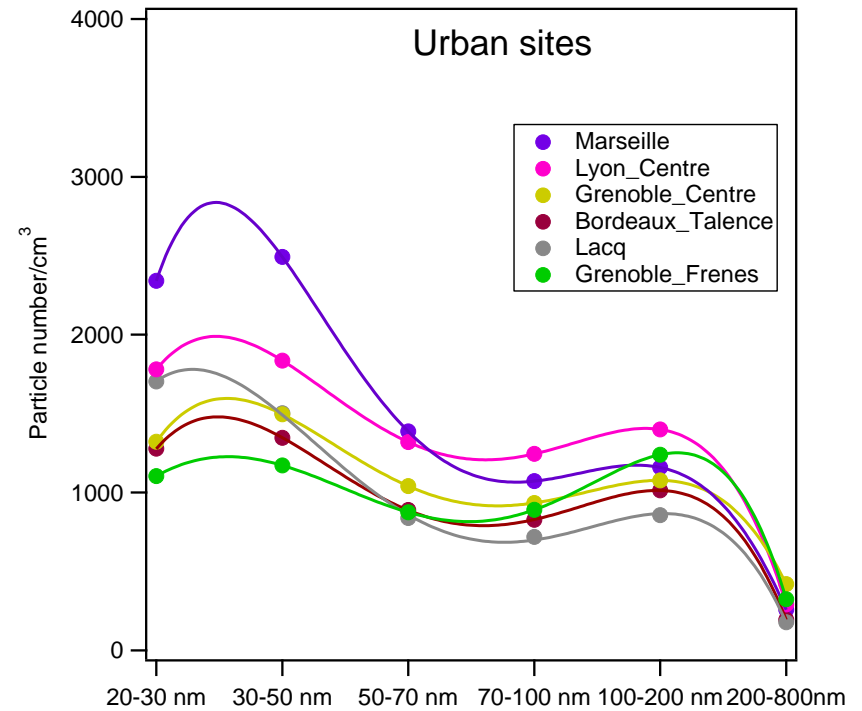
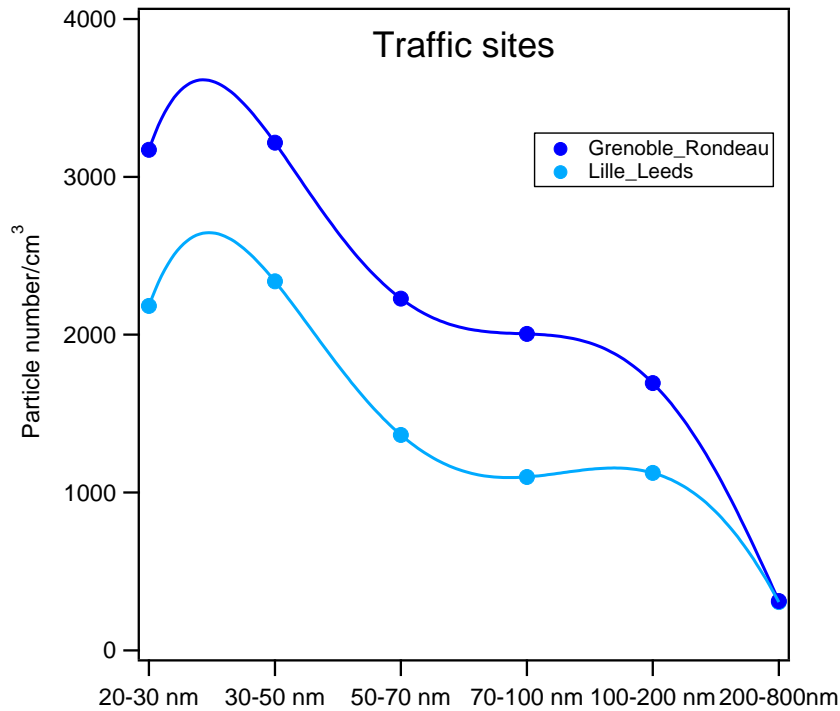
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Urban and traffic sites

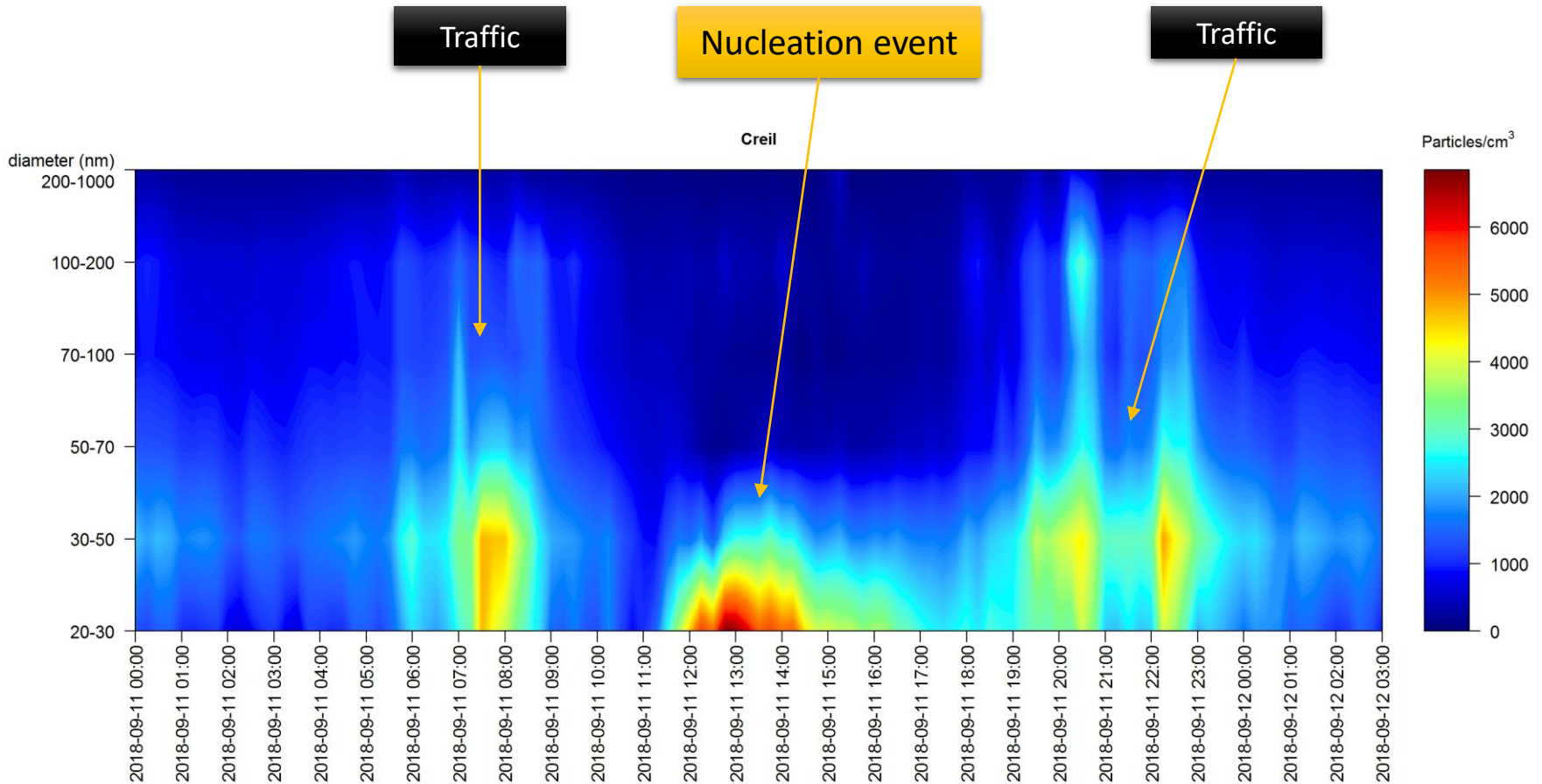


Traffic sites : higher number concentration at 20-50 nm

Urban sites : double peaks

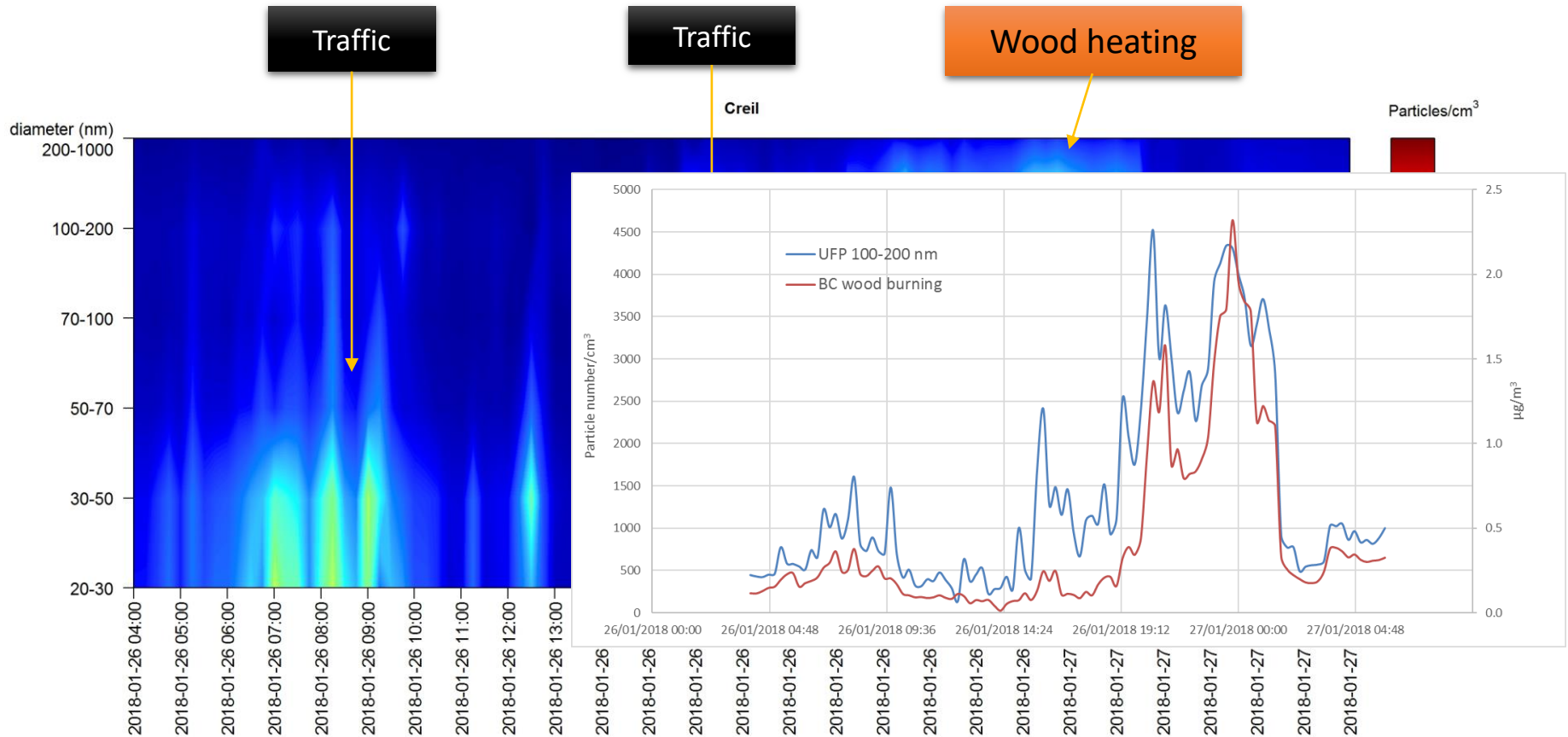
- 20-50 nm : traffic influence (fossil fuel) + new particle formation
- 100-200 nm : wood heating

UFP at an urban site (Creil)



Traffic : 20-50 nm, morning and evening
New particle formation : 20-30 nm, beginning of afternoon

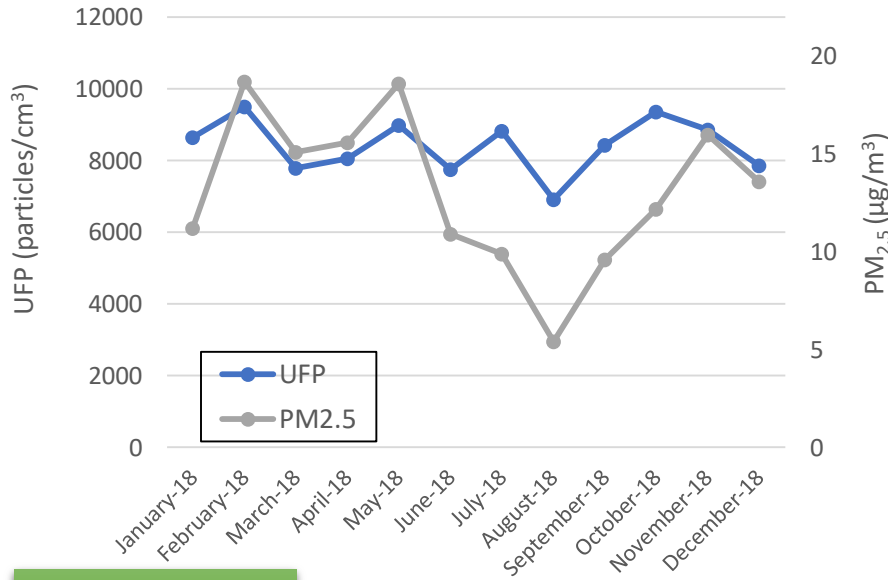
UFP at an urban site (Creil)



Traffic : 20-50 nm, morning and evening
Wood heating : 100-200 nm, night ; correlation with BC wood burning

Monthly average UFP and others measurements

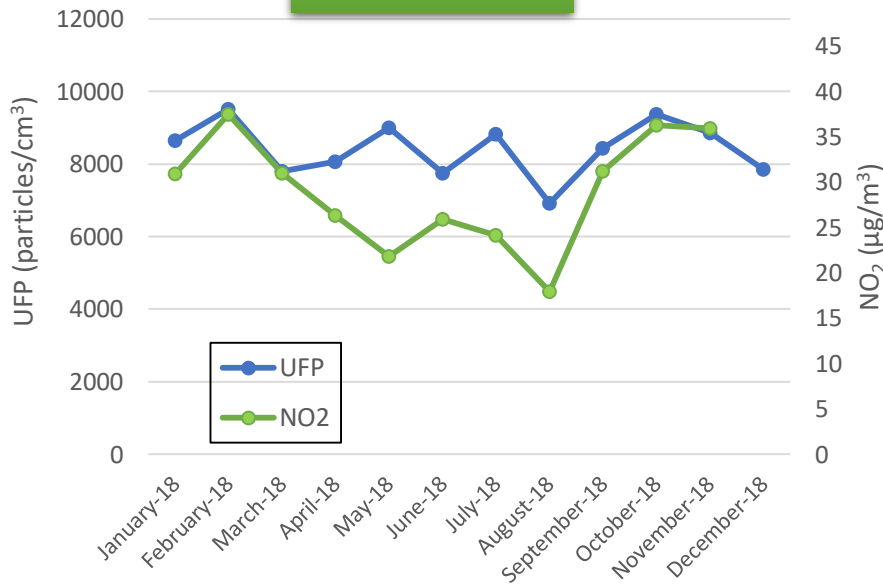
UFP & PM_{2.5}



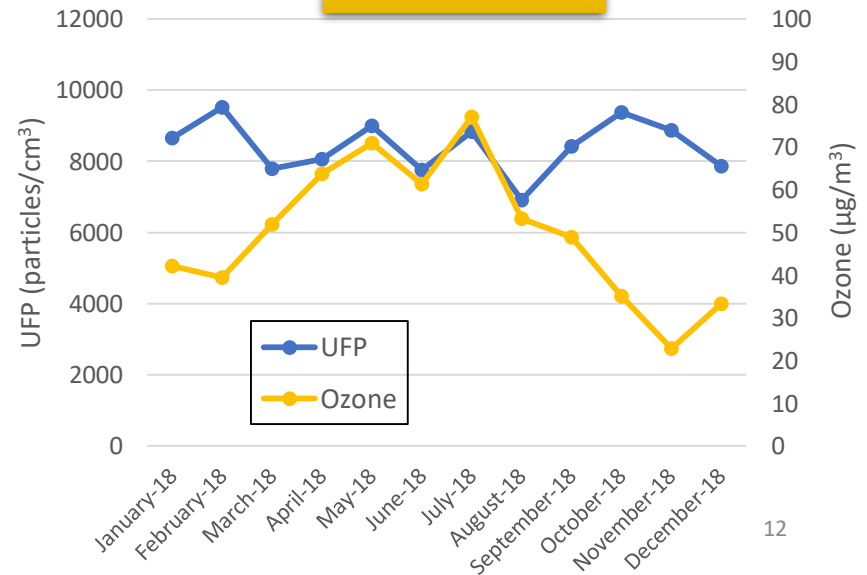
Main UFP sources at a urban/traffic site (Lille)

Cold period : road traffic
Warm period : photochemical reactions

UFP & NO₂



UFP & O₃



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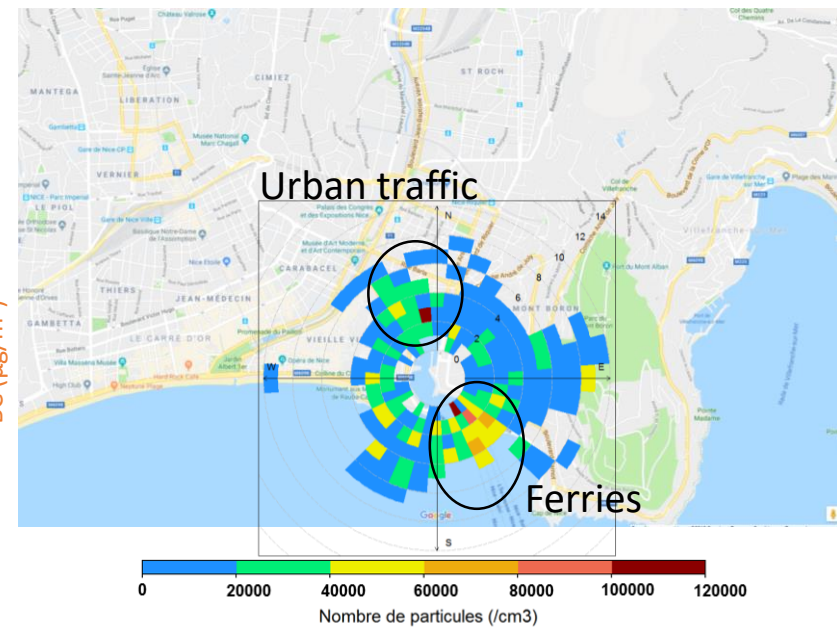
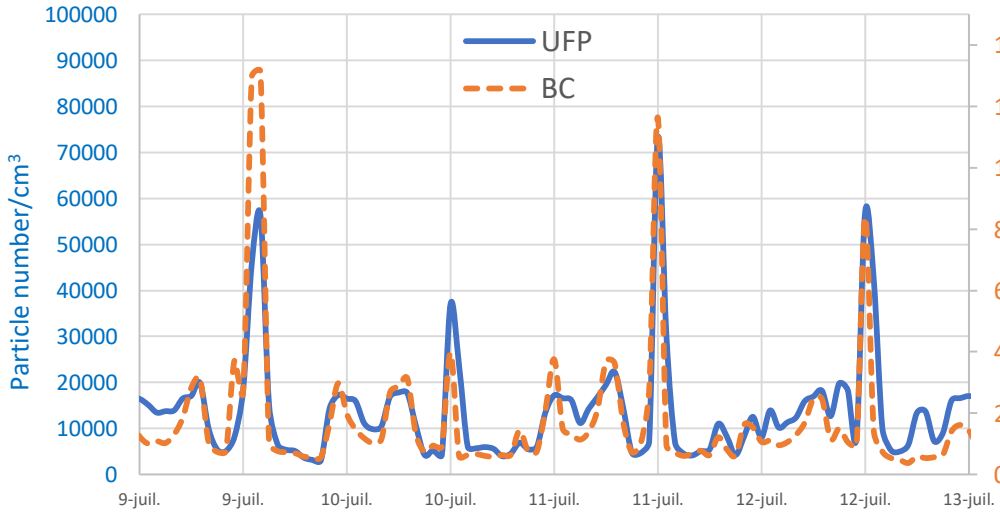
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Harbor area (Nice)

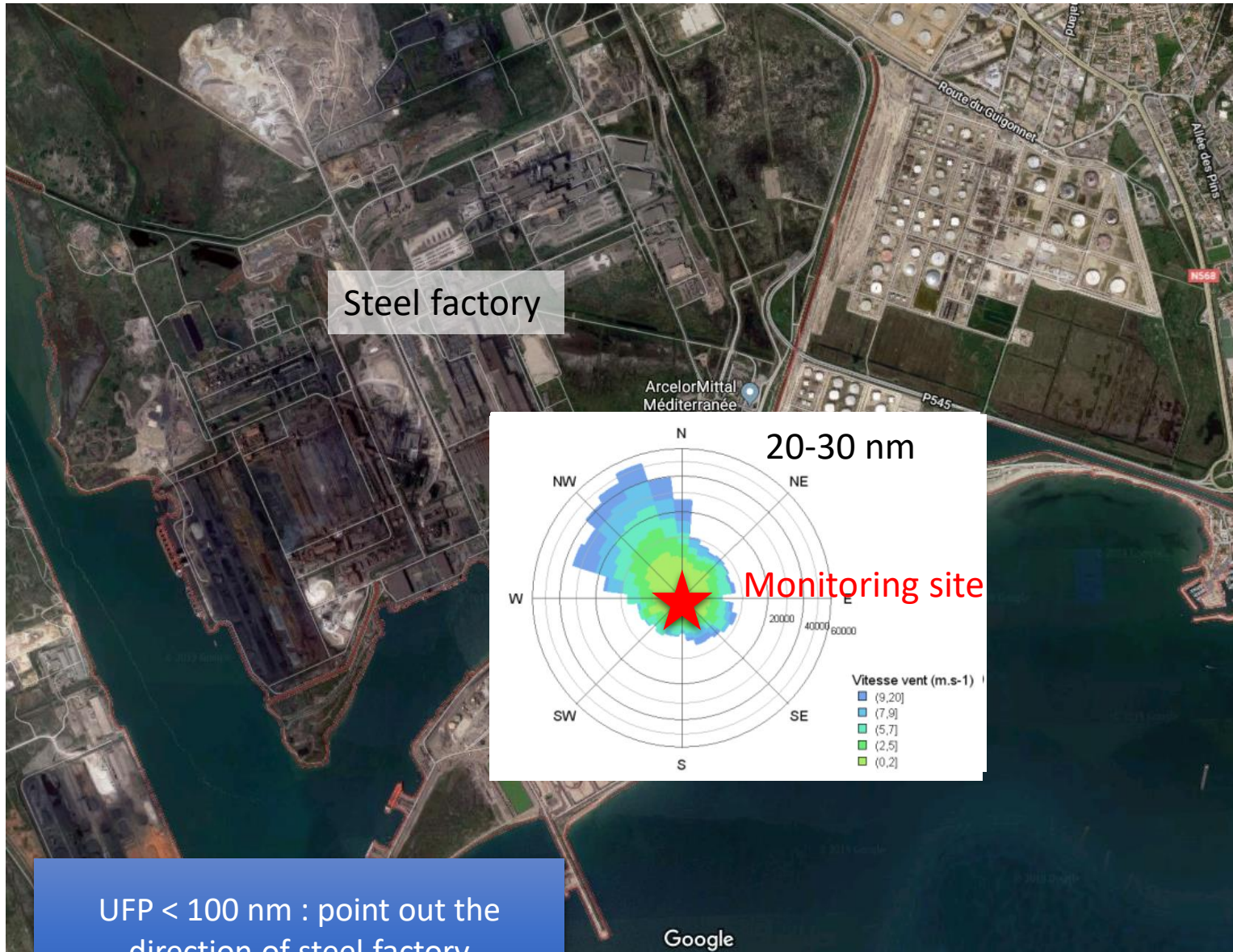


Summer 2018
 UFP : total number concentration (7 nm - 5 μm)
 BC : Black Carbon (AE33)



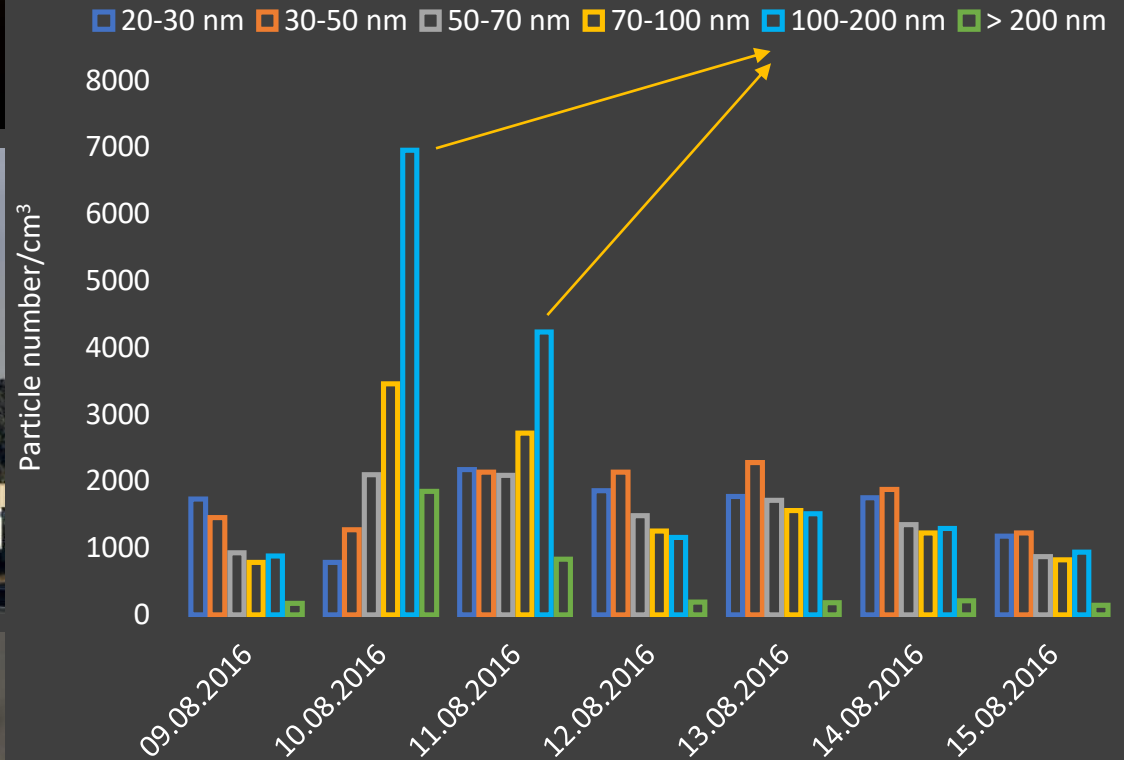
Industrial original UFP

(Fos-sur-Mer, southern France)



Forest fires

- 10-11 August 2016 near Marseille



Particle size 100-200 nm : good Indicator for biomass burning

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Conclusion and perspectives

- Ultrafine particle monitoring is being developed in French air quality monitoring networks
 - Identification of main UFP sources in an urban environment (traffic, house heating, new particle formation...)
 - Relationship source & size distribution
 - Other source identification (industry, harbor zone and forest fires)
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- Intercomparison of instruments: UFP 3031, CPC and SMPS this summer
 - The French national strategy will focus on the impact of UFP on human health.

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Thank you for your attention!

