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ACTRIS NOx workshop  
April, 19, 2023

# SIRTA station: Analysis of the 2022 Year

Nicolas Bonnaire, Lorna Foliot and Valérie Gros (LSCE)  
Marc-Antoine Drouin & Christophe Boitel (LMD)  
and Nicolas Pascal (HYGEOS ICARE)



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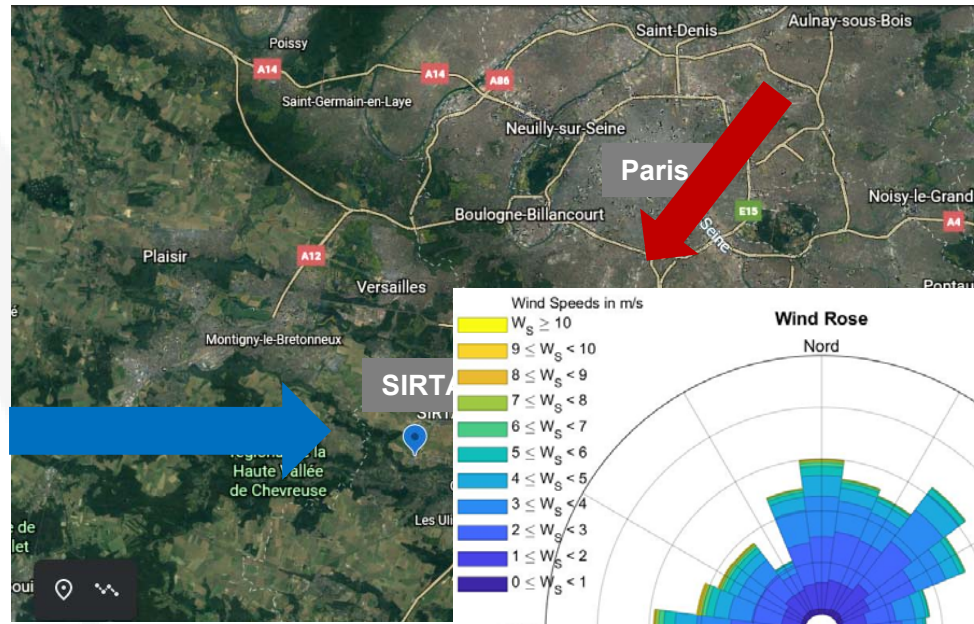
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ACTRIS NOx QA workshop 2023



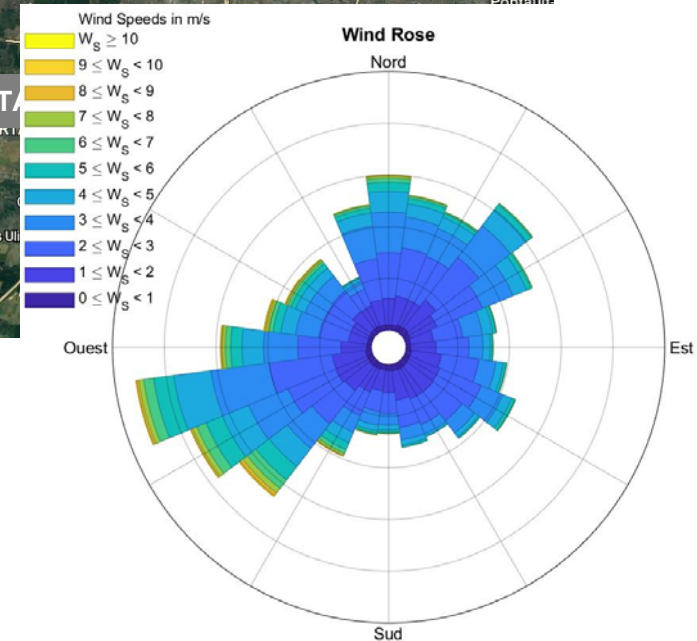
# SIRTA station: peri-urban station in Paris area



Regional background

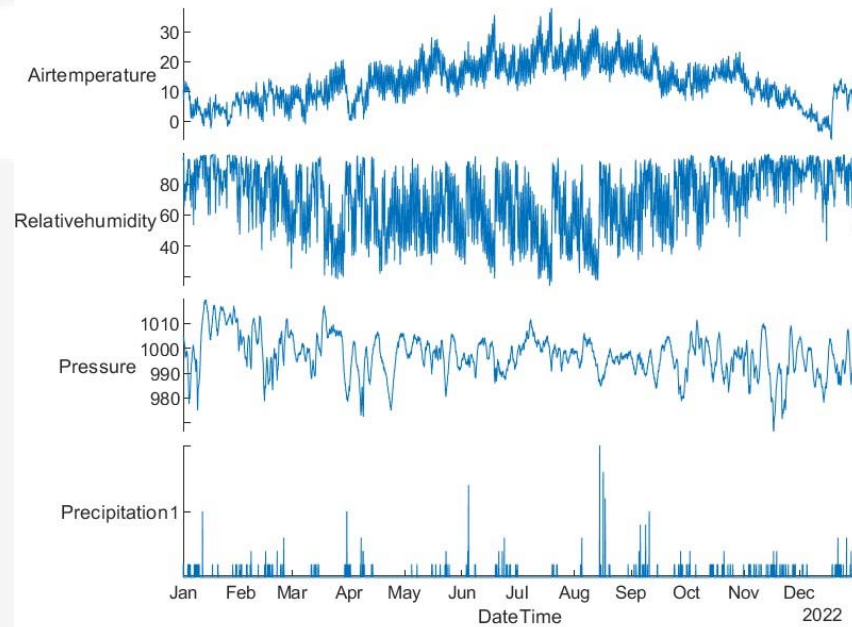


European and Paris plume

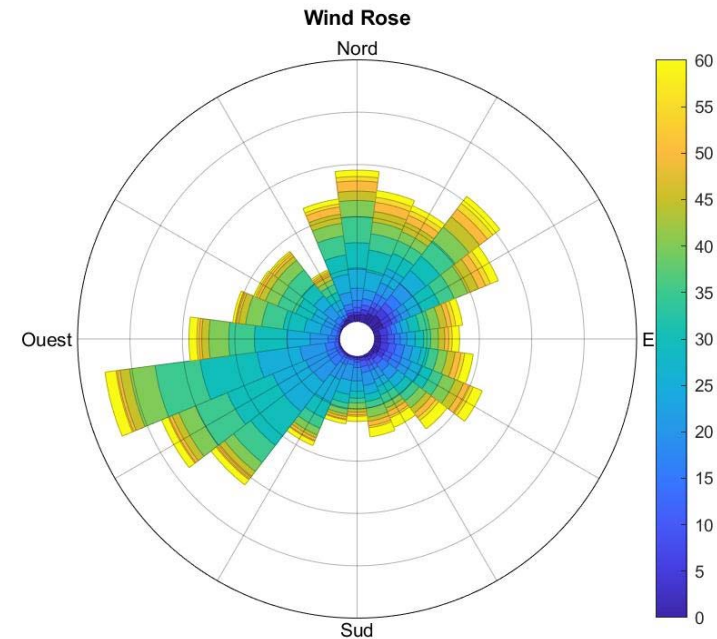


# Meteo & O3

## Meteo

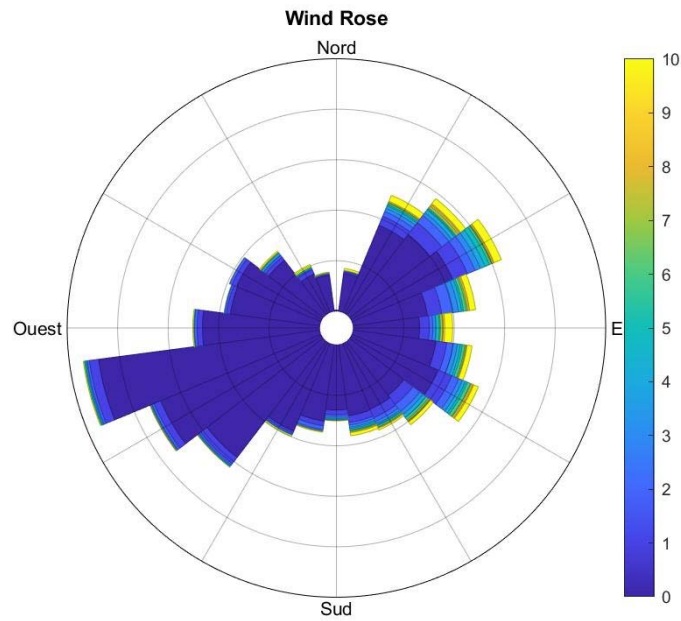


## O3

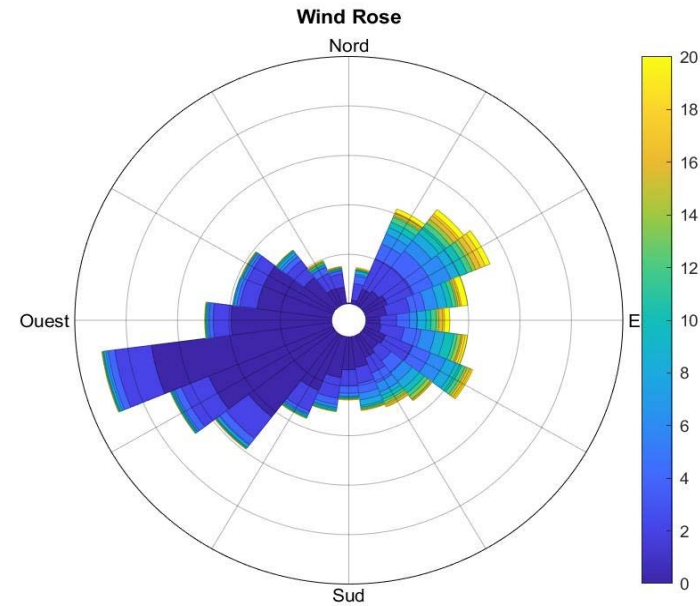


# Meteo : Wind

NO



NO2



- Higher mixing ratio : North/East wind
- Most frequently wind : Sud/west



# Instrumentation

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## Instrumentation :

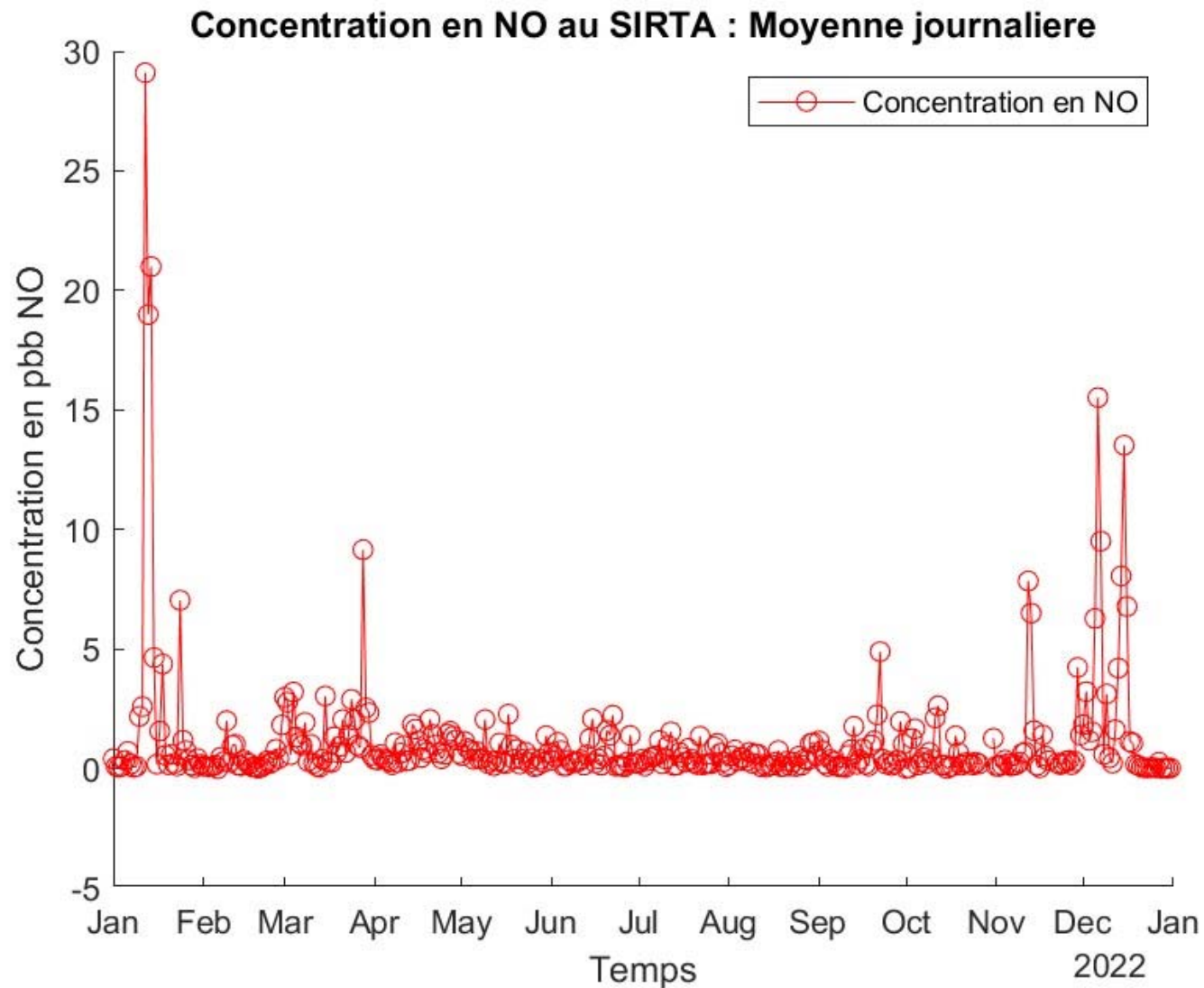
NO & NO<sub>2</sub> : API TELEDYNE T200UP, NO by ozone induced chemiluminescence detection (O<sub>3</sub>-CLD) and measurement of NO<sub>2</sub> by photolytic conversion of NO<sub>2</sub> to NO followed by chemiluminescence detection (BLC-O<sub>3</sub>-CLD)

## maintenance / QA during measurement :

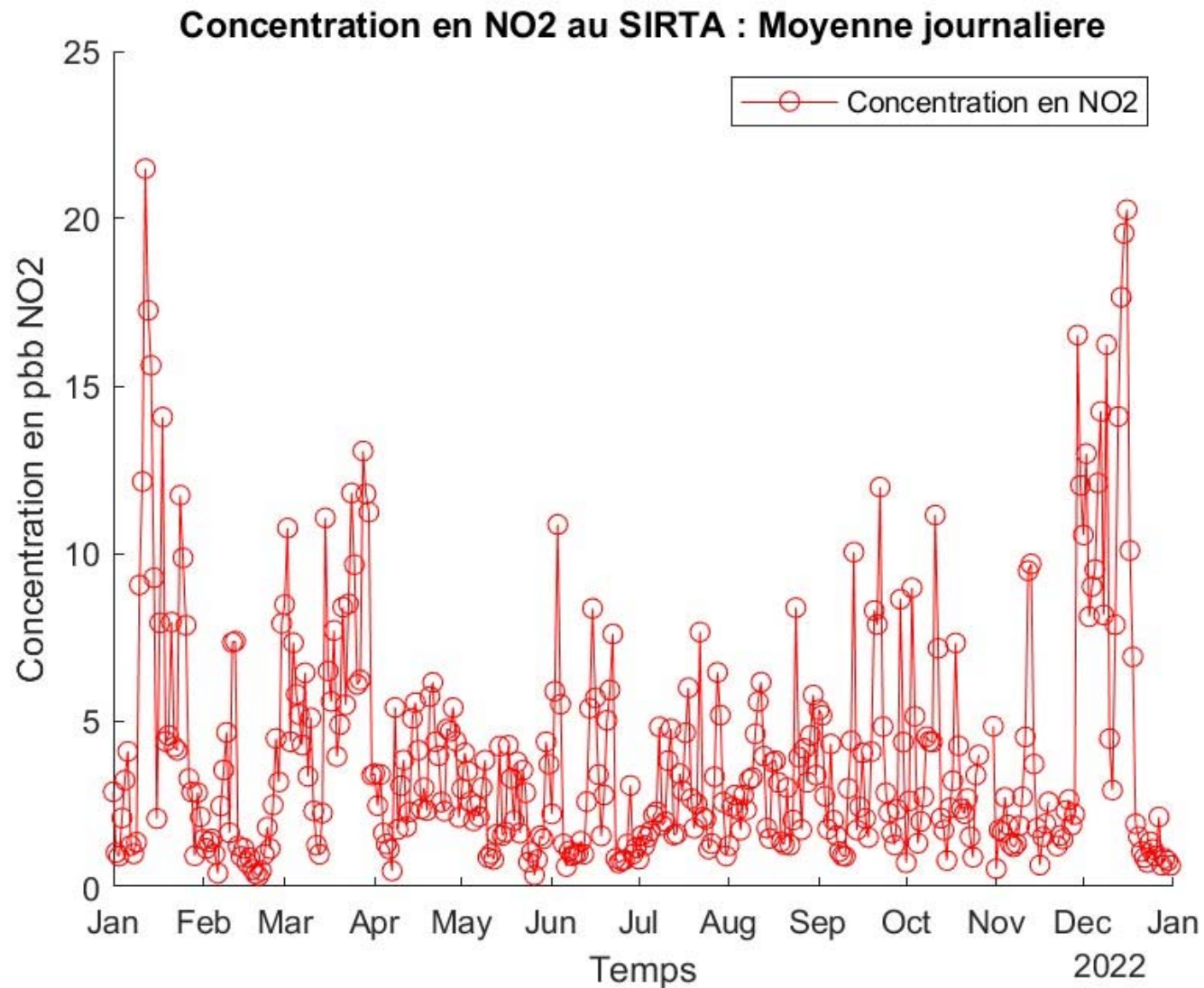
1. 1/month : calibration with 30 ppb NO (dynamic dilution & GPT)
2. 2/year : converter efficiency, near of 40 %
3. 1/year linearity of analyzer
4. Scale : NPL # 1635, NO = 10,00 ± 0,06 ppm in N<sub>2</sub> (Since April 2014)
5. Every two week : filter change
6. Automatic download each day of parameters for Offline checks (chamber temp, pressure, flow, O<sub>2</sub>-supply)
7. laboratory journal



# Quality-Plots : NO, 2022 (daily mean)

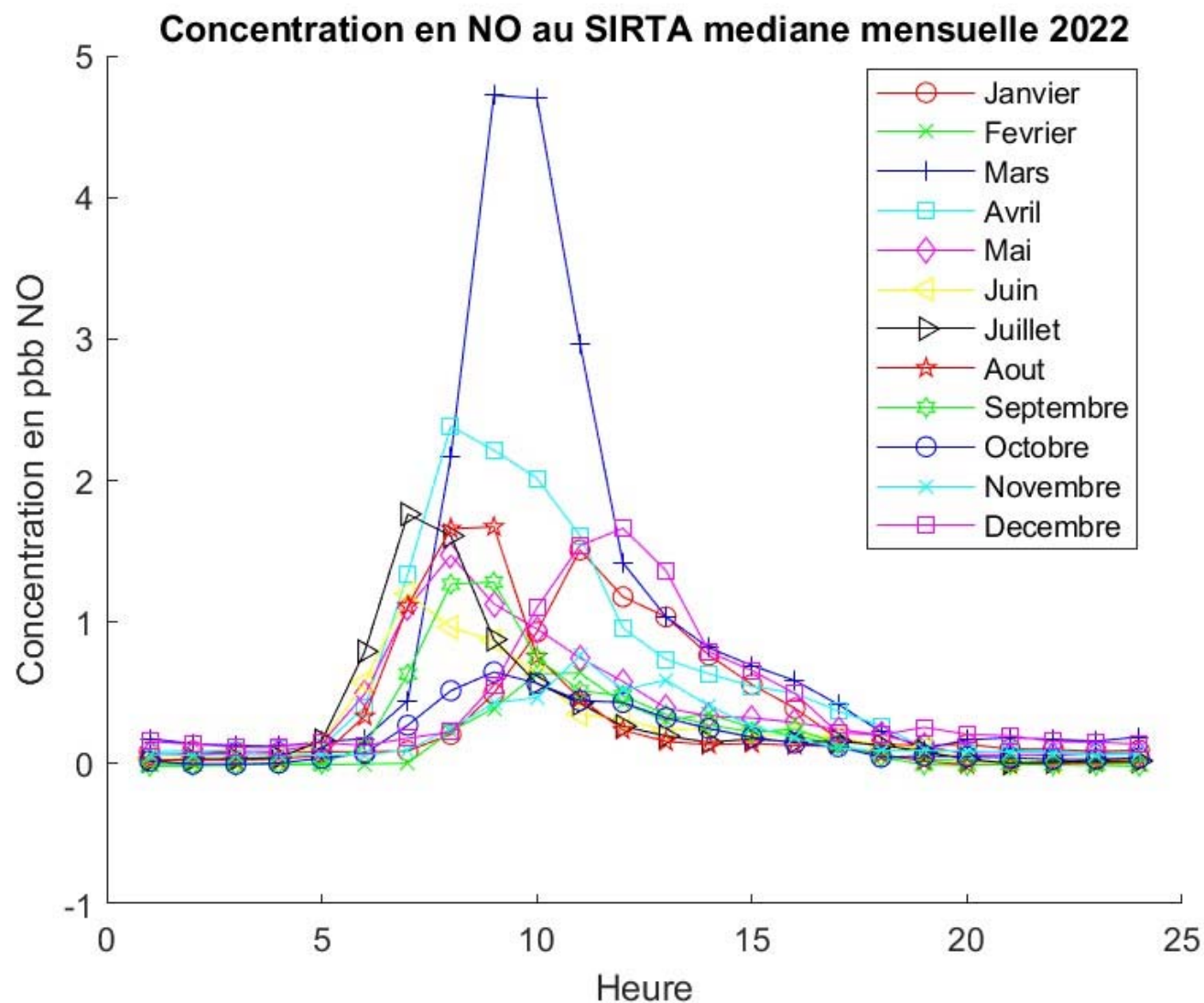


# Quality-Plots : NO<sub>2</sub> , 2022 (daily mean)



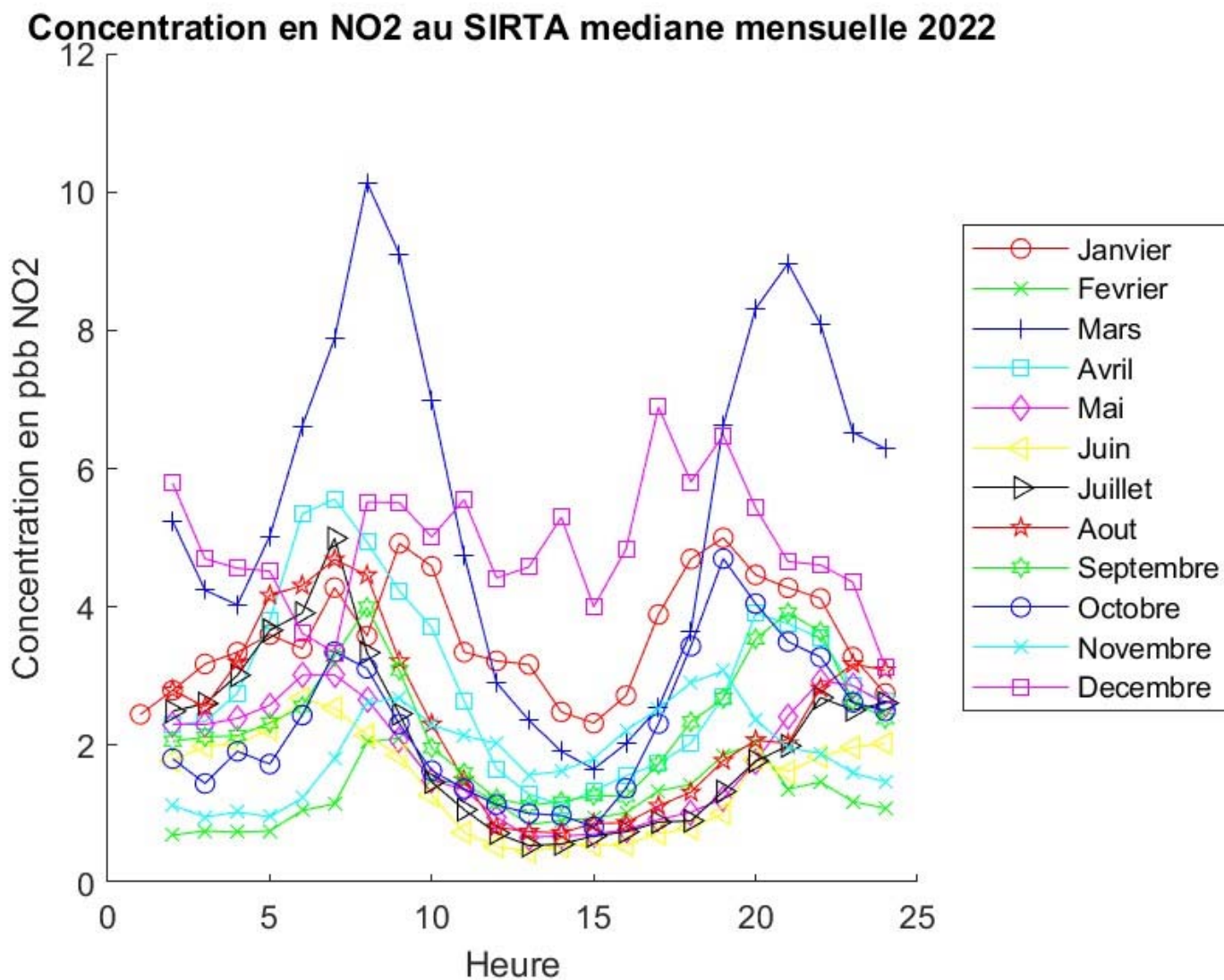
# Quality-Plots : NO , 2022 (hourly medians)

- Atypical month : February and Mars
- February is low
- Mars is high





# Quality-Plots : NO<sub>2</sub> , 2022 (hourly medians)



# Informations

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- Level 0 submitted to E-bas
- Level 2 : TC
- New permanent technician at the station : Lorna Foliot



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Mai, 05, 2022

# SIRTA station: Quick Evaluation of MIRO (NO<sub>x</sub> & O<sub>3</sub>)

Olivier Laurent, Luc Lienhardt, Nicolas Bonnaire and Valérie Gros  
(LSCE)

Maria Timofeeva & Morten Hundt (MIRO analytical)



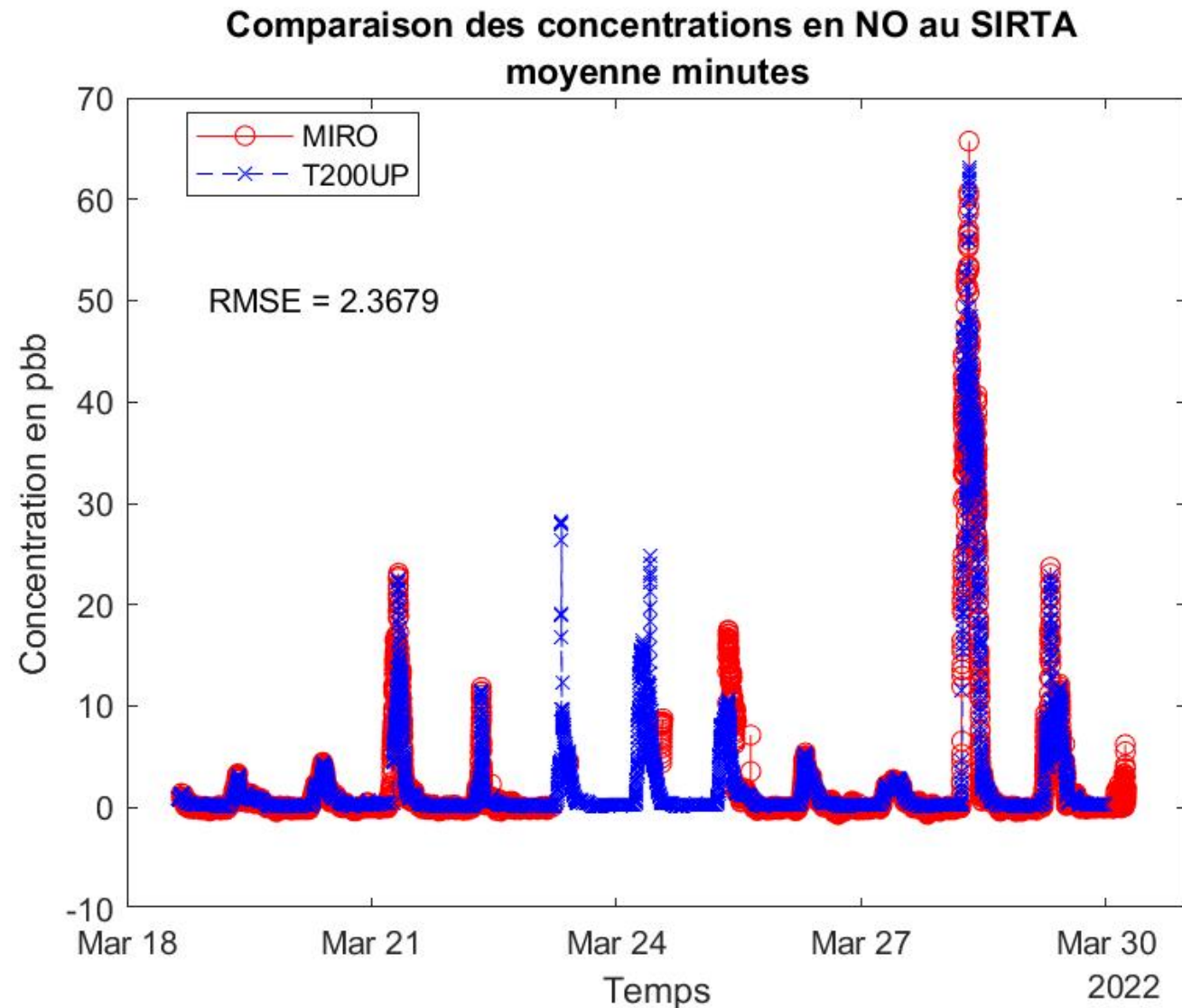
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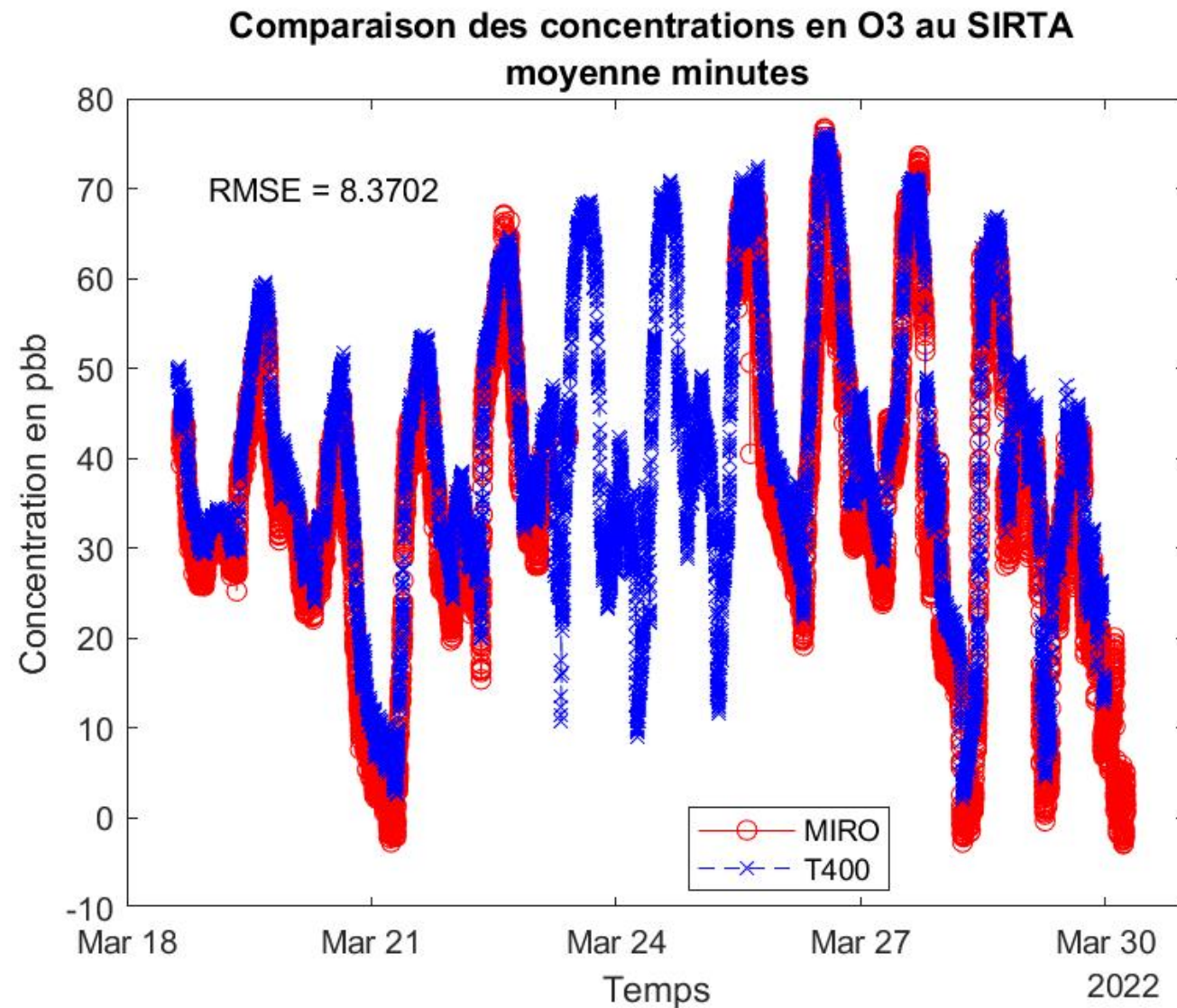
# Quality-Plots : NO, minutes

- Same variability between both device
- Good accuracy for MIRO device
- Seconde data of MIRO are more noisy with a lot negative values



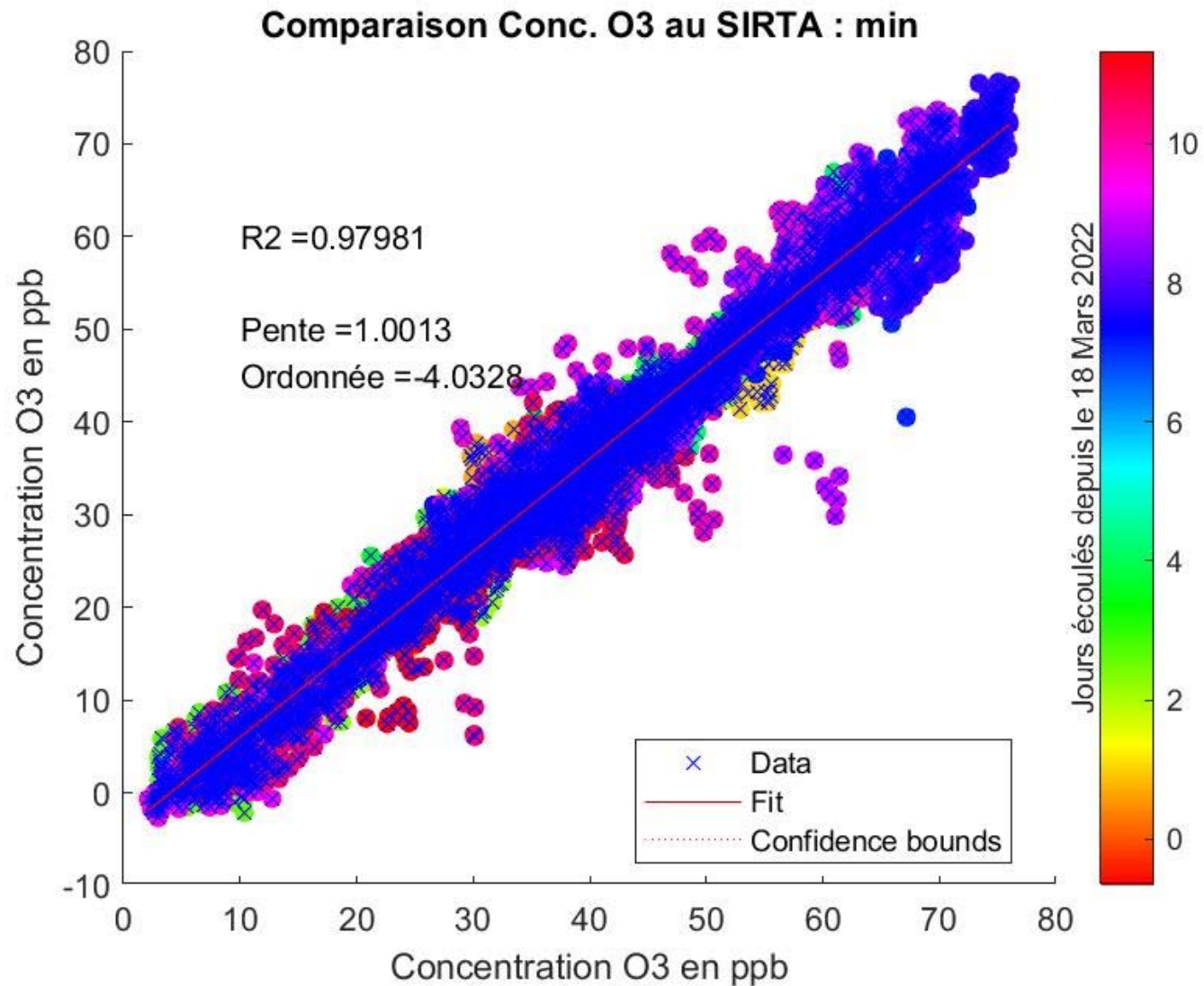
# Quality-Plots : O<sub>3</sub>, minutes

➤ Look like similar



# Quality-Plots : O<sub>3</sub>, minutes

- Good correlation
- Slope of 1 but offset of - 4 ppb



# Conclusion

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- Frequent zero is needed
- Good correlation for NO<sub>x</sub> & O<sub>3</sub>, better results with minute average



# PAUL project: Quick Evaluation of Model N500 CAPS True NO<sub>2</sub>-NO<sub>x</sub>-NO (Teledyne API)

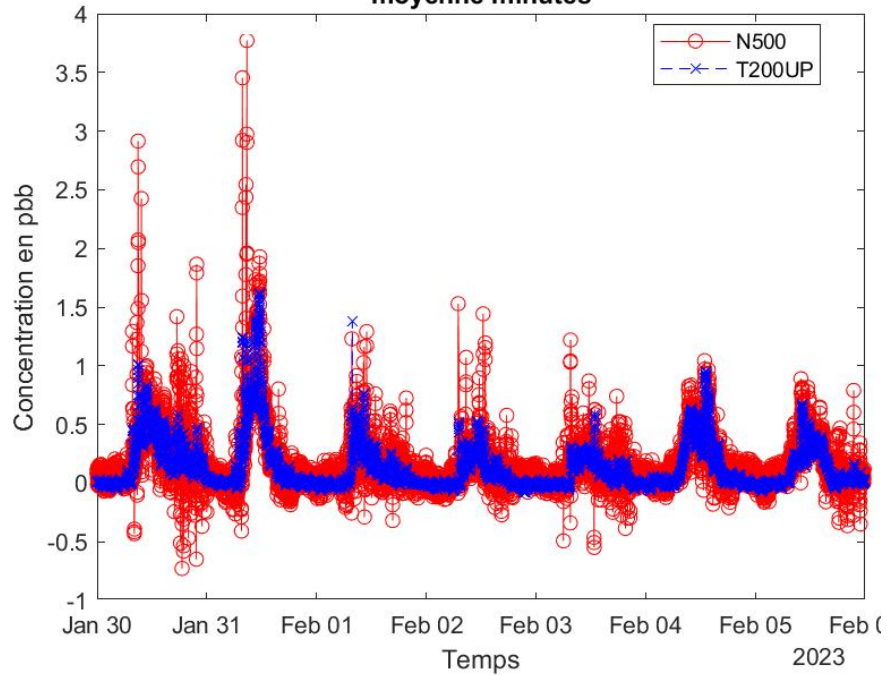
Michel Ramonet, Laura Bouillon, Guillaume Nief, Lorna Foliot,  
Olivier Laurent, Nicolas Bonnaire and Valérie Gros (LSCE)





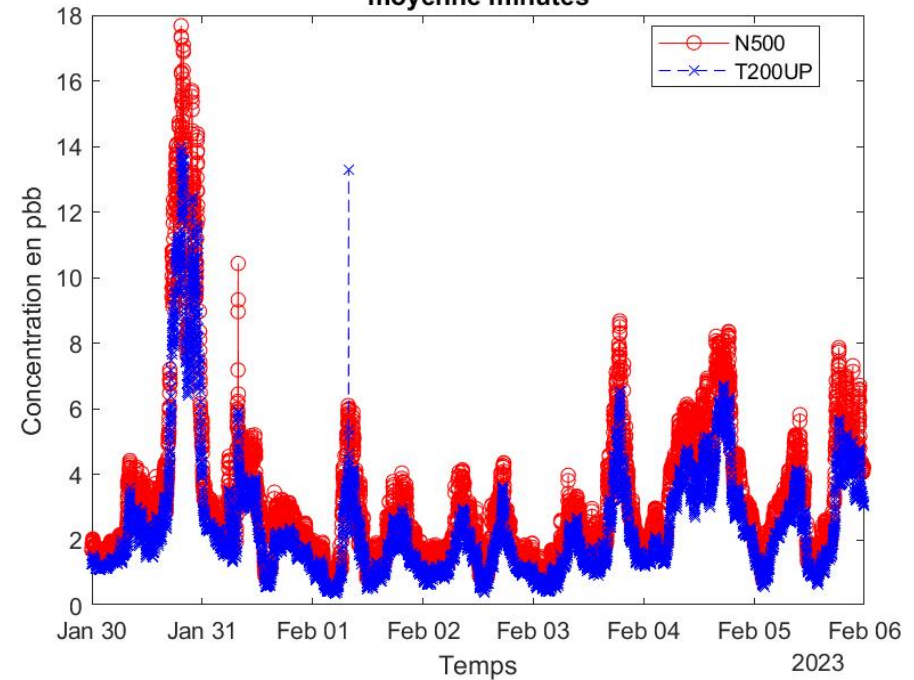
# N500 versus T200UP(Ref Instrument)

Comparaison des concentrations en NO au SIRTA  
moyenne minutes



- N500 more noisy for NO (indirect measurement)
- N500 is not for background site

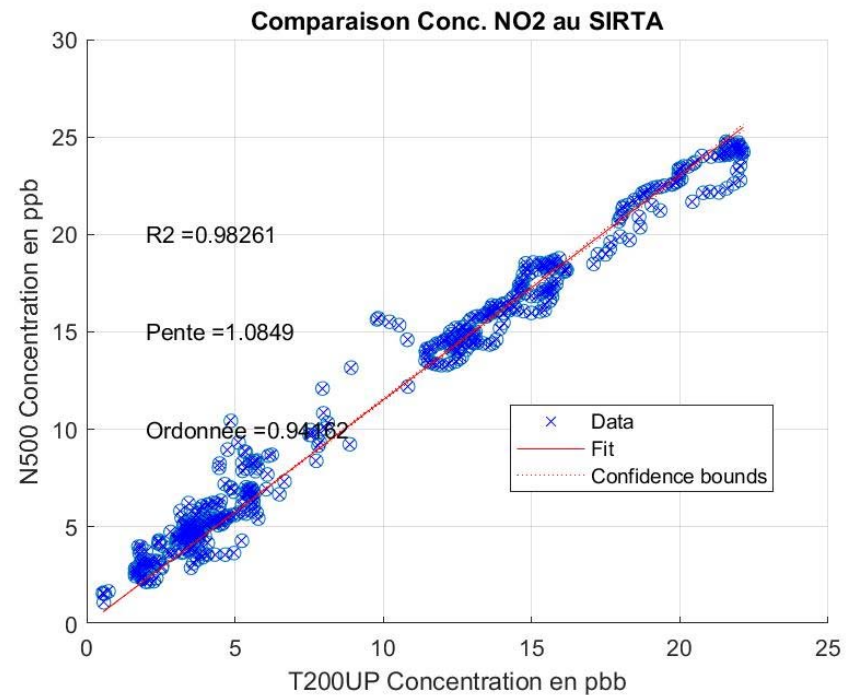
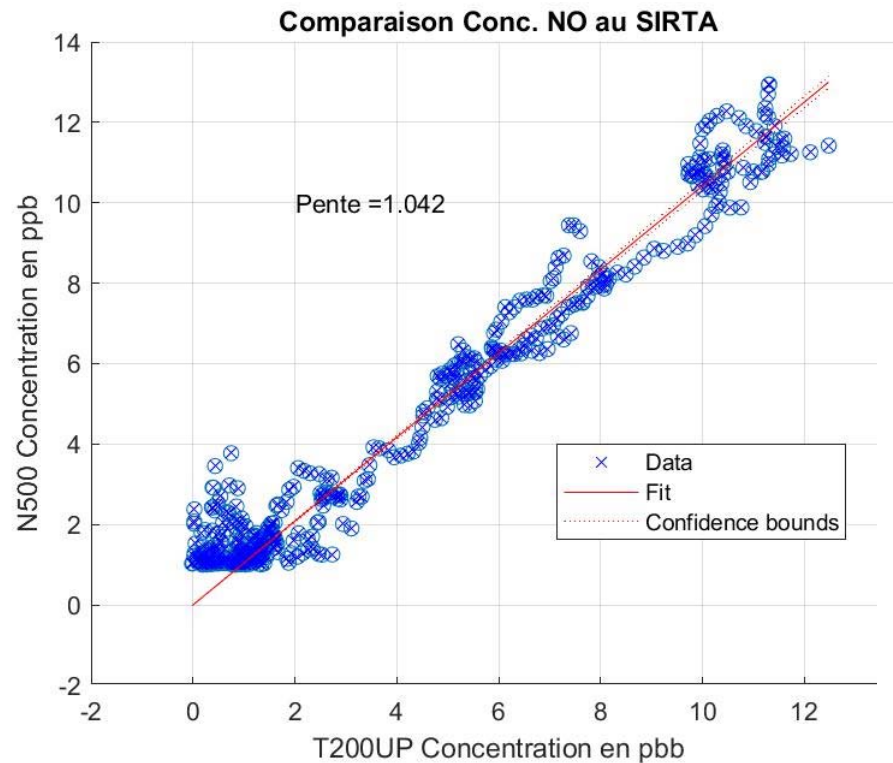
Comparaison des concentrations en NO2 au SIRTA  
moyenne minutes



2 N500 devices will be set up in Paris at the top of tower (Urban site)



# N500 versus T200UP(Ref Instrument)



# N500 : Issues and avantages

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- NO standard should be in matrix air
- Calibration of OFFSET every 2 hours, to decrease drift
- NO<sub>2</sub> standard stability : 120 ppb in nitrogen
  
- Low maintenance
- Easy to use
- Direct measurement of NO<sub>2</sub>

