

Presence of siloxanes in the ambient air of urban Paris during the ACROSS field campaign

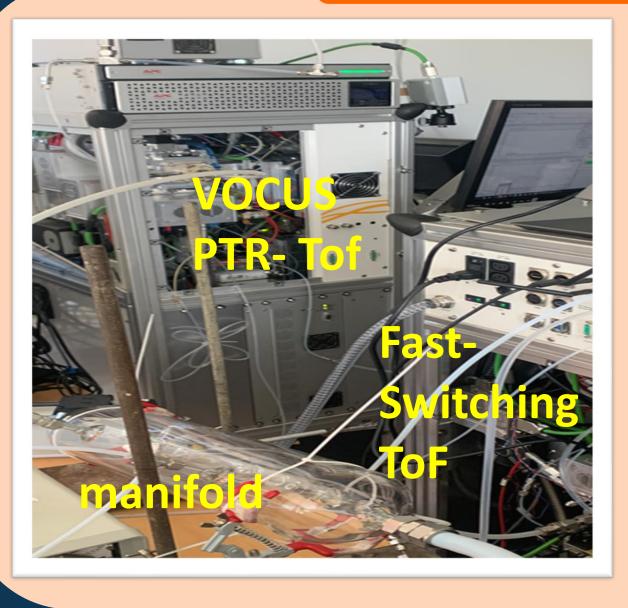
Sampling Location



Ambient air measurements performed at Université Paris Cité 2.38°E) 48.83°N, about sampling at 25m above ground summer level in season from 13-06-2022 to 12-07-2022.

What are siloxanes and their environmental implications?

- Cyclic volatile methyl Siloxanes (cVMS) are siliconbased organic compounds of anthropogenic origin.
- Annual global output: 45-227*10⁴ tons
- extensively in **industrial**, automotive, Utilized consumer, and personal care products.⁽¹⁾
- 90% of the environmentally released cVMS diffuse directly into the atmosphere.⁽²⁾
- **Persistent** and **bioaccumulative** in the environment.
- EU restricted use of cVMS in certain cosmetic and personal care products, with recommendations in 2021 to restrict use in certain industrial processes.⁽³⁾



Instruments Used

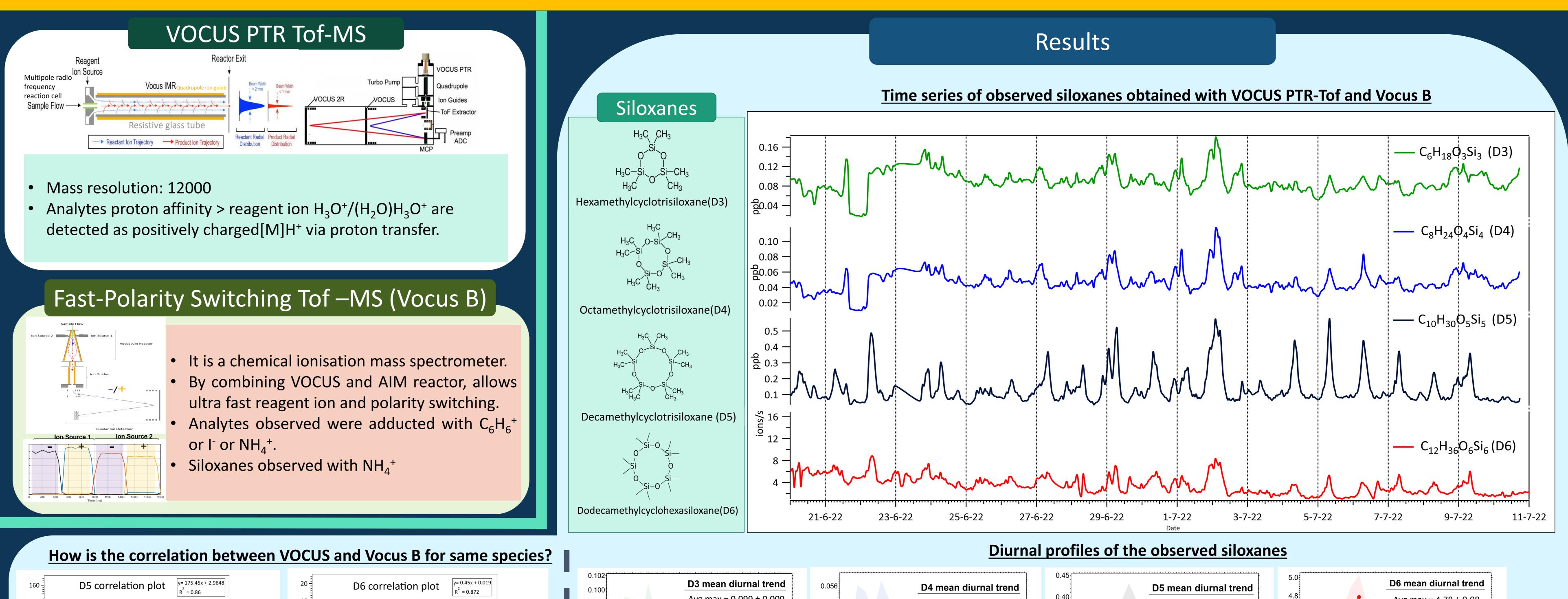
- Two time of flight mass spectrometers deployed:
 - 1. VOCUS PTR-Tof 2. Fast-polarity Switching Tof
- Ambient air sampled via a Teflon tube, connected to manifold.

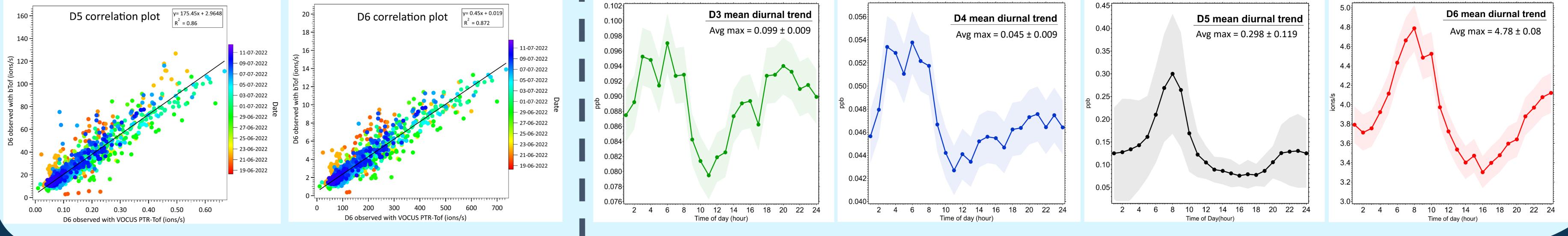
References

Allen, R. B.; Kochs, P.; Chandra, G. Industrial Organosilicon Materials, Their Environmental Entry and Predicted Fate; Springer-Verlag: Berlin, 1997 Vol. 3. Balducci, C., Perilli, M., Romagnoli, P., & Cecinato, A. (2012). New developments on emerging organic pollutants in the atmosphere. Environmen

Science and Pollution Research, 19(6), 1875–1884. https://doi.org/10.1007/s11356-012-0815-2 REACH regulation , European Chemical Agency (ECHA), 2020

Rulan Verma^a, Sébastien Perrier^a, Felipe Lopez-Hilfiker^b, Urs Rohner^b, Vincent Michoud^c, Claudia Di Biagio^c, Aline Gratien^c, Lelia Hawkins^d, Barbara D'Anna^e, Julien Kammer^e Anne Monod^e, Christopher Cantrell^f, Christian George^a, Matthieu Riva^{a,b}





- HR-peak fitting for the mass spectrum observed with both instruments was performed with Tofware (v 3.3.0), run in Igor Pro 8 environment.
- Hexamethylcyclotrisiloxane (D3), Octamethylcyclotrisiloxane (D4), Decamethylcyclotrisiloxane (D5) and Dodecamethylcyclohexasiloxane (D6) ,cVMS were observed.
- Observed intensities were **well correlated** for both instruments.
- **Diurnal trends** are apparent for cVMS.







Ircelyon NSTITUT DE RECHERCHES SUR LA CATALYSE T L'ENVIRONNEMEI



Observations and Conclusions

- **D5**.
- **FURTHER QUESTIONS?**
- What are the main sources of cyclic siloxanes?



Correspondance to :

rulan.verma@ircelyn.univ-lyon1.fr

matthieu.riva@ircelyon.univ-lyon1.



Concentrations peaked early in the morning reaching to an averaged maximum of 0.298 ± 0.119 ppb for

• A minimum value is observed in the afternoon followed by a slight increase during the night.

• What are the oxidation mechanisms, pathways and oxidation products of siloxanes?



rsité Claude Bernard Lyon1, CNRS, IRCELYON, 69626 Villeurbanne, France Tofwerk AG, 3600 Thun, Switzerland Université Paris Cité and Univ Paris Est Creteil, CNRS, LISA, F-75013 Paris, France

Department of Chemistry, Harvey Mudd College, 301 Platt Blvd, Claremont, California 91711, United States Aix Marseille Université, CNRS, LCE, Marseille, France

Univ Paris Est Creteil and Université Paris Cité, CNRS, LISA, F-94010 Créteil, France