

# Characterization of brake-wear emissions from a bus, evaluation of a frictionless braking system.

A. Vishnoi<sup>1</sup>, A. Beji<sup>1</sup>, B. Vansevenant<sup>1</sup>, M. Goriaux<sup>2</sup>, P. Tassel<sup>1</sup>, S. Serindat<sup>1</sup>, M. Messieux<sup>3</sup>, Y. Azizi<sup>3</sup>, P. Bouard<sup>4</sup>, X. Delepine<sup>4</sup>, B. Guiot<sup>3</sup>, N. Quennet<sup>4</sup>, Y. Liu<sup>1</sup>

<sup>1</sup> AME-EASE, University Gustave Eiffel, <sup>2</sup> GERS-LEE, University Gustave Eiffel, <sup>3</sup> CRMT, <sup>4</sup> TELMA

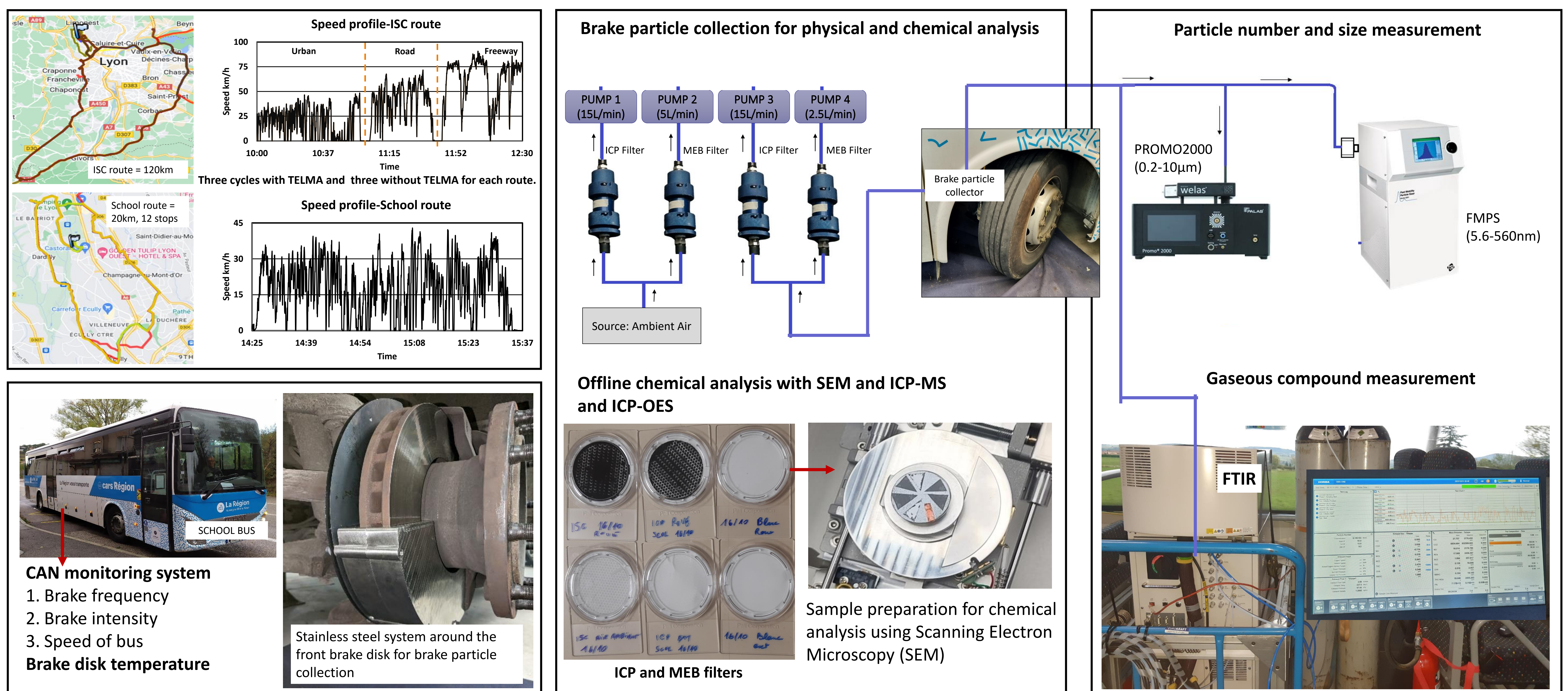
## Context

- ❖ 85% of traffic-related PM<sub>2.5</sub> is linked to non-exhaust sources (Timmers and Achten, 2016).
- ❖ Brake wear = major non-exhaust pollution.
- ❖ Heavy vehicle with high traffic density and frequent braking events intensifies emissions.
- ❖ Critical knowledge gap: Brake particle characteristics and composition

## Objectives

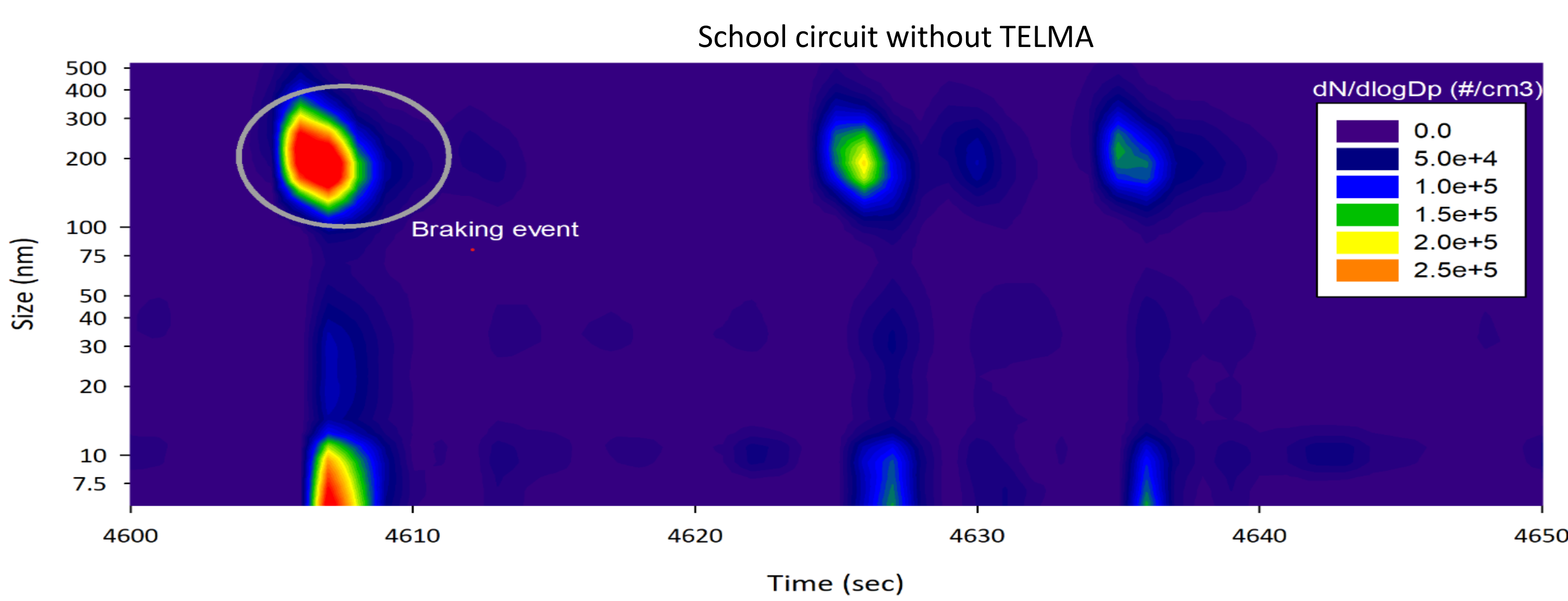
- ❖ Characterize brake emissions from a school bus under real driving condition
- ❖ Evaluate the impact of a frictionless braking system

## Experimental setup

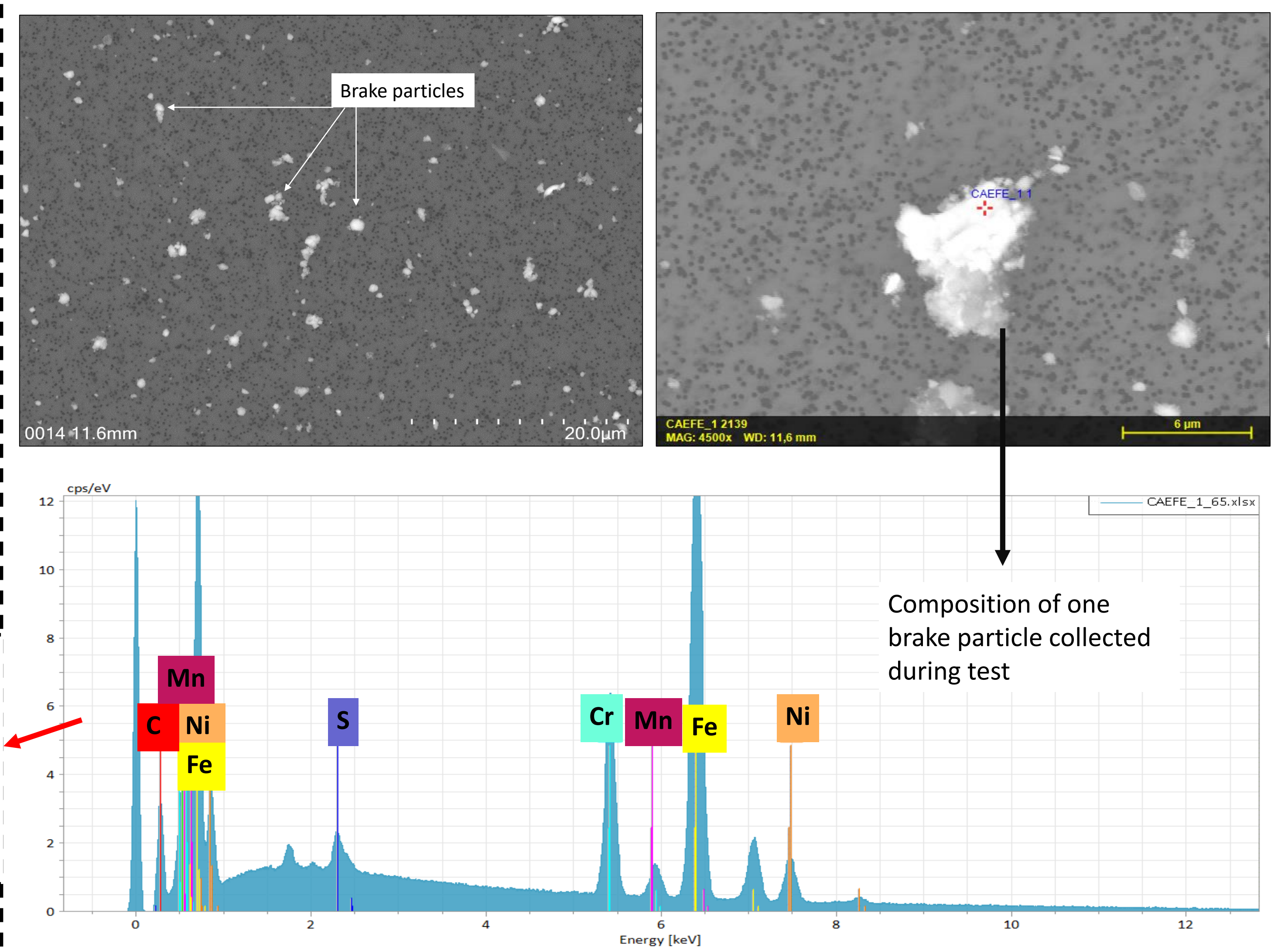


## Preliminary results

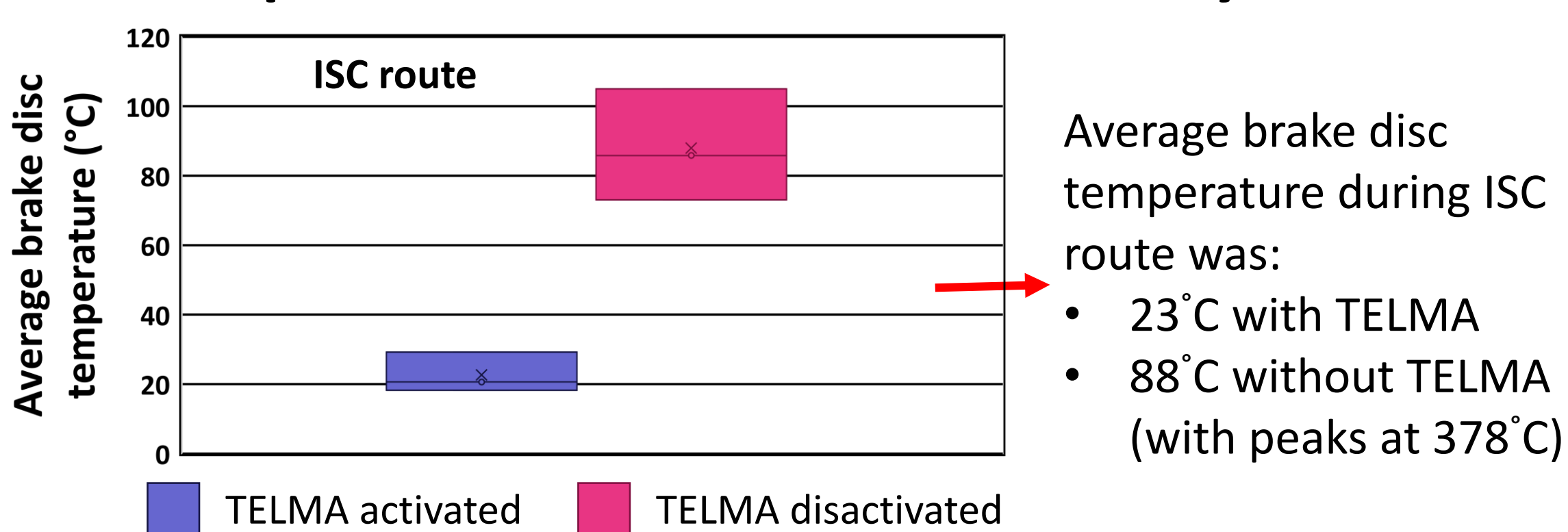
### Emission of particles



### Composition of particles



### Impact of the frictionless TELMA system



Initial analysis shows brake particles mainly composed of Fe, Cu, Si, Ca, Ba, S, with traces of Mg, Cr, Mn, Sb, and Ni.

## Conclusion

- ❖ Preliminary results show that the TELMA braking system is effectively reducing the friction resulting in fewer and less intense braking events.
- ❖ Further analysis will include: 1) Quantifying brake particle emission factors. 2) Examining the influence of temperature on emissions (size and concentration).

## Aknowledgments / references

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ashok-singh.vishnoi@univ-eiffel.fr  
boris.vansevenant@univ-eiffel.fr  
yao.liu@univ-eiffel.fr

Timmers and Achten  
Atmospheric Environment  
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