

**An insight on the chemical
composition of submicronic aerosols
during the 2011 Field Campaign : the
Sulfates content**

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Background and Topics

-Sulfates in submicronic aerosols are formed from the (photo)oxidation of SO_2 and other sulfur-containing compounds, such as DMS (dimethyl sulfide).

- After nucleation and growing, sulfates (SO_4^{2-}) are found in the “hundreds nanometers” size range.

-Our aim here is to differentiate locally generated SO_4^{2-} (by nucleation/growing), from SO_4^{2-} advected from distant sources.

-For that, SO_4^{2-} concentrations are compared to aerosol size sorting, performed by differential electrical mobility measurement (SMPS).

Material and Methods

-Aerosols were collected by cascade impaction for chemical analyses and sorted into three size ranges:

- The coarse fraction ($> 2 \mu\text{m}$ in diameter)
- The “accumulation” mode (100 nm – $2 \mu\text{m}$)
- The “ultrafine particles” mode ($< 100 \text{ nm}$)

-A Scanning Mobility Particle Sizer (SMPS – *Grimm® GmbH*) provided the Number Size Distributions

-Sulfates were analyzed in the “accumulation mode” by Ionic Chromatography (DIONEX® ICS 90):

- Detection Limit: 57 ng/m^3
- Accuracy: 98%
- Reproducibility: $<5\%$

1st and 2nd of July: Sulfates formation seems to be related to local nucleation/growing processes

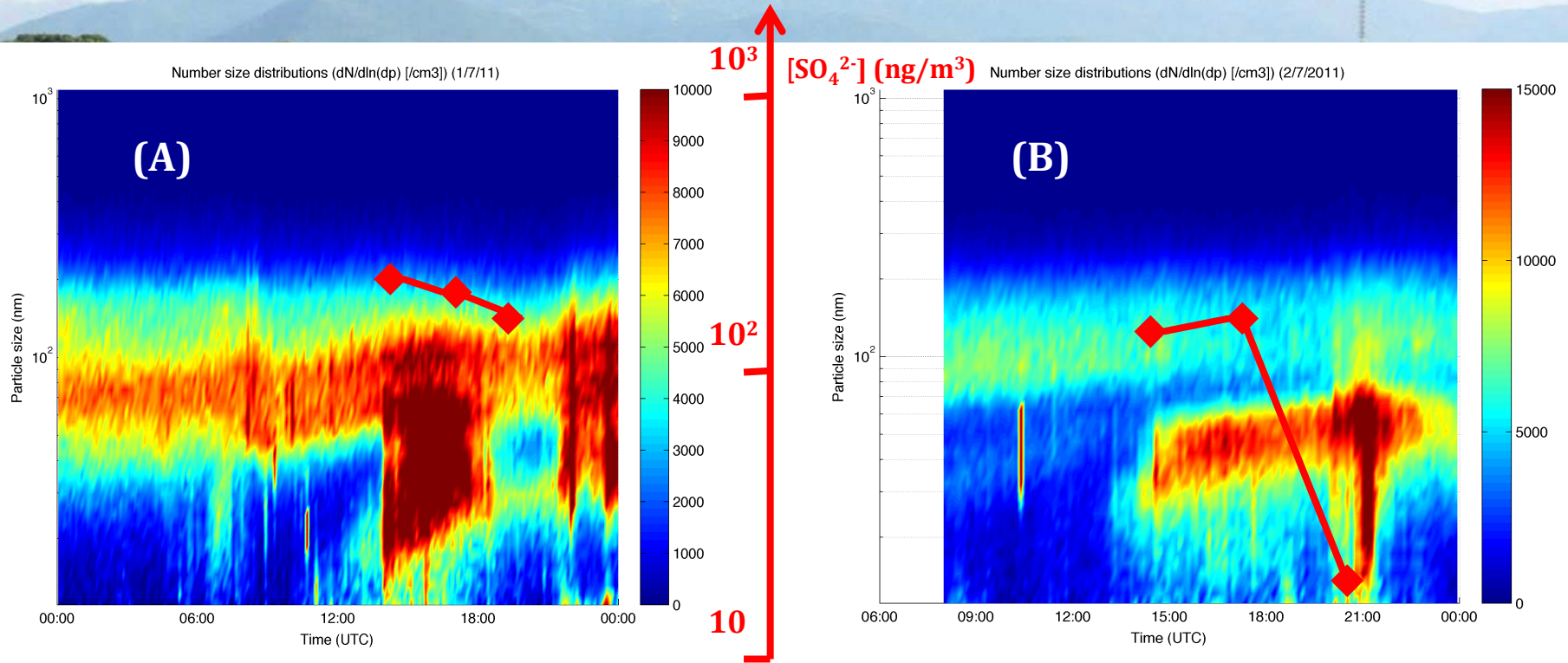


Chart of the aerosol number size distributions and SO_4^{2-} concentrations (red diamonds) vs. time (UTC), measured the 1st (A) and 2nd (B) July 2011 on "Super Site 1" during the BLLAST Field Campaign

**6th and 7th of July: Sulfate concentrations are $> 1 \mu\text{g}/\text{m}^3$ and seems not to be related to local nucleation/growing processes ...
Are regional transport episodes the cause of these important SO_4^{2-} concentrations ?**

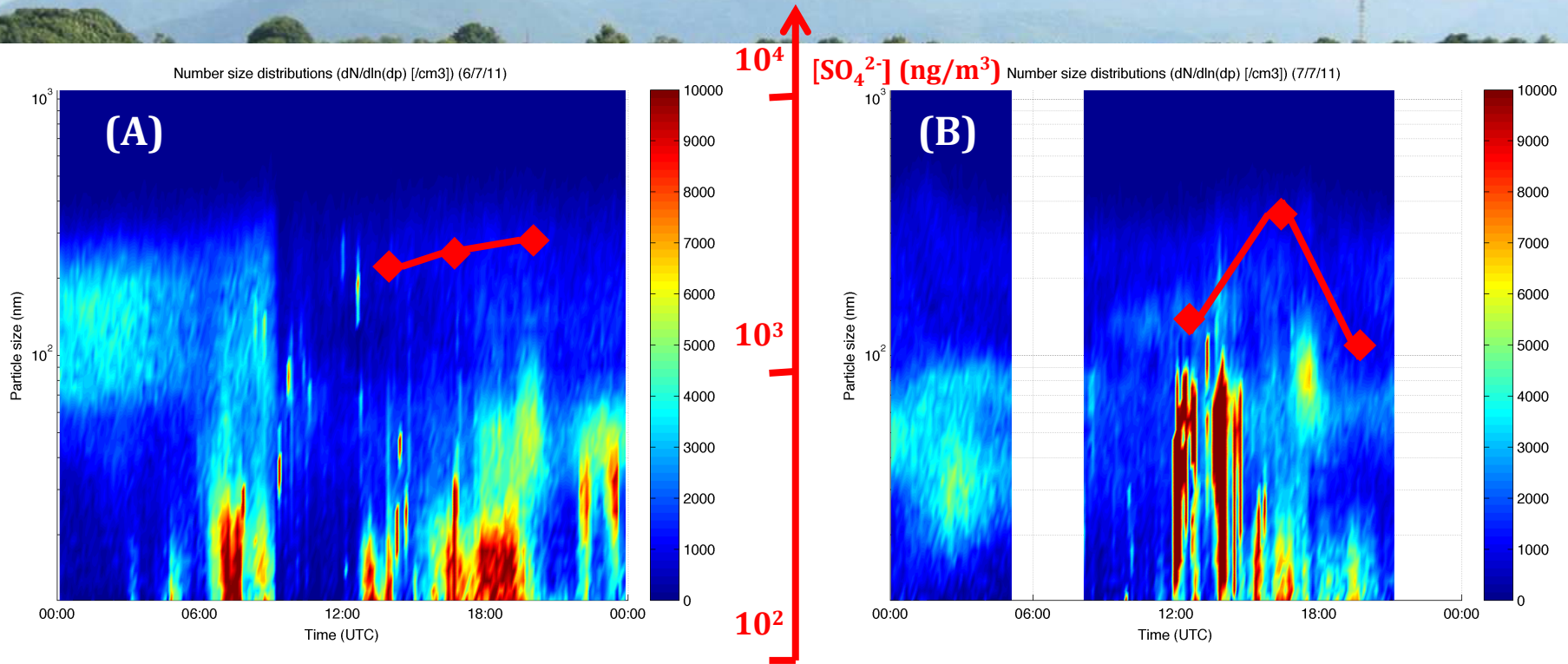


Chart of the aerosol number size distributions and SO_4^{2-} concentrations (red diamonds) vs. time (UTC), measured the 6th (A) and 7th (B) July 2011 on "Super Site 1" during the BLLAST Field Campaign

Conclusion and Outlooks

- Sulfates production is a good example of submicronic aerosols formation from gas-particle conversion (nucleation/growing processes) during the 2011 Field Campaign.
- But distant sources have affected the aerosol chemistry in the boundary layer on “Super Site 1”.
- In case of subsequent field campaigns, a “real time” aerosols monitoring, combined with individual particle analyses, will be necessary to make links between aerosol chemistry and turbulent phenomena in the boundary layer.

Acknowledgements

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