

Ground based perspective during the AROMAT 2015 campaign

Airborne ROmanian Measurements of Aerosols and Trace gases

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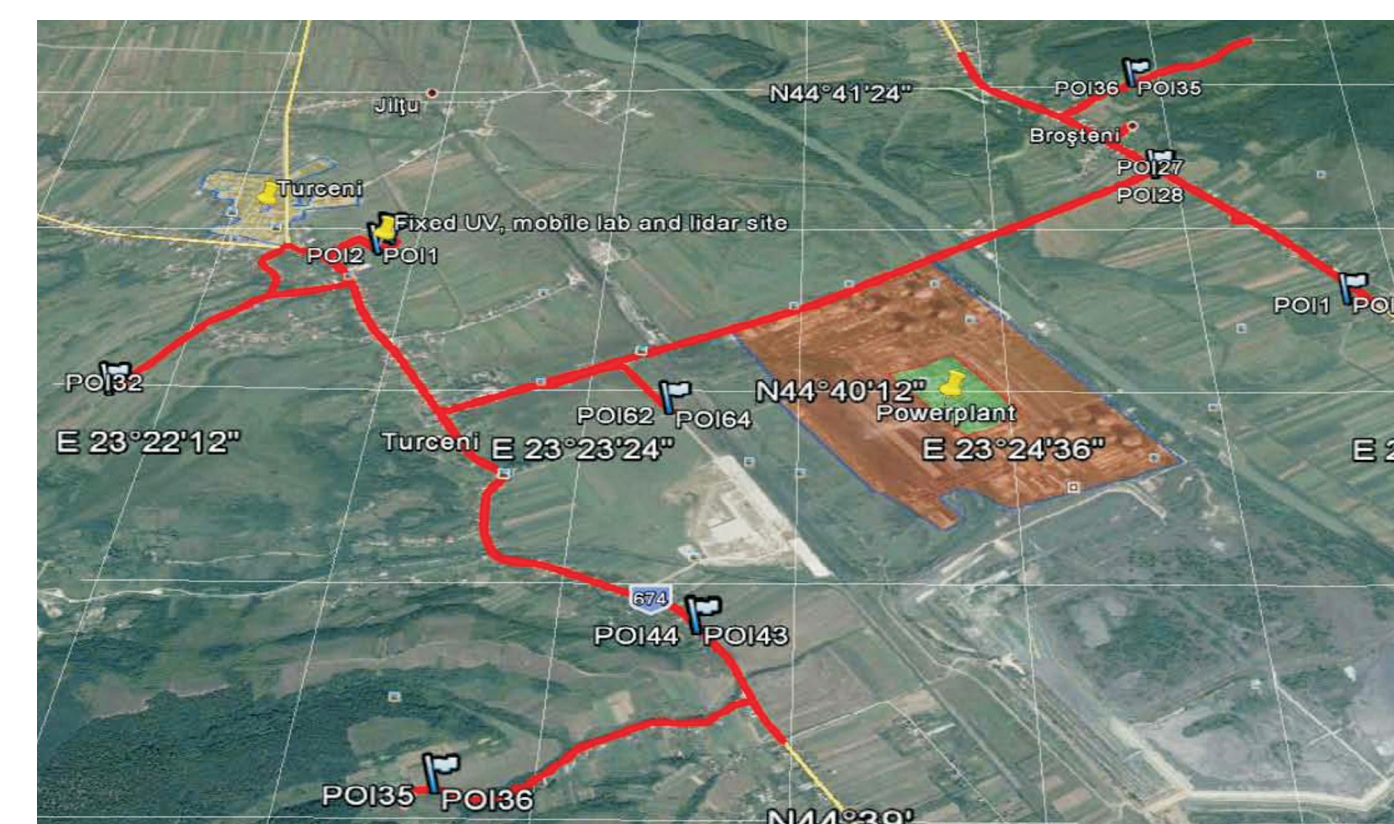
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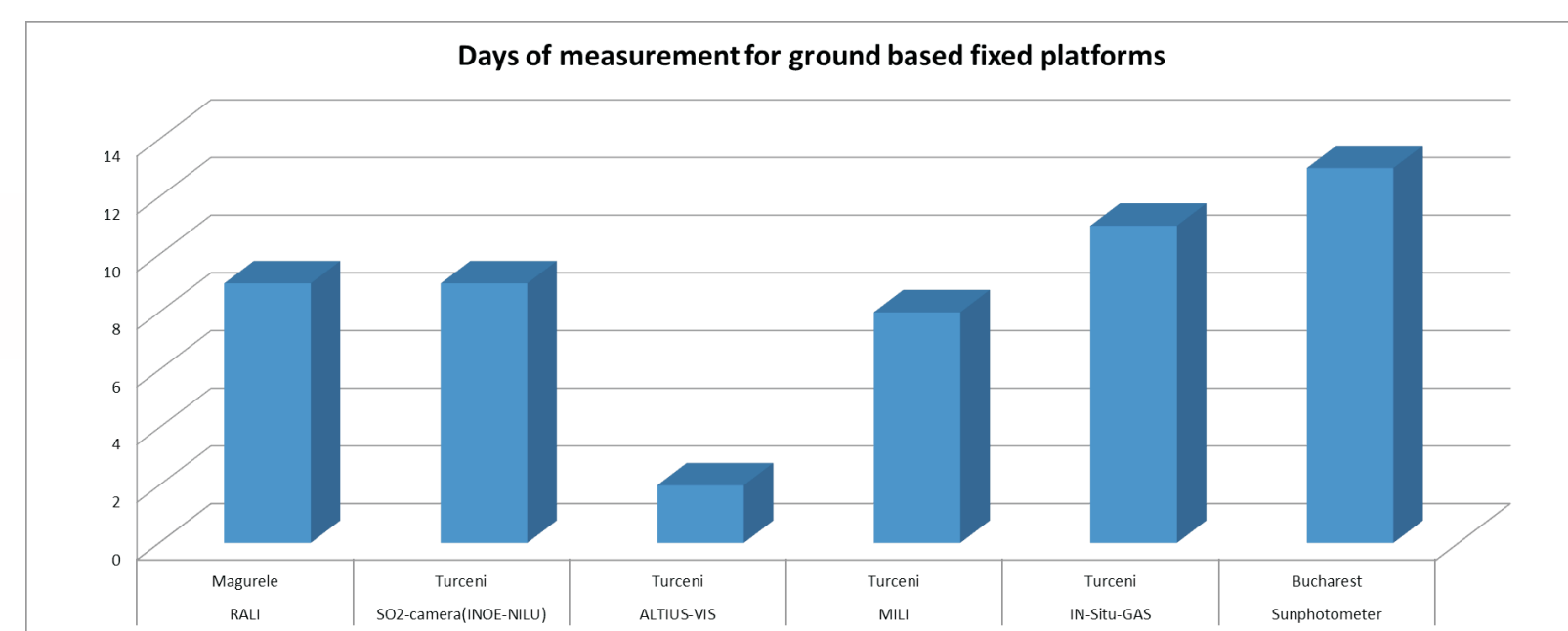
Campaign objectives

- The 2015 campaign was organized to study different chemical species relevant to S4, S5, S5p and CarbonSat missions at relevant dimensional and temporal scales by means of ground based and airborne measurements.
- In addition, the campaign was also focused on retrieving detailed information about the aerosol load (backscatter and extinction coefficients) above the two sites (Magurele and Turceni) by means of active (lidar) and passive (UV cameras) remote sensing.
- A special interest was given to the 3D tomography of the plume emitted by the Turceni power-plant, a first attempt to use a combination of UV cameras placed at different sites along the power plant, in order to retrieve the spatial distribution of the plume.

Location and methodology

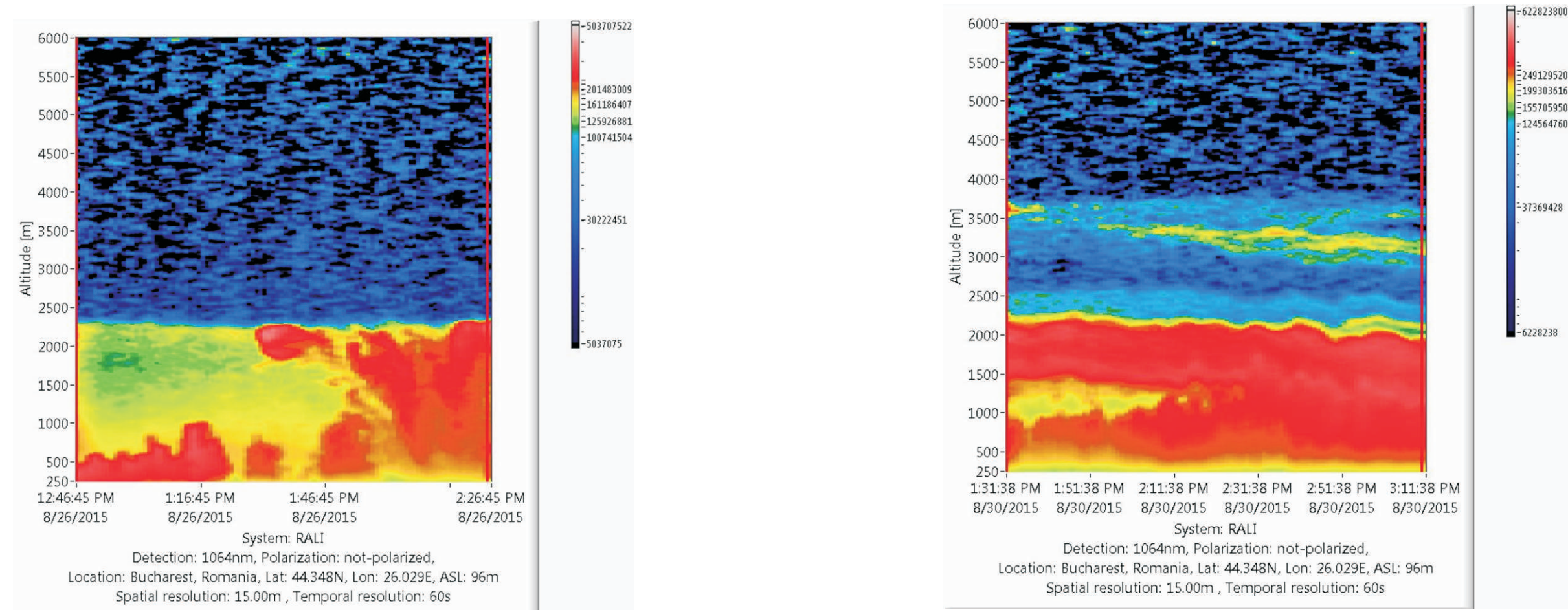


**Turceni- SO₂ cameras set-up
—for measurements of the plume's distribution**



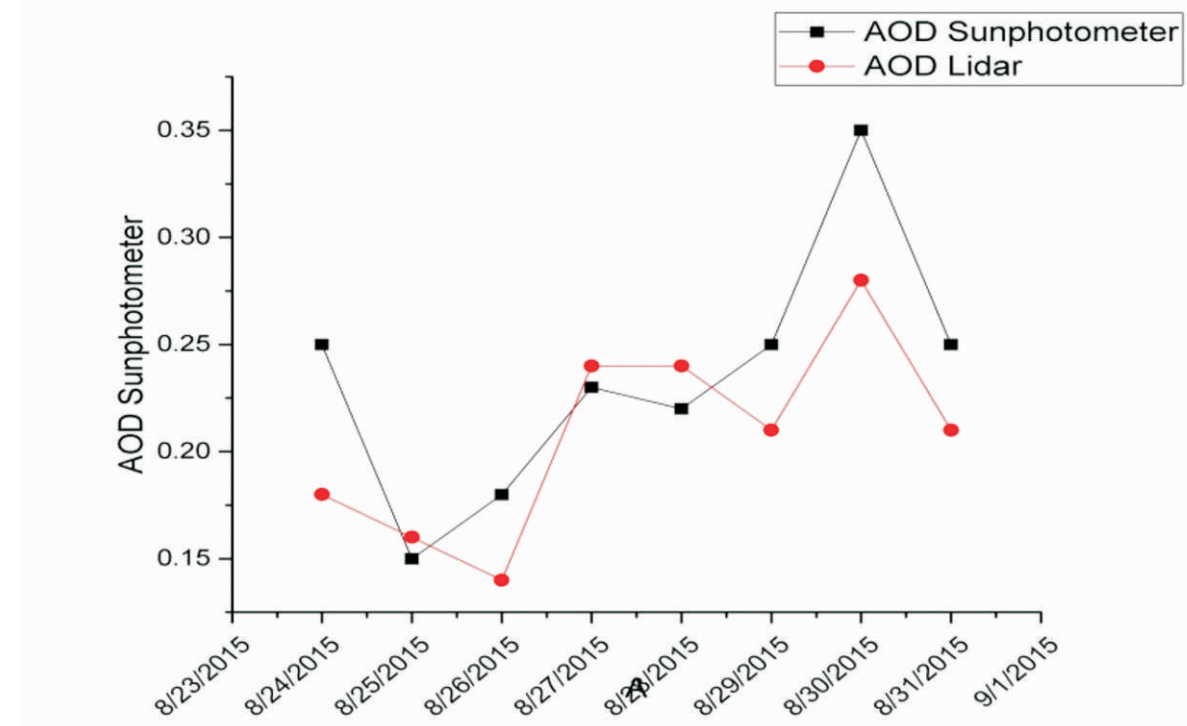
- **UV scanning LIDAR (MILI)**-measurements in Turceni
- Data processing procedure&products
- Backscatter coefficient: Fernald-Klett algorithm with constant LIDAR ratio (assumed)
- PBL height: altitude of the maximum negative gradient of the range corrected signal
- 355nm volume linear depolarization ratio

Results- Bucharest

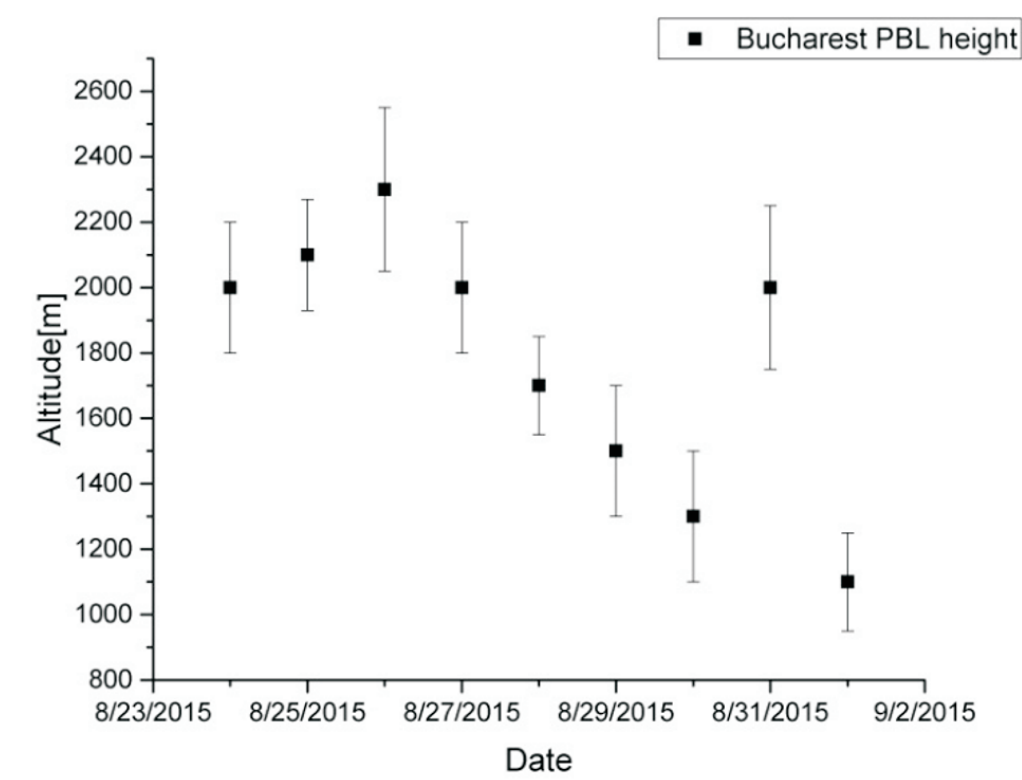


Lidar RCS-Range corrected signal at 532nm
from the multiwavelength instrument -Bucharest 26.08.2015
the dynamics of the PBL can be observed in details

Lidar RCS-Range corrected signal at 532nm
from the multiwavelength instrument -Bucharest 30.08.2015
a layer at 3.5km can be observed



AOD from the collocated sunphotometer and lidar in Bucharest

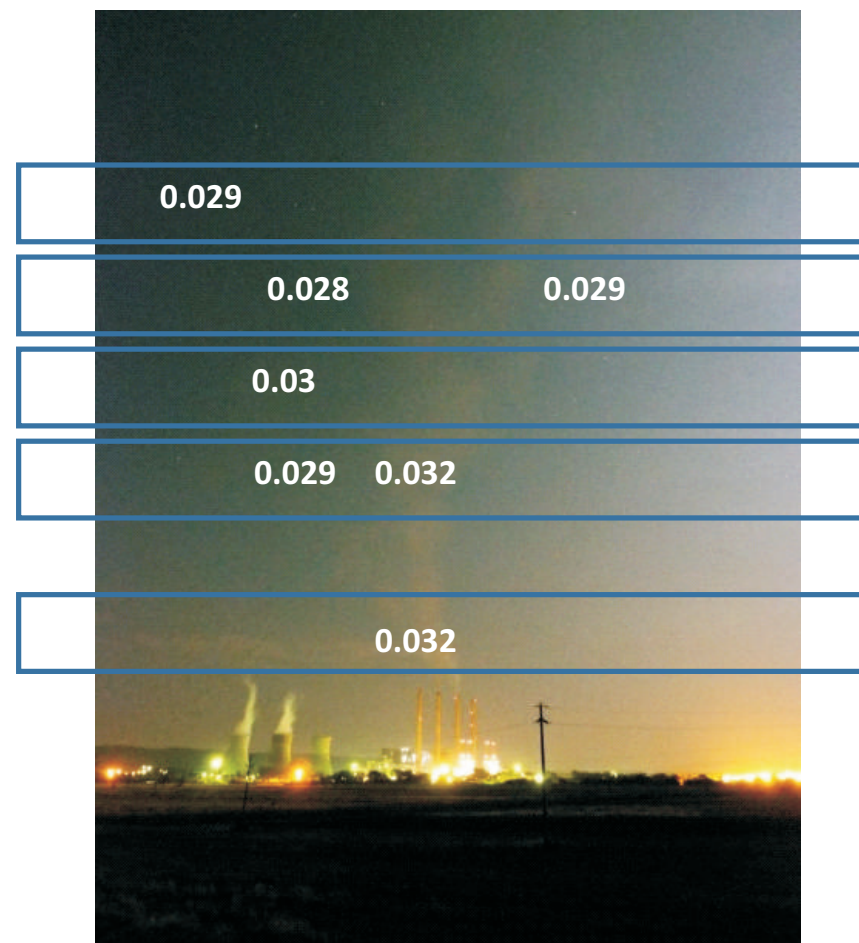


Lidar mean man PBL height as was derived from the lidar measurements in Bucharest

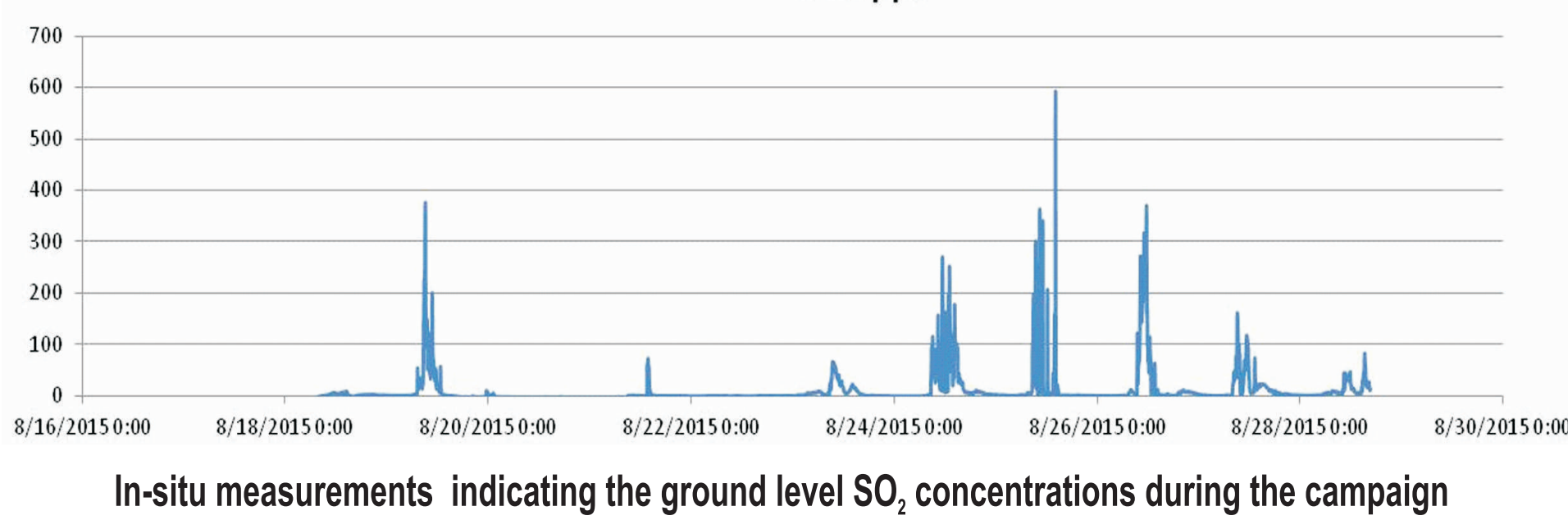
- **Turceni** night-time lidar scans of the plumes were performed due to high SNR- lower integration times, stabile atmosphere, no heating issues
- Mean 355nm volume linear depolarization ratio 0.03 ± 0.02 - Typical for smoke



Lidar set-up for scanning of the plume



Lidar mean 355nm volume linear depolarization ratio
different layers in the smoke plume
power plant

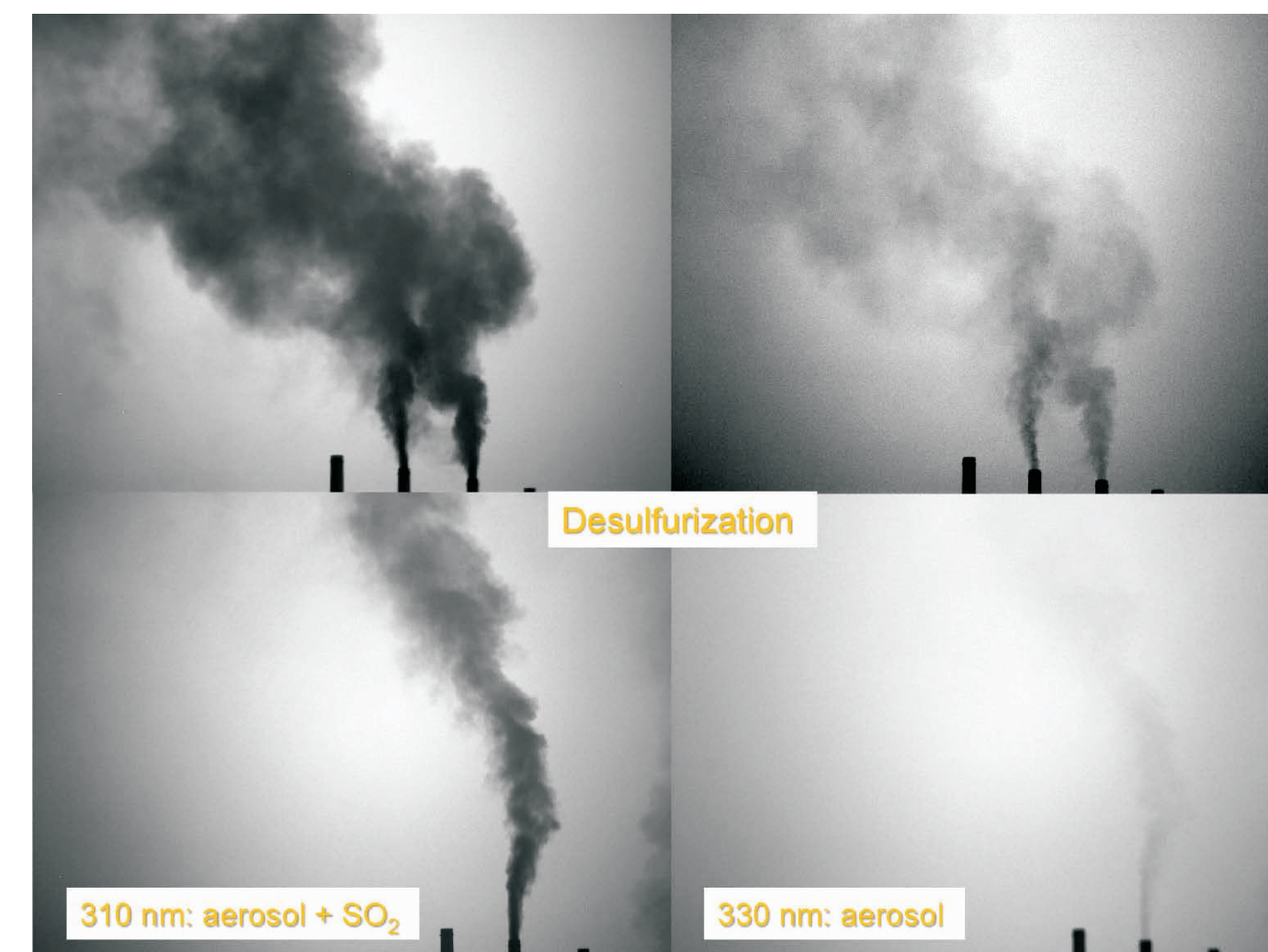
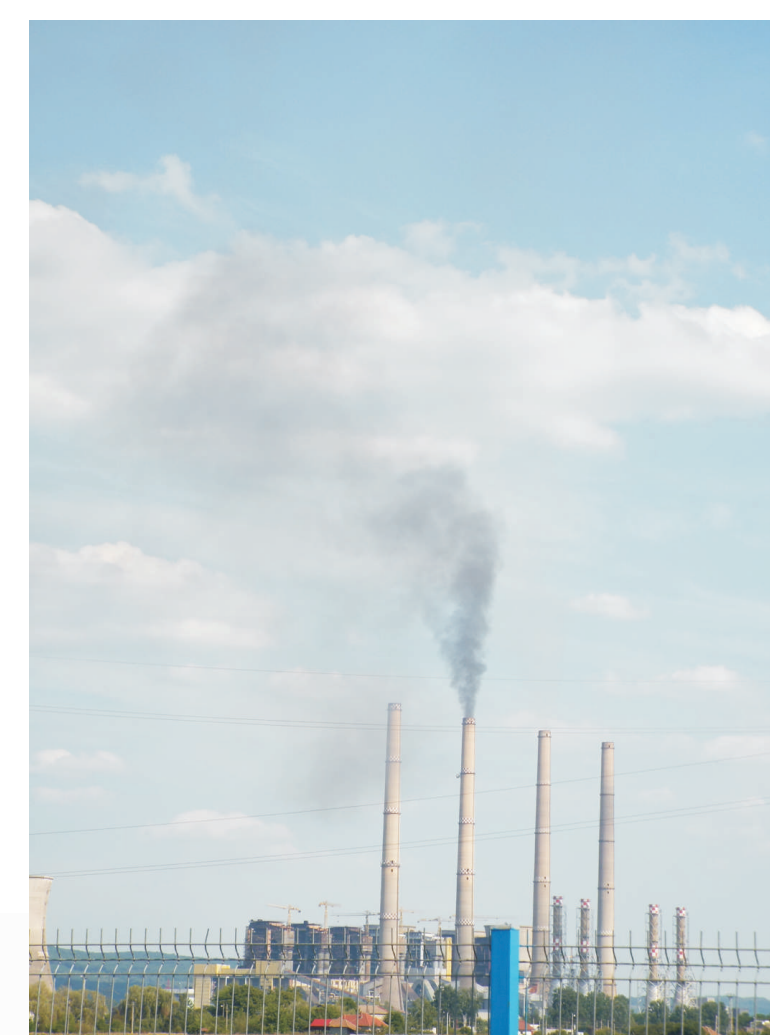


In-situ measurements indicating the ground level SO_2 concentrations during the campaign

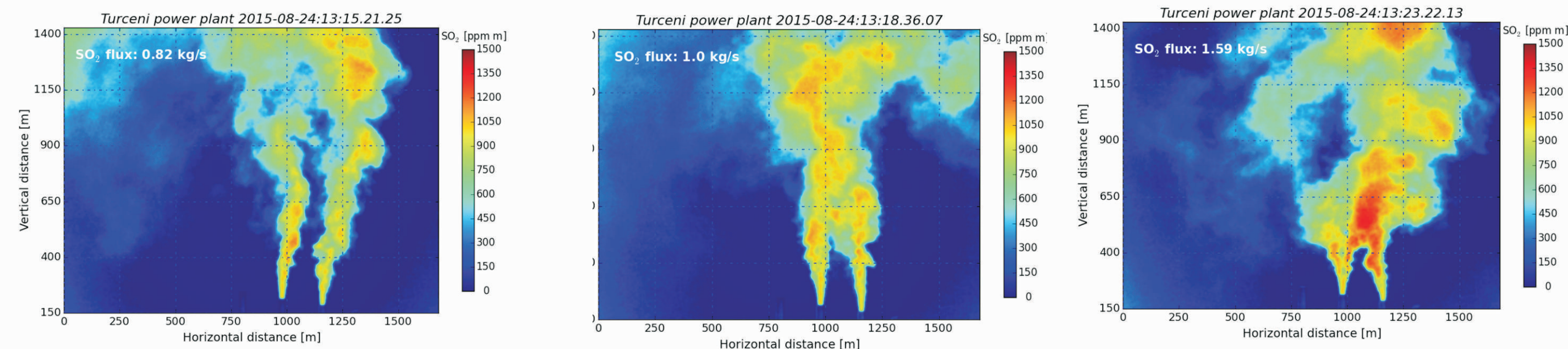


Results- Turceni

Geophysical target of the campaign, the Turceni power plant



The Turceni power plant plume as seen by the UV cameras



SO₂ fluxes as they were calculated from the measurements around the power plant

Conclusions

- The 2015 AROMAT campaign brought new instruments and measurement techniques like the UV SO₂ cameras, used to perform a 3D mapping of the plume emitted by the Turceni power plant.
- In parallel, the UV depolarization lidar was used to perform a mapping of the plume in order to add information related to the aerosol content emitted by the power plant.
- Quantification of the 3D distribution of trace gases and aerosols emitted by the Turceni power plant measured by using passive SO₂ cameras and lidar was fulfilled.
- These types of 3D scanning experiments can be organized to assess how the collected data can be used in further Cal/Val activities.
- An important output of the AROMAT 2015 campaign was the high quality dataset (ground-based remote sensing and in situ) collected at the two sites. The further analysis of these data will give reliable information on the performances of the different techniques, and their potential use in the future Cal/Val of the Sentinel missions

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