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The RAMOS infrastructure and its application to the validation of TROPOMI tropospheric NO_2 VCDs

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Contents

The RAMOS project

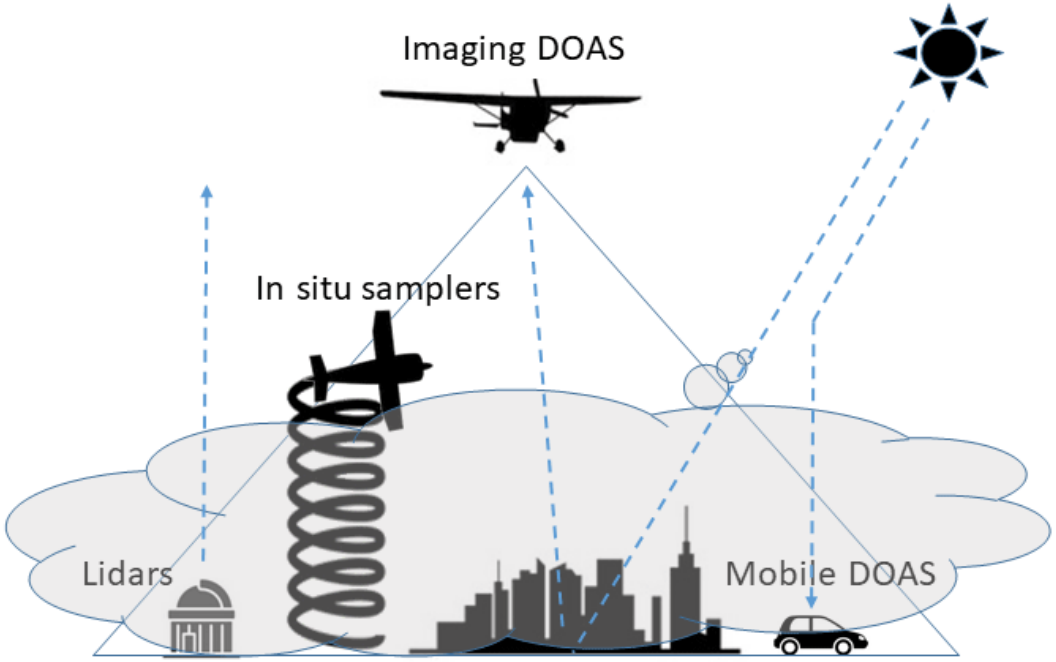


Fig. 1: RAMOS* campaign setup

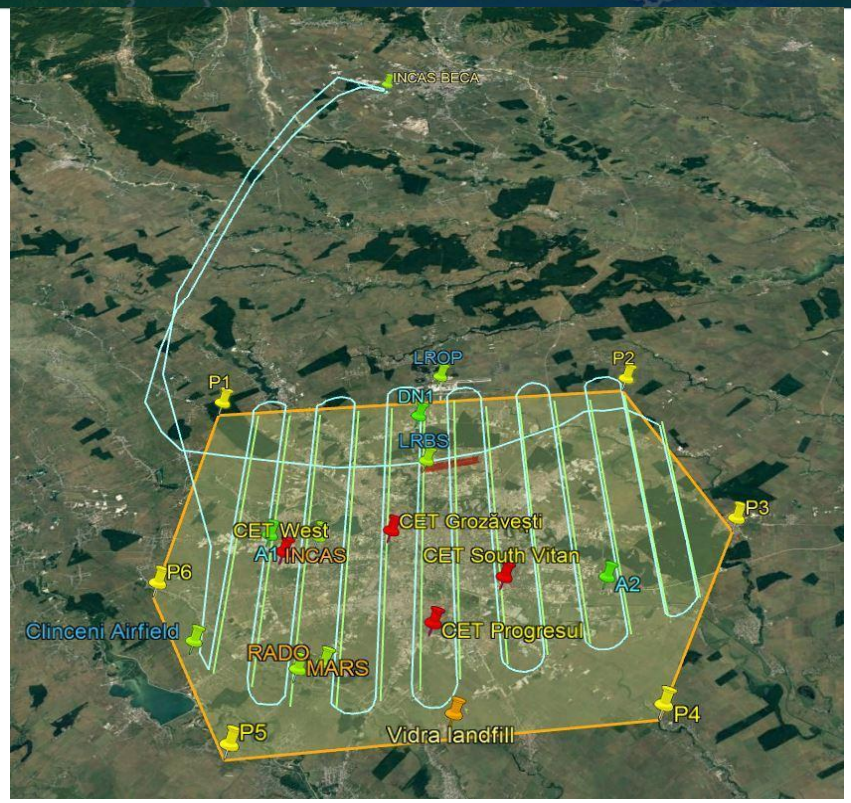


Fig. 2: RAMOS flight strategy

Objectives:

1. Development and implementation of an observation system (ground-based and airborne) in the context of cal/val activities for EO missions.
2. NO_2 mapping together with airborne and ground-based profile measurements of NO_2 and aerosol will better constrain the AMF of S5P TROPOMI over the target urban area.

*AROMAT campaigns, Merlaud et al., 2020

Airborne platform

Fig. 3: Britten-Norman 2 Islander (BN2)

Fig. 4: Instrumentation on board BN2

Ground-based facilities

Instrument	Product
Pandora 2S	NO_2 column densities
Multiwavelength Raman depolarization lidar	Aerosol extinction profiles in UV, Vis, IR
Lunar Sun photometer	Aerosol
FTIR	CO, CH_4
Car-based Mobile-DOAS	NO_2 column densities

Preliminary results - Bucharest

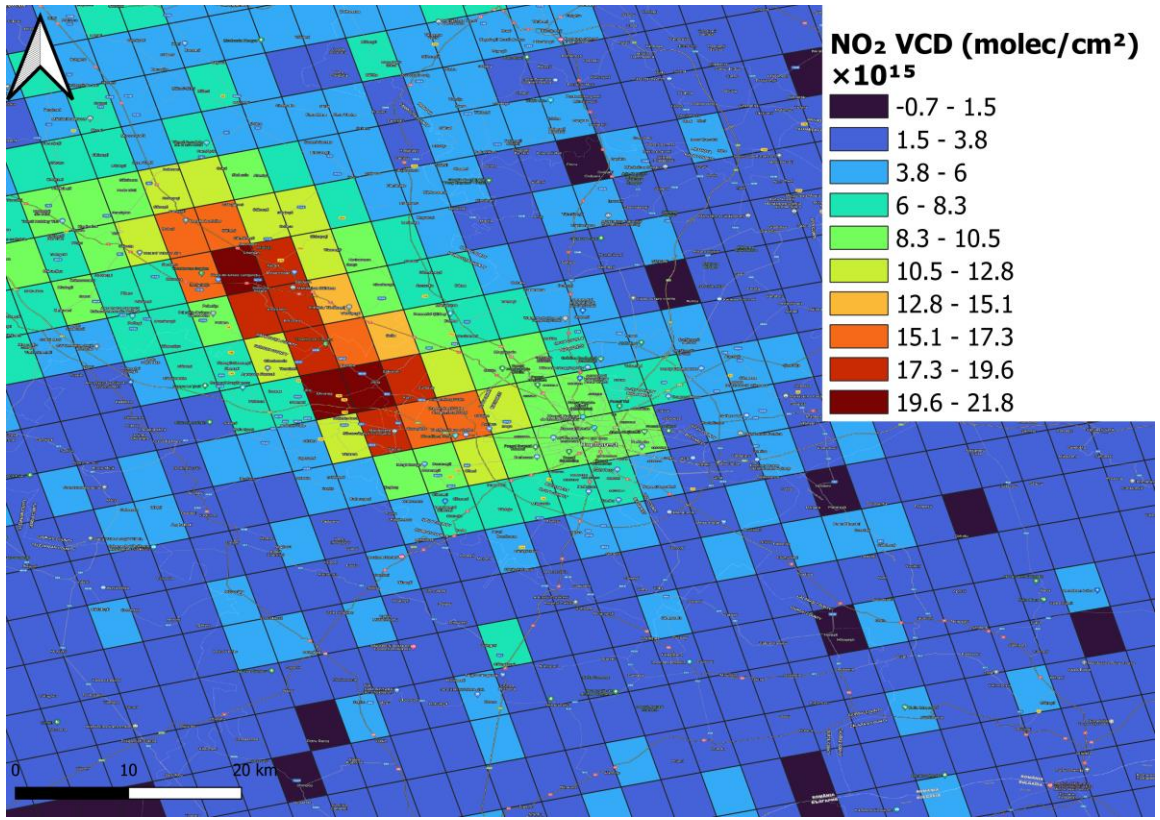


Fig. 5: TROPOMI CAMS data over Bucharest, 22 Nov 2021

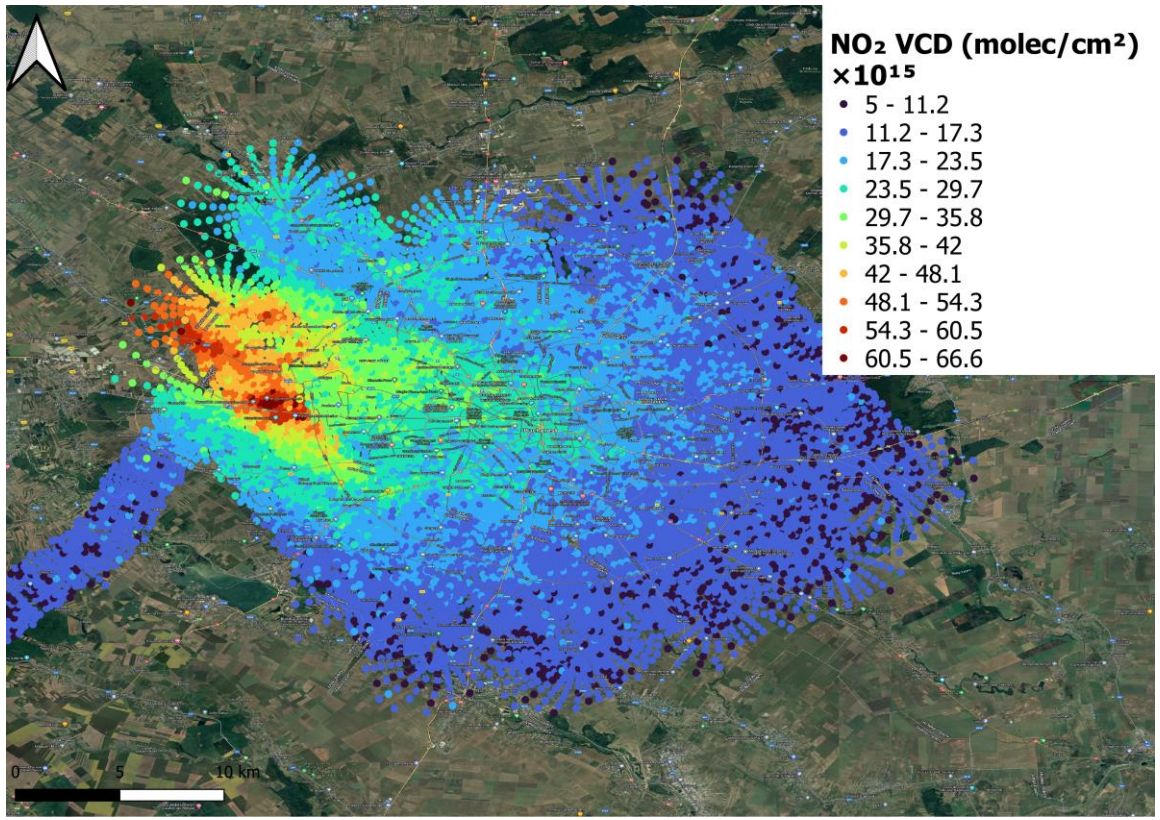


Fig. 6: SWING+ data over Bucharest, 22 Nov 2021

Preliminary results - Bucharest

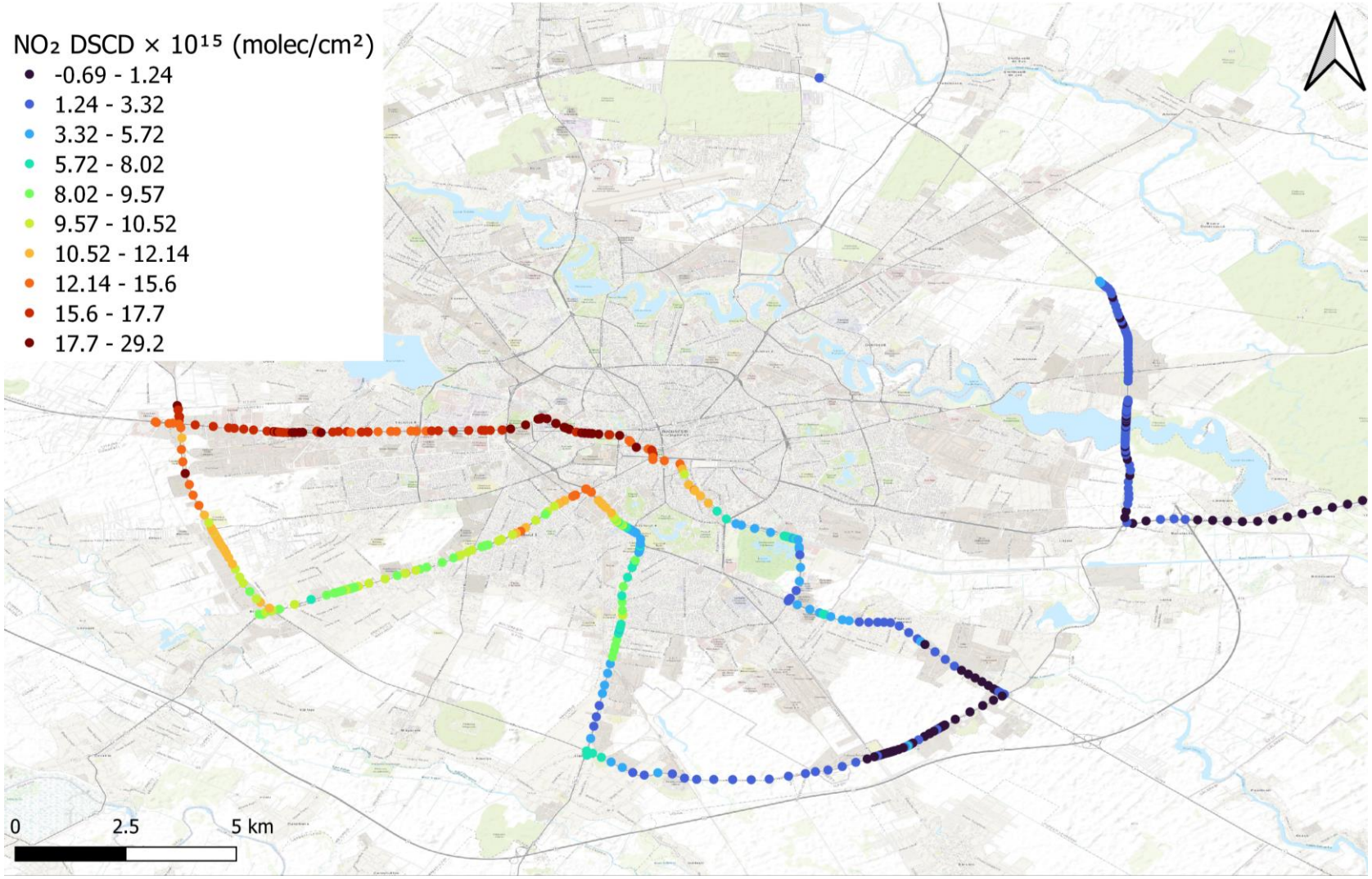


Fig. 7: Mobile-DOAS data in Bucharest, 22 Nov 2021

Preliminary results - Bucharest

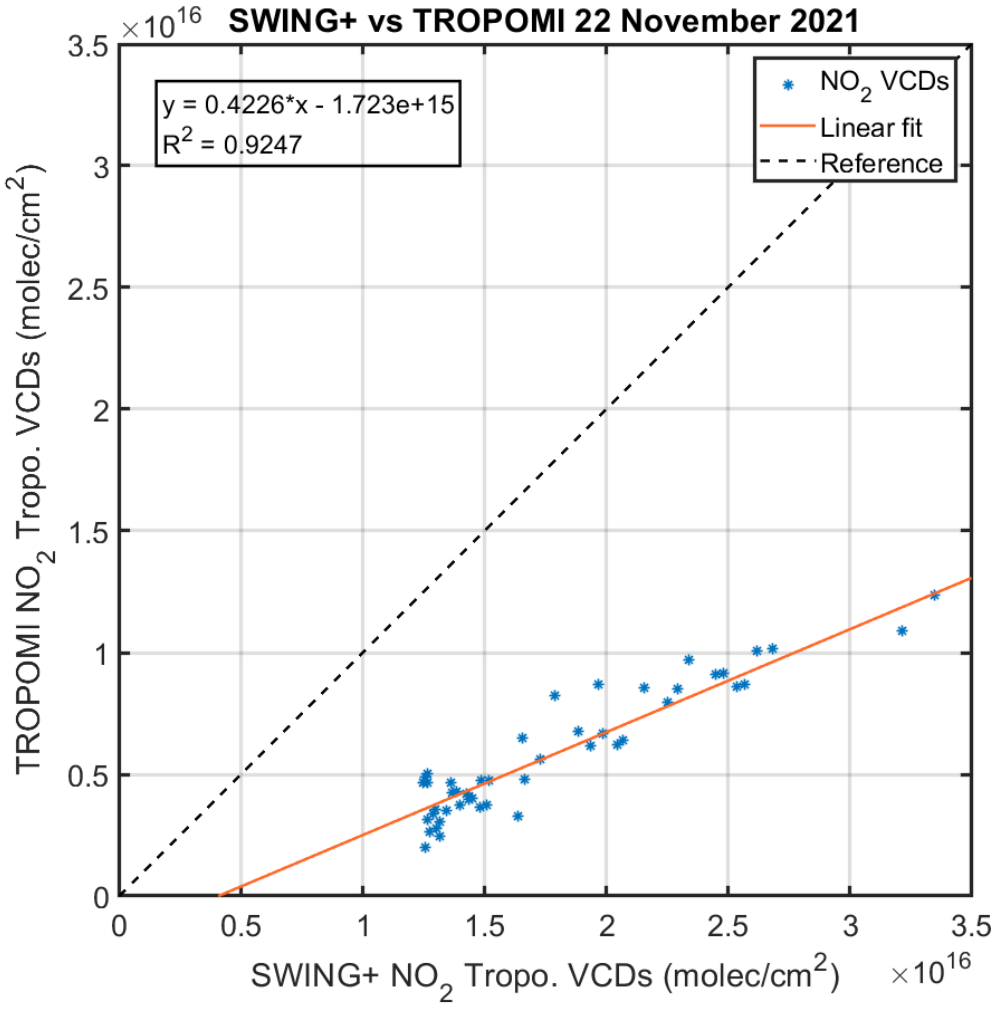


Fig. 8: SWING+ and TROPOMI CAMS data correlation

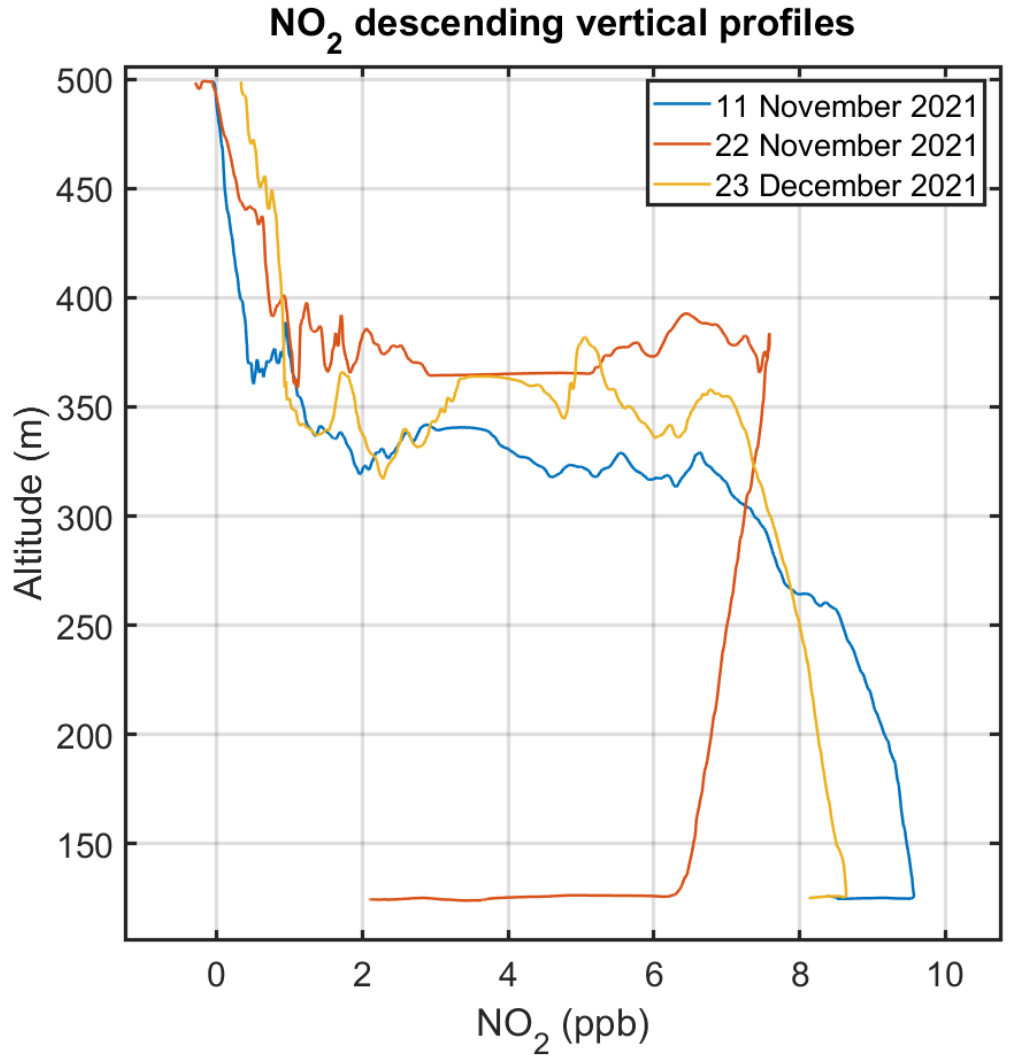


Fig. 9: CAPS AS32M vertical profiles over Bucharest

Preliminary results - Bucharest

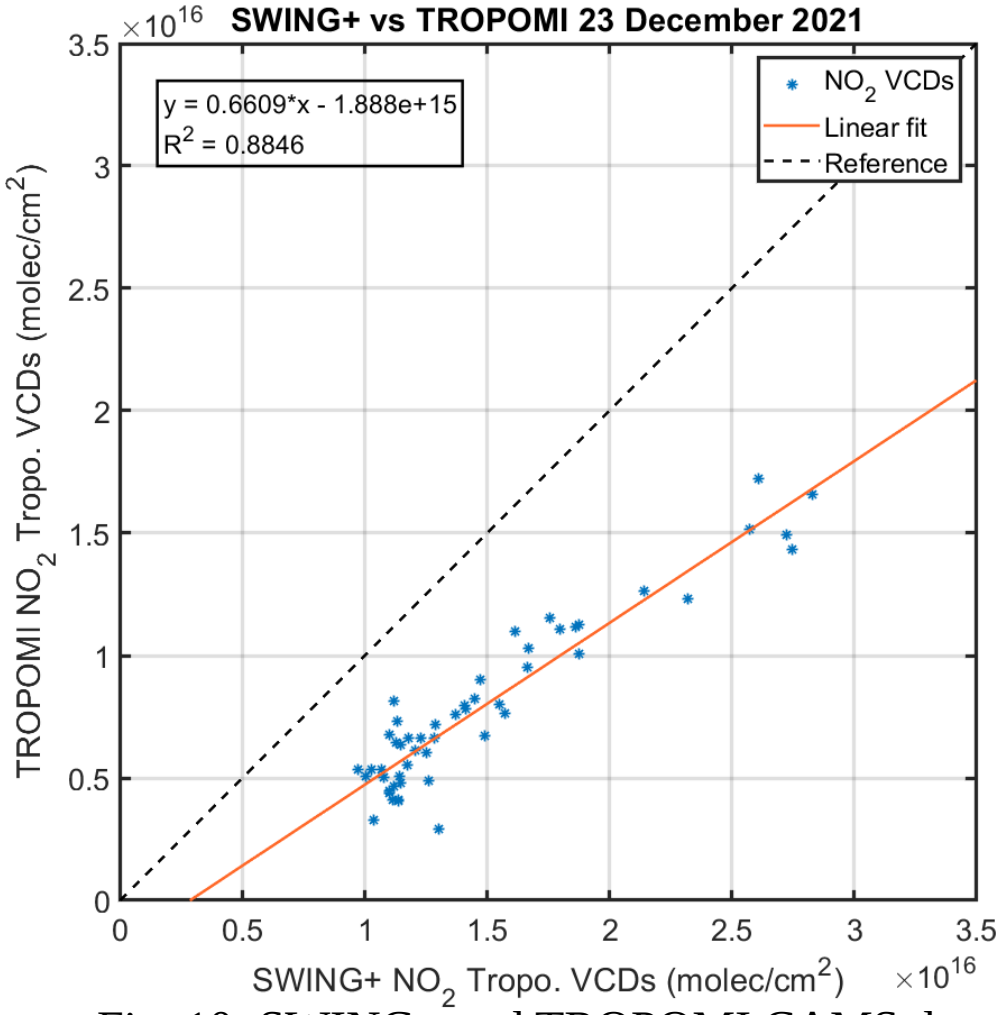
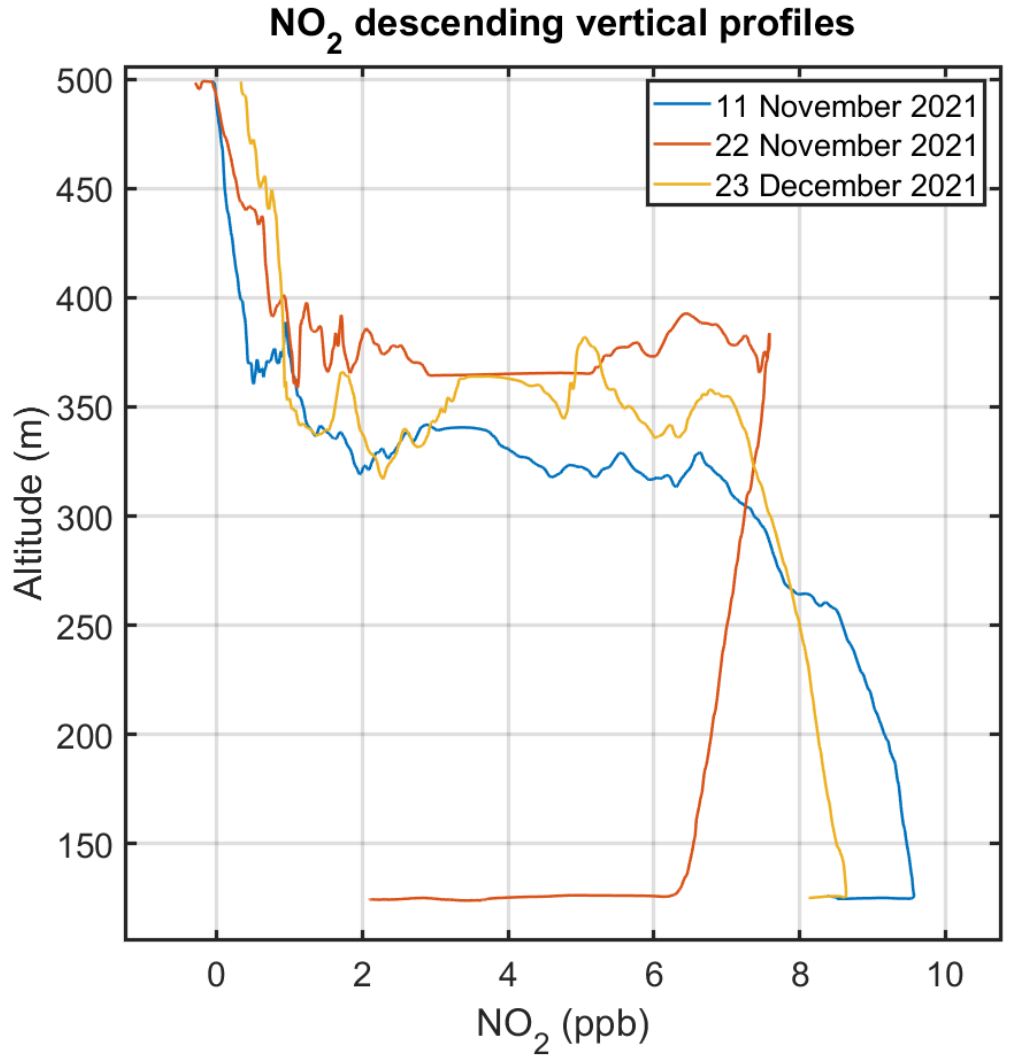


Fig. 10: SWING+ and TROPOMI CAMS data correlation



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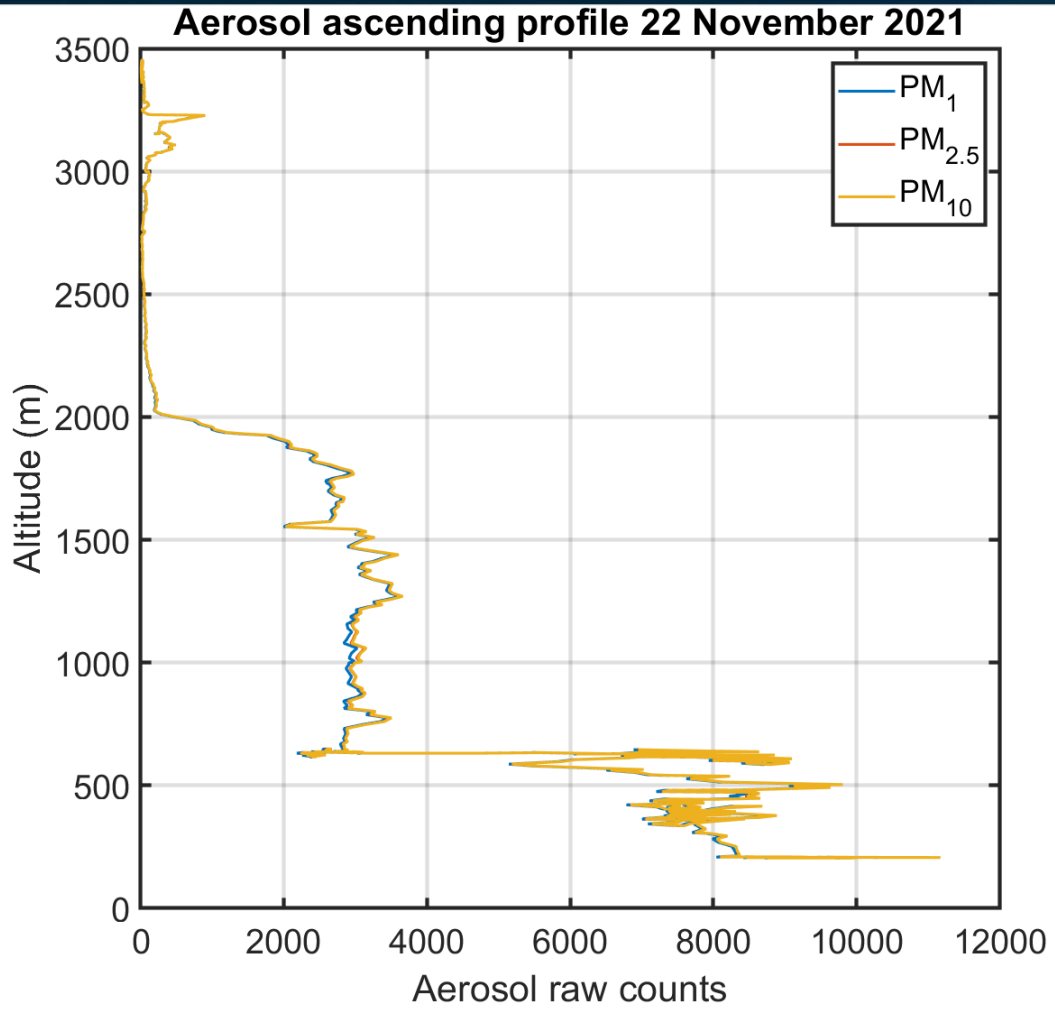

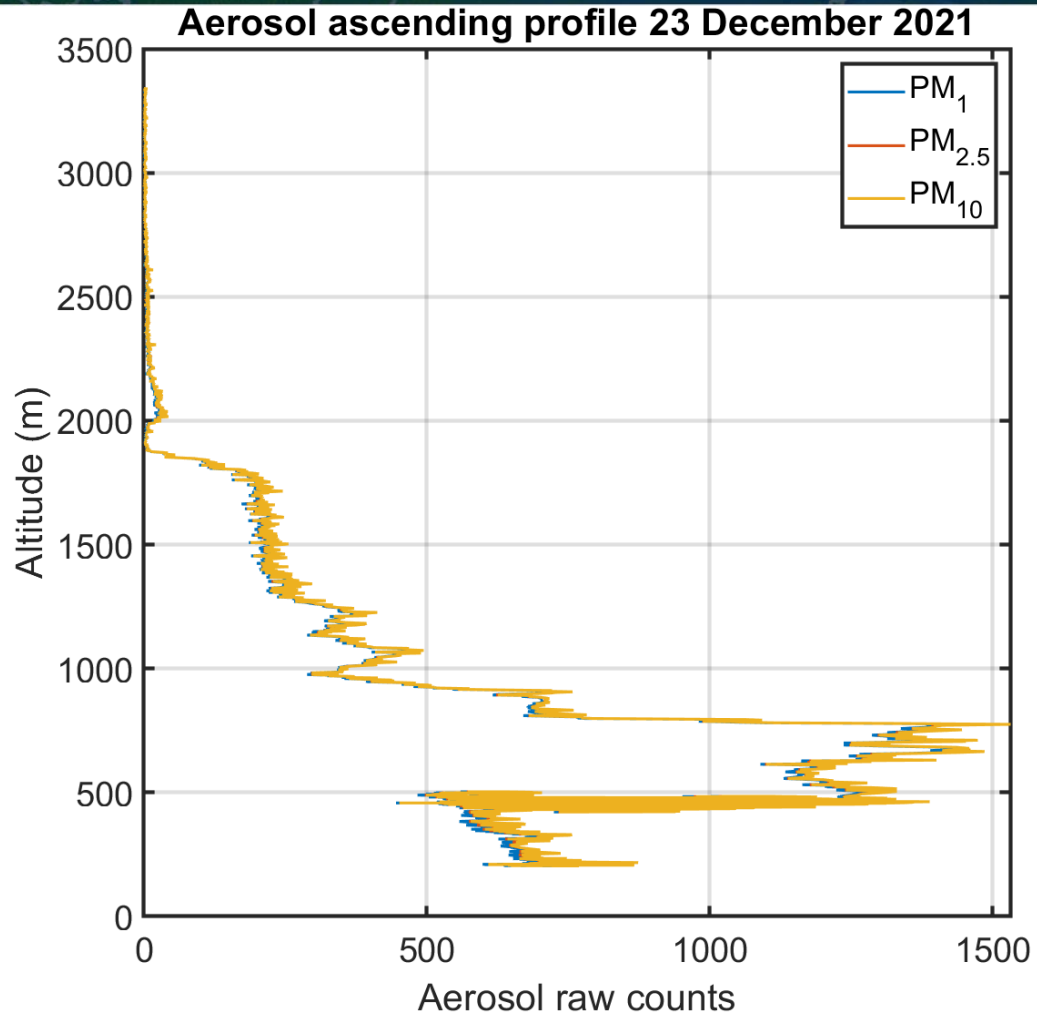

Fig. 11: APS vertical profiles over Bucharest

Effect on the AMF?

Future development

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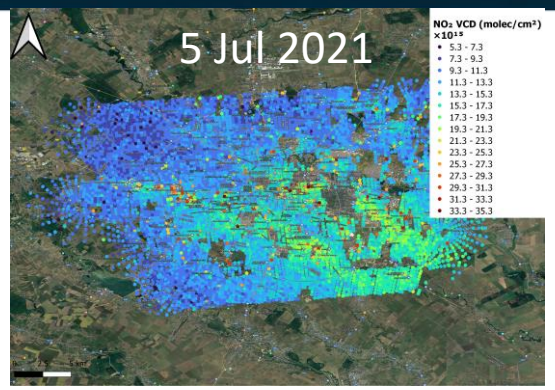

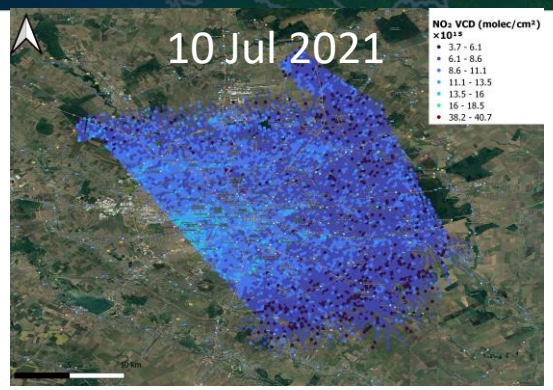

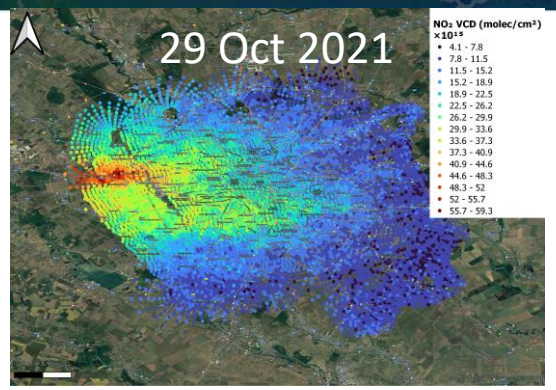

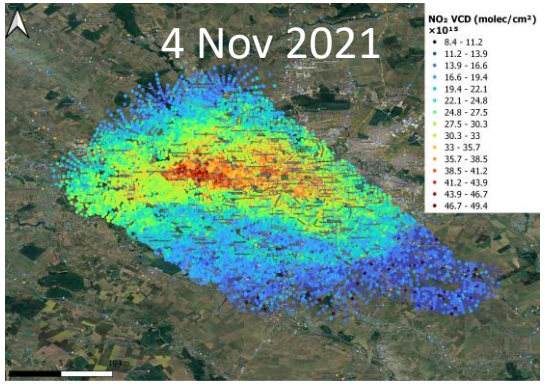

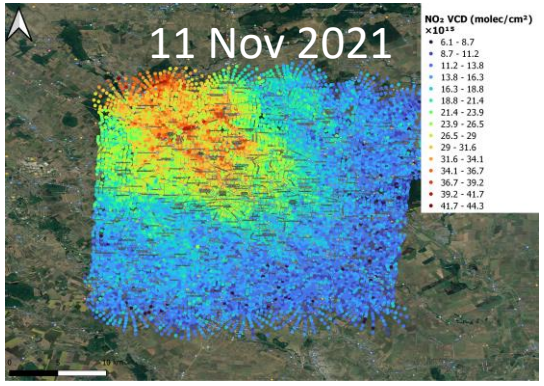

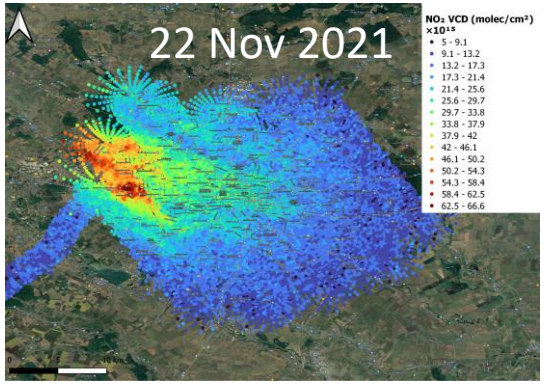

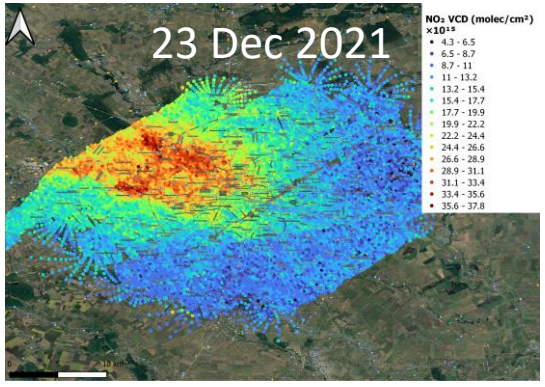

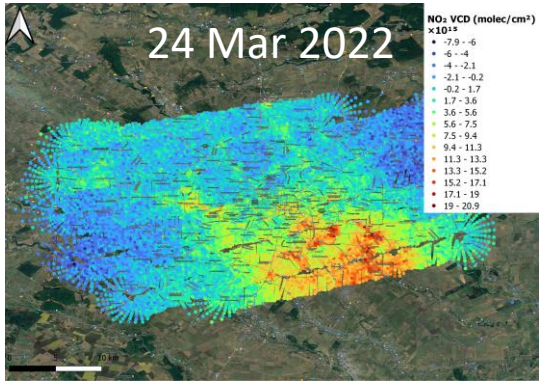

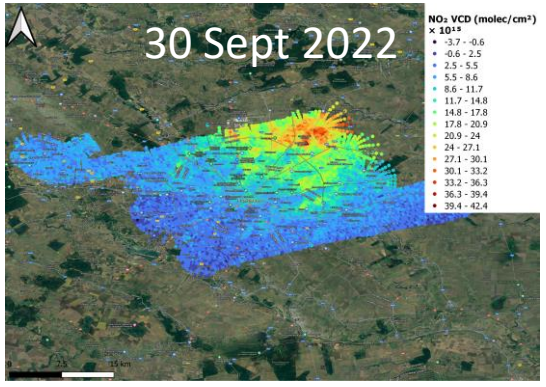

Future development

- The datasets cover the full length of the year with 25 flights so far and the measurements go on.
- The data include profile information (in-situ and remote sensing), which will be used for better characterization of TROPOMI over Bucharest.
- The measurements will also be included in the central analysis performed at BIRA-IASB.
- The RAMOS infrastructure will be further detailed in an article that’s a work in progress.