

living planet | BONN symposium | 23-27 May 2022

TAKING THE PULSE
OF OUR PLANET FROM SPACE



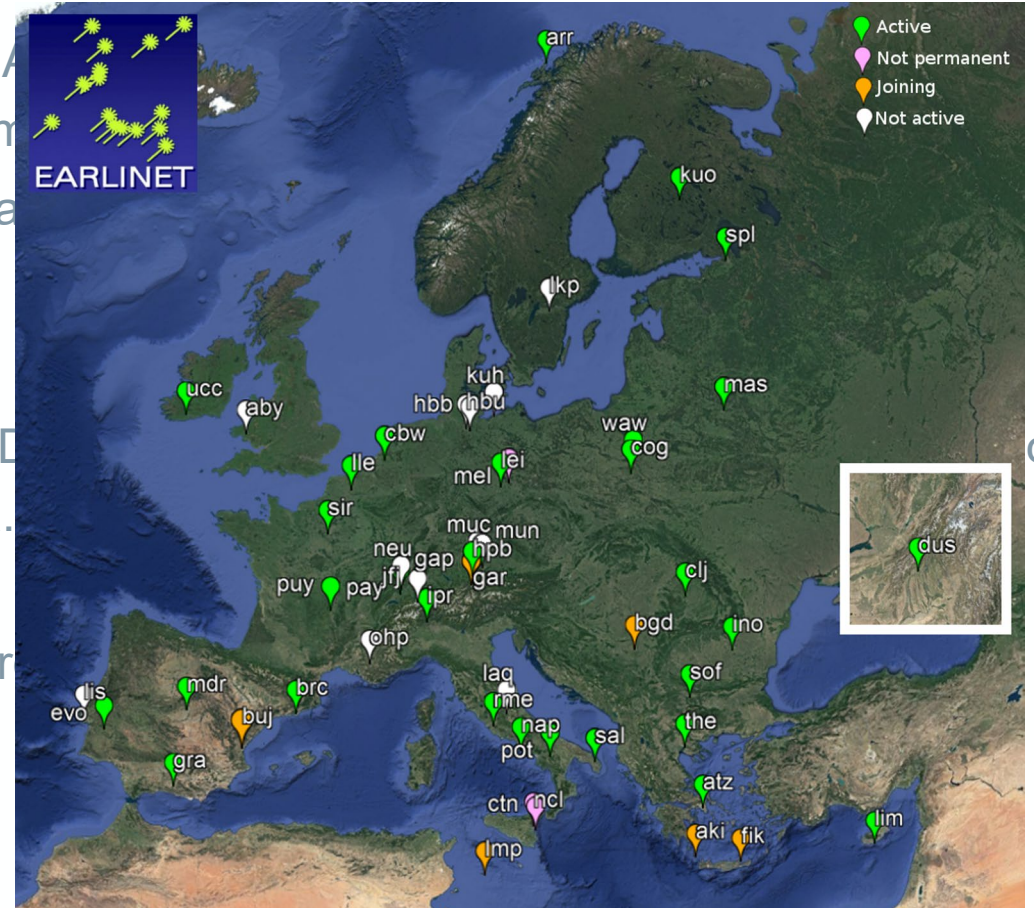
Validation Study of ALH/S5p Product using Ground Based Active Remote Sensing Measurements From European Networks

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- Develop a operational procedure for comparison between A S5P/TROPOMI and ground based active remote sensing m
- Tropomi ALH is based on absorption by oxygen in the A ba
- Complementary to UVAI – aerosol products from S5P;
- EARLINET – European Lidar Network;
- Neural Network Aerosol Typing Algorithm Based on Lidar D probable aerosol type from a set of multispectral lidar data. EARLINET $3\beta+2\alpha(+1\delta)$ profiles;
- Intensive aerosol optical parameters for each identified aer

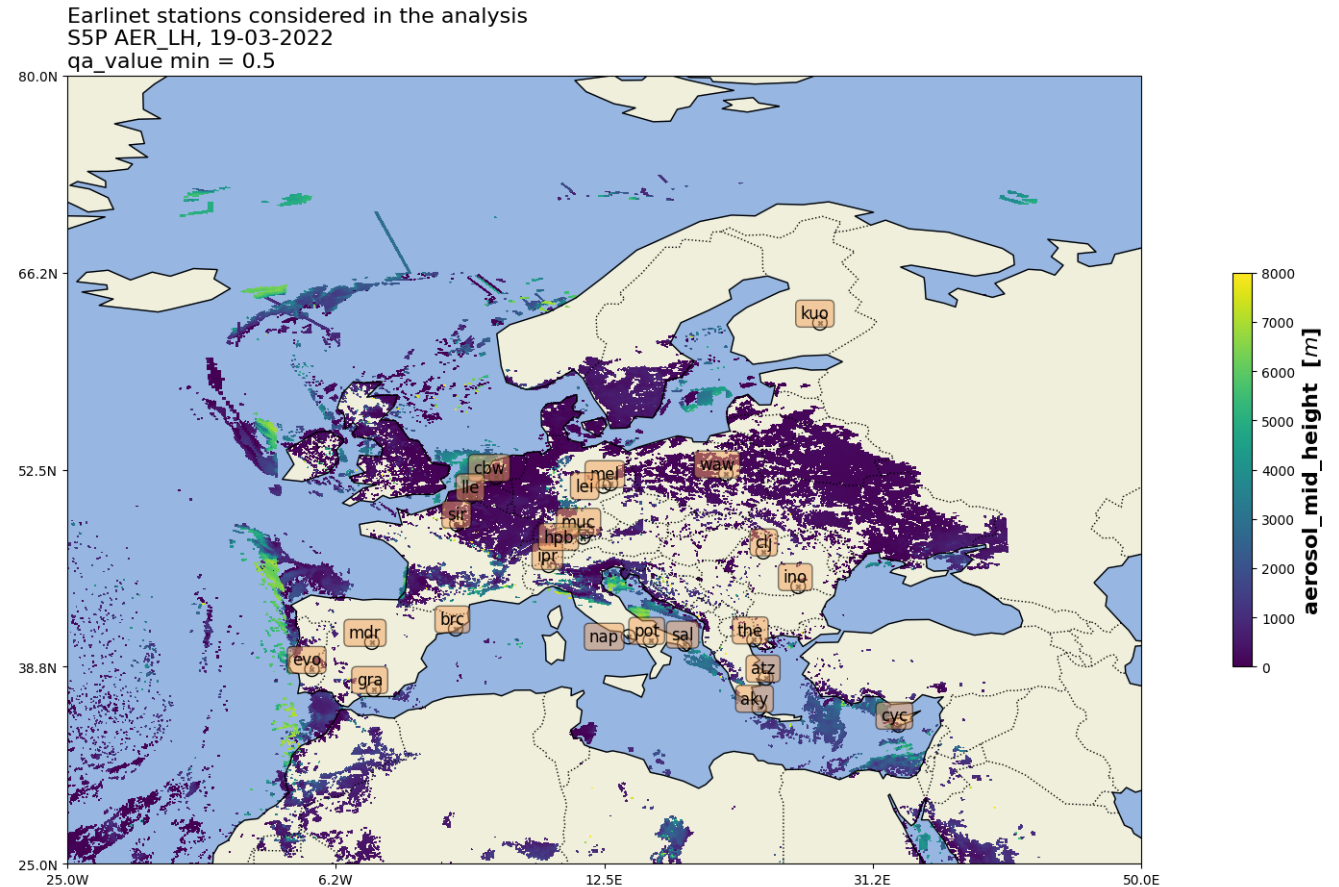


<https://earlinet.org>

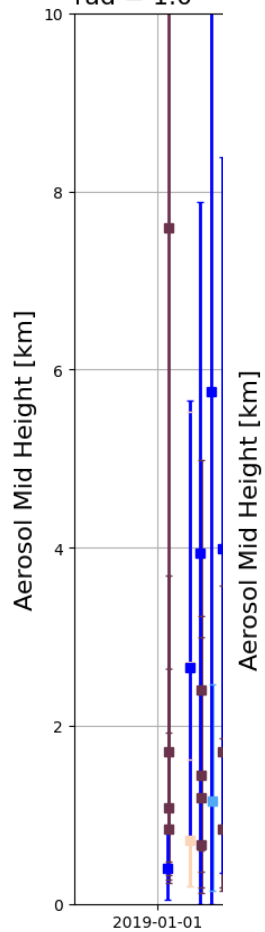
Nicolae, D., Vasilescu, J., Talianu, C., Binietoglou, I., Nicolae, V., Andrei, S., and Antonescu, B.: A neural network aerosol-typing algorithm based on lidar data, Atmos. Chem. Phys., 18, 14511–14537, <https://doi.org/10.5194/acp-18-14511-2018>, 2018.

TROPOMI ATBD of the Aerosol Layer Height product. source: KNMI; ref: S5P-KNMI-L2-0006-RP; issue: 1.0.1; date: 2019-06-24

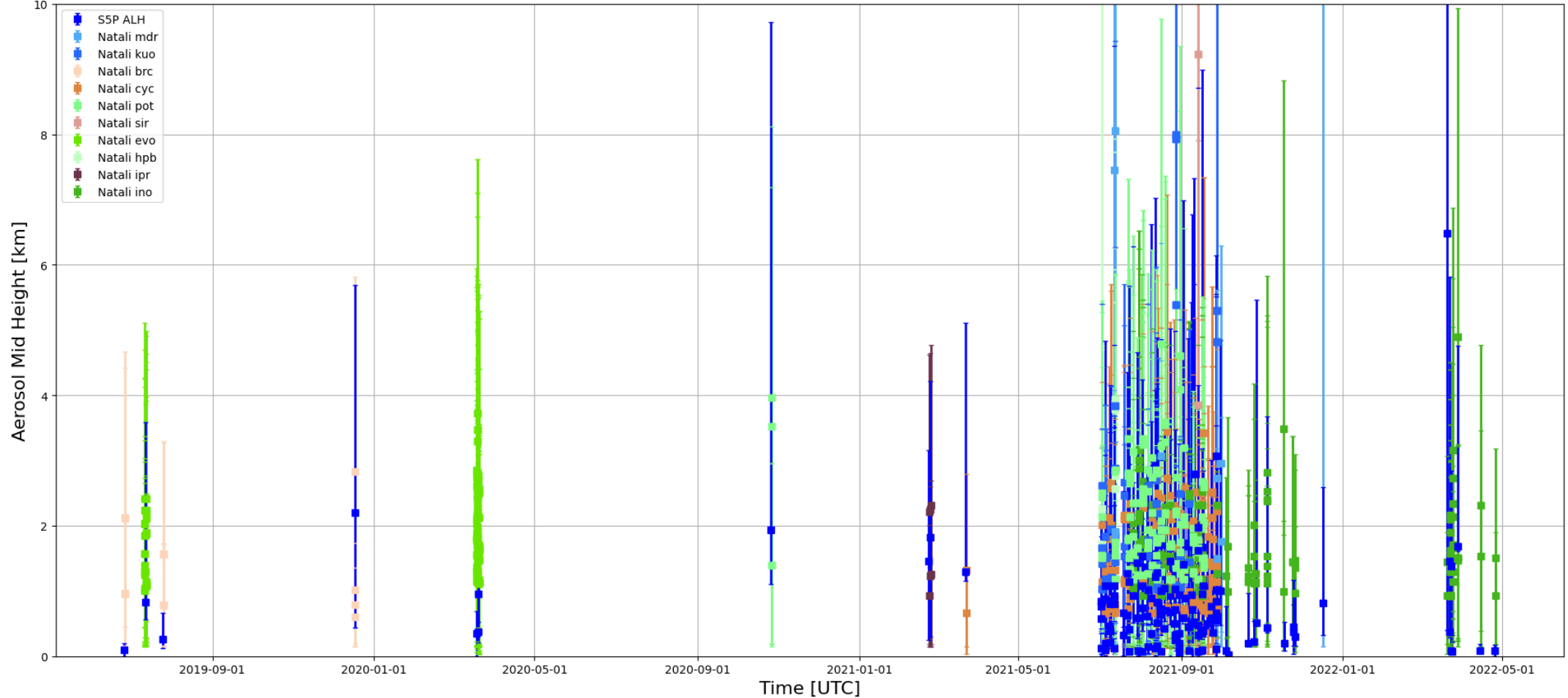
- ROI – EUROPE;
 - Lat = 25 – 80N;
 - Lon = 25W – 50E;
- Timeframe 2018 – 2022;
- Tropomi operational L2 ALH
 - OFFL + RPRO;
- EARLINET database
 - 24 stations;
 - 30 min average profiles regardless of the LIDAR's temporal resolution



- S5p Aerosol Layer Height comparison with Natali retrieval
 $qa_{min} = 0.1$
 $rad = 1.0$



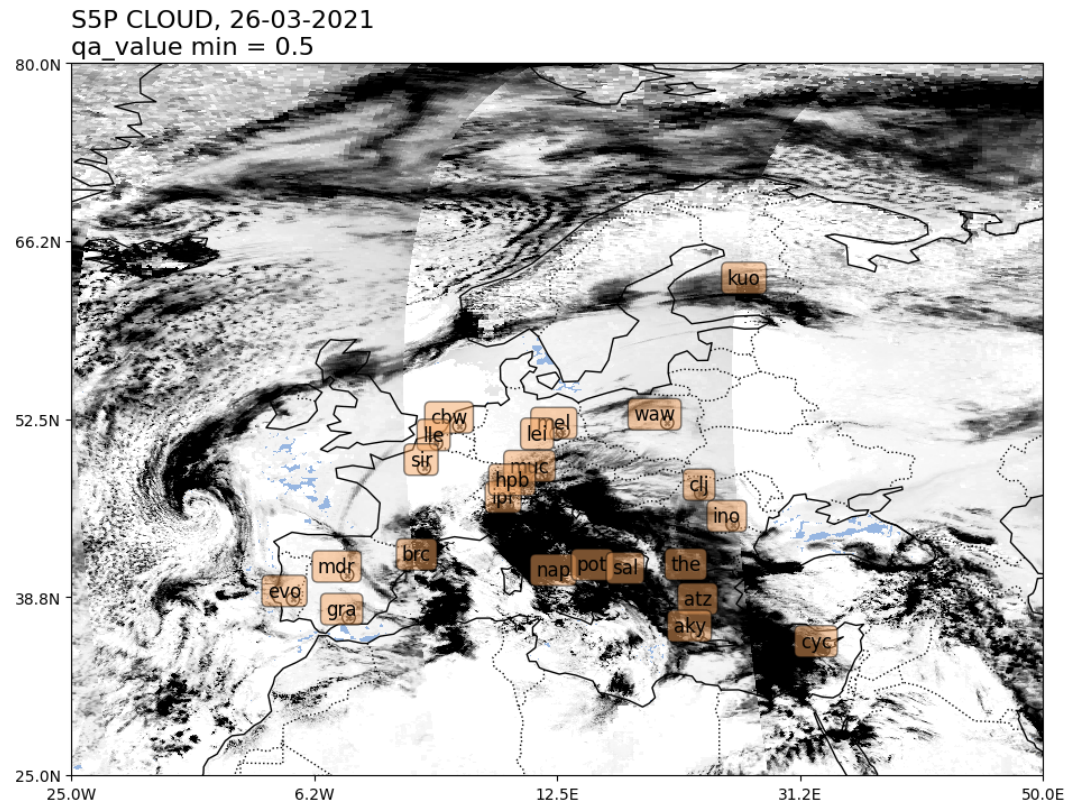
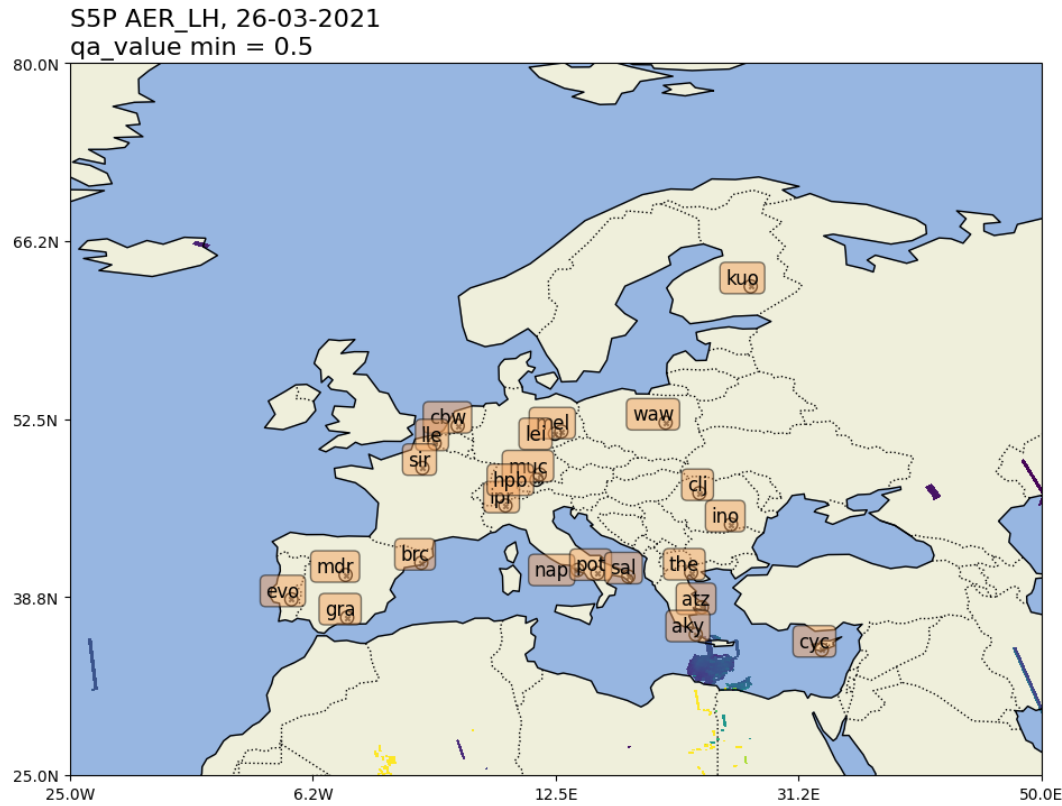
- S5p Aerosol Layer Height comparison with Natali retrieval
 $qa_{min} = 0.5$
 $rad = 0.5$



Challenges

- L2 ALH processor, before and after July 2021;
- Ground based nighttime measurements;
- Time difference and profile averaging;
- Low LH values from satellite retrieval;

Challenges – stringent filter on L2 ALH

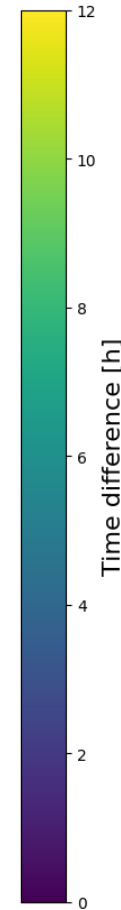
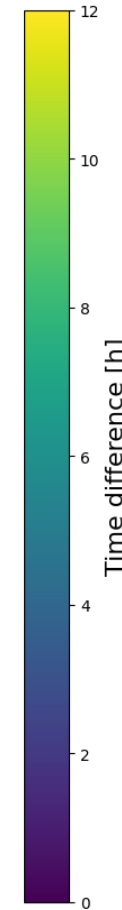
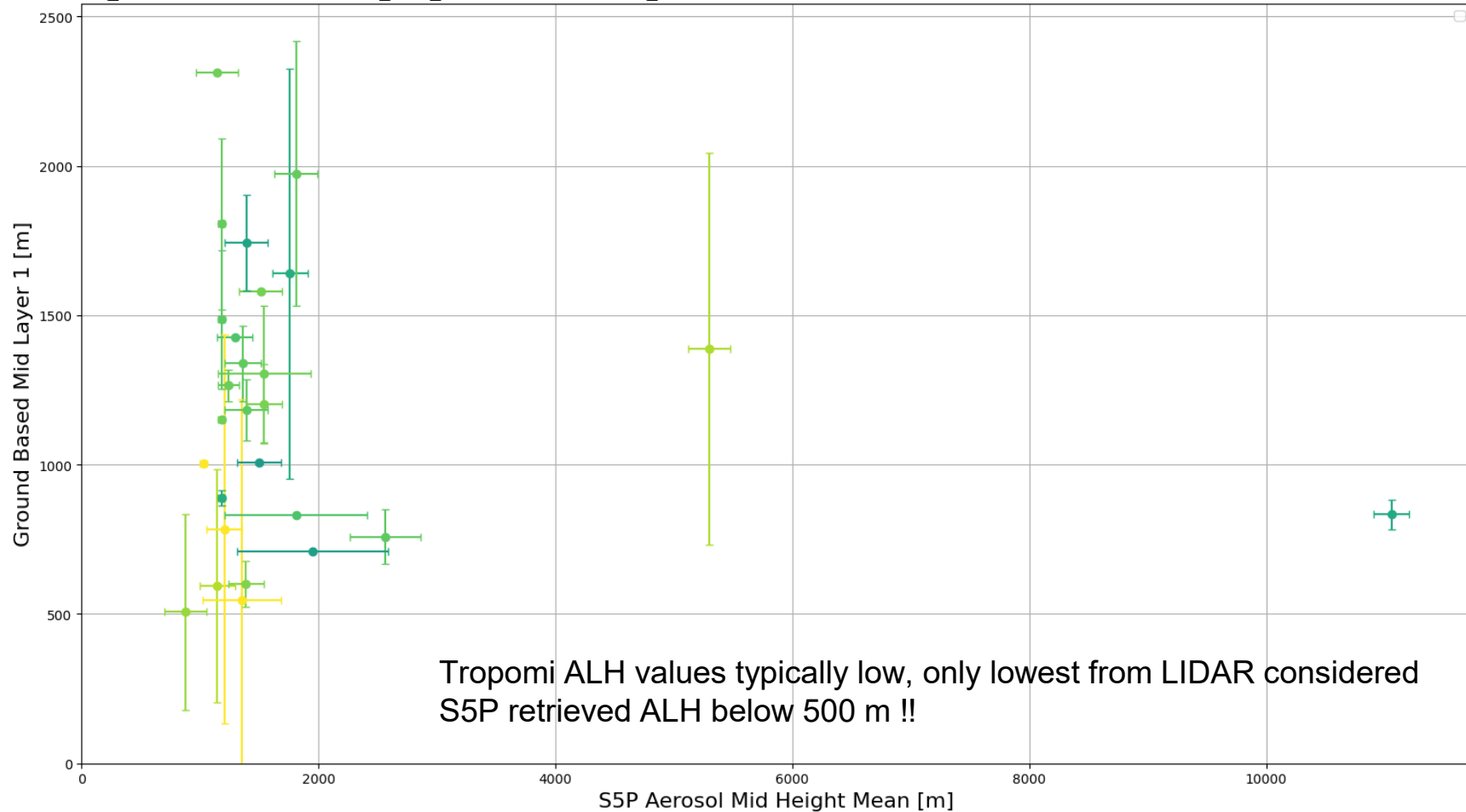


Challenges – Nighttime ground based

Correlation plot - all stations

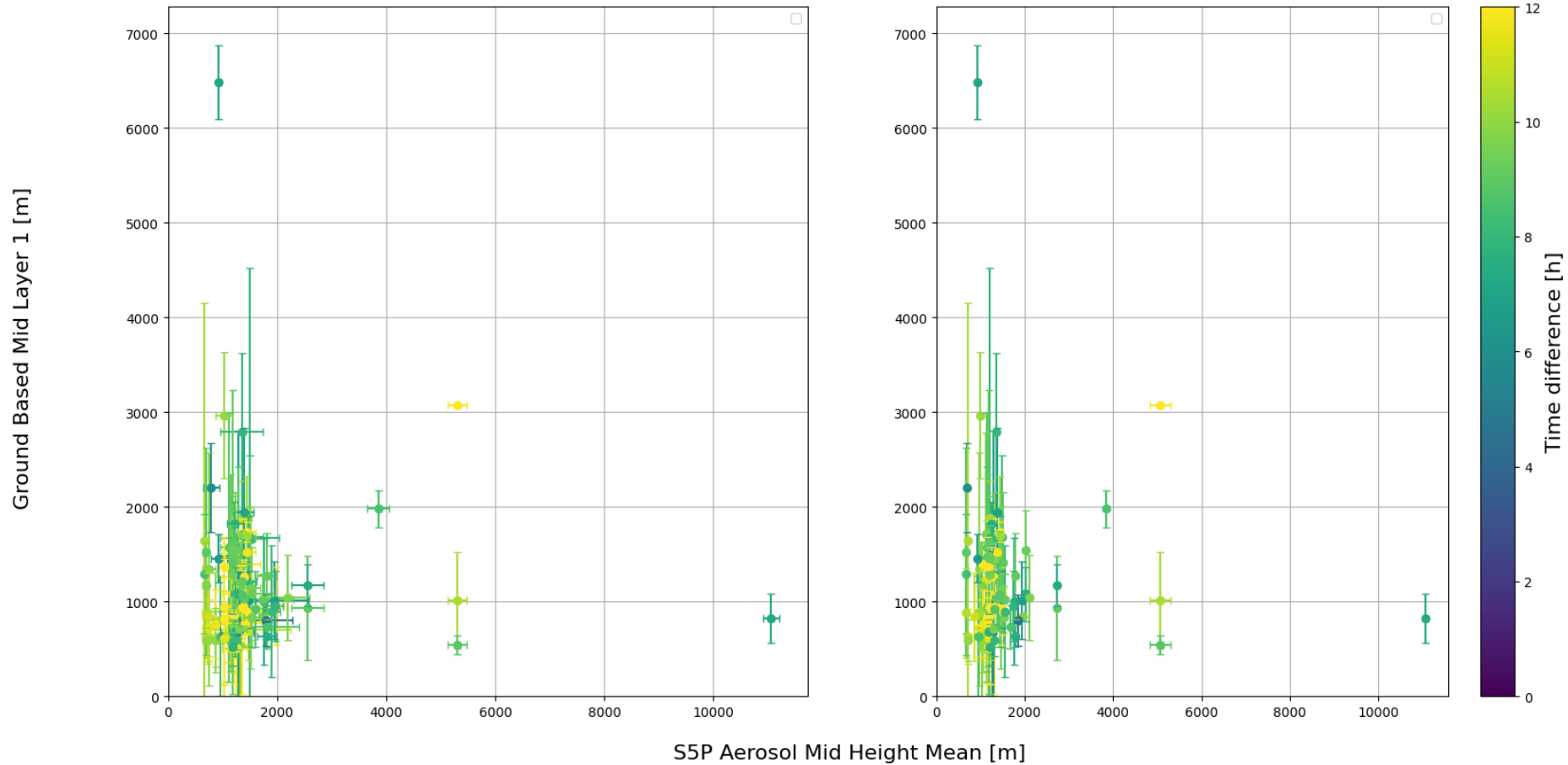
Type = closest

qa_min = 0.7; rad = 0.1; alt_min_s5p = 500[m]; #no_points = 27



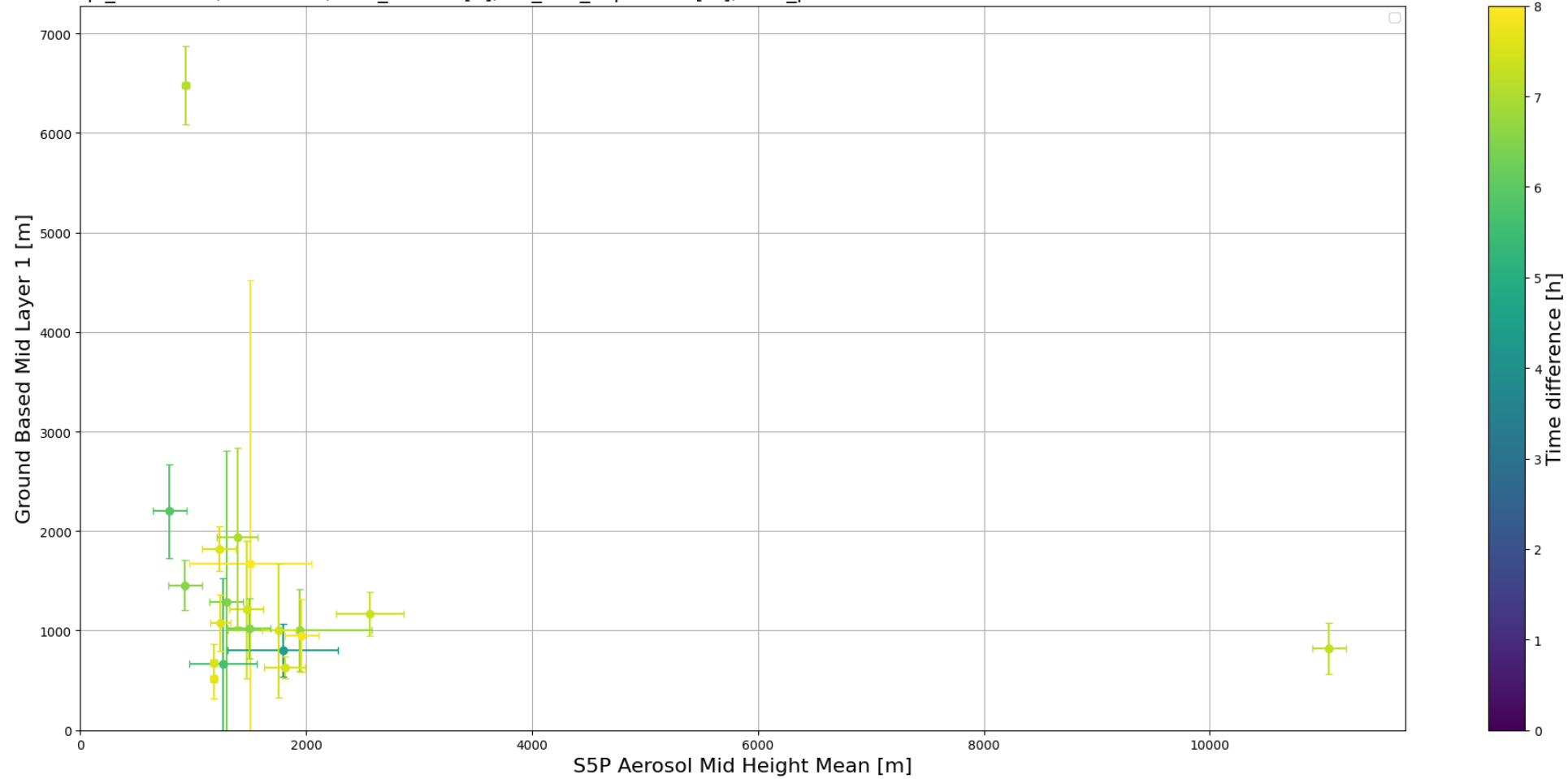
Challenges – Nighttime ground based – average vs closest profile

Correlation plot - all stations
Type = closest + average
qa_min = 0.5; rad = 0.5; alt_min_s5p = 500[m]; #no_points = 95

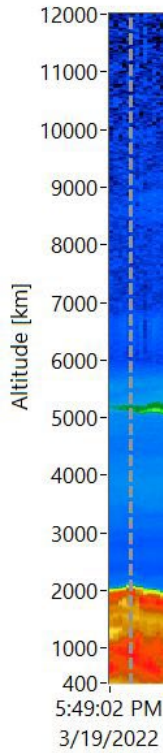


Time difference

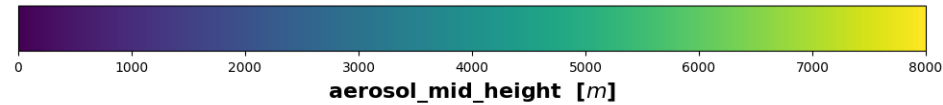
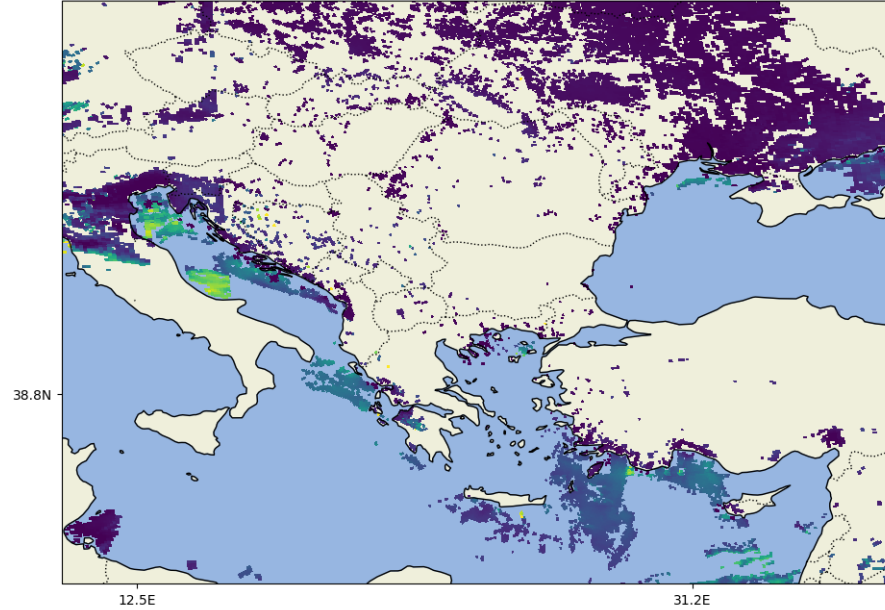
Correlation plot - all stations
Type = closest
qa_min = 0.5; rad = 0.5; time_diff = 8[h]; alt_min_s5p = 500[m]; #no_points = 20



S5P AER_LH, 2022-03-19
qa_value min = 0.5



S5P AER_LH, 2022-03-19
qa_value min = 0.5



aerosol_mid_height [m]

- On a path for developing a procedure for operational validation of TROPOMI L2 ALH product using ground-based LIDAR network -> towards statistically relevant co-locations;
- Improvement in the processor increase data availability;
- Time differences between ground based and satellite can be overcome with continuous LIDAR measurements -> adapted NATALI;
- Use of Ceilometer data – E-Profile network;
- Validation based on specific events.