

Field evaluation of miniature absorption photometers in an Eastern Mediterranean urban environment

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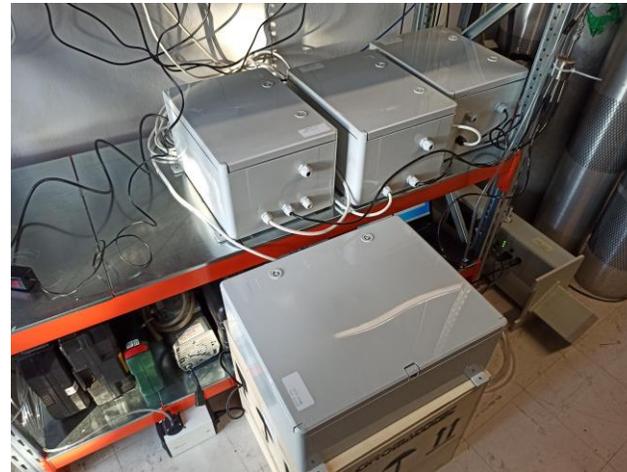


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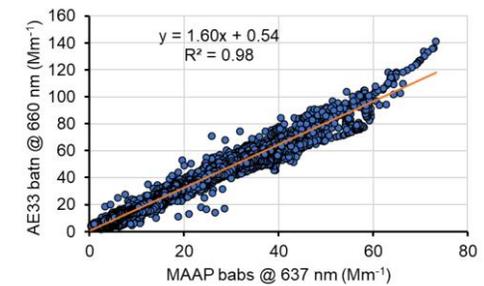
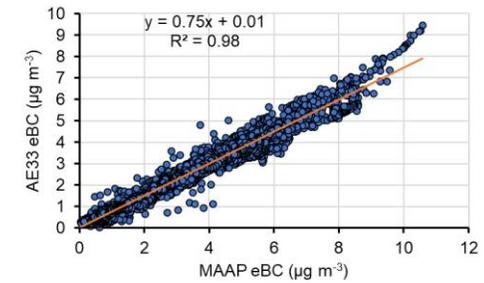
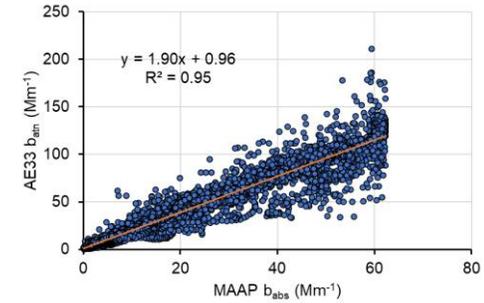
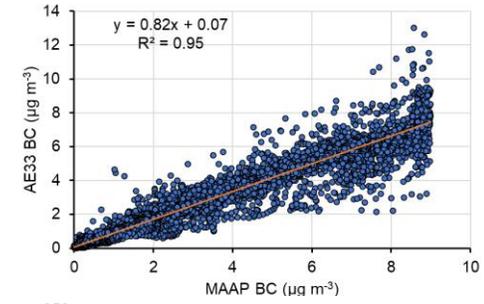
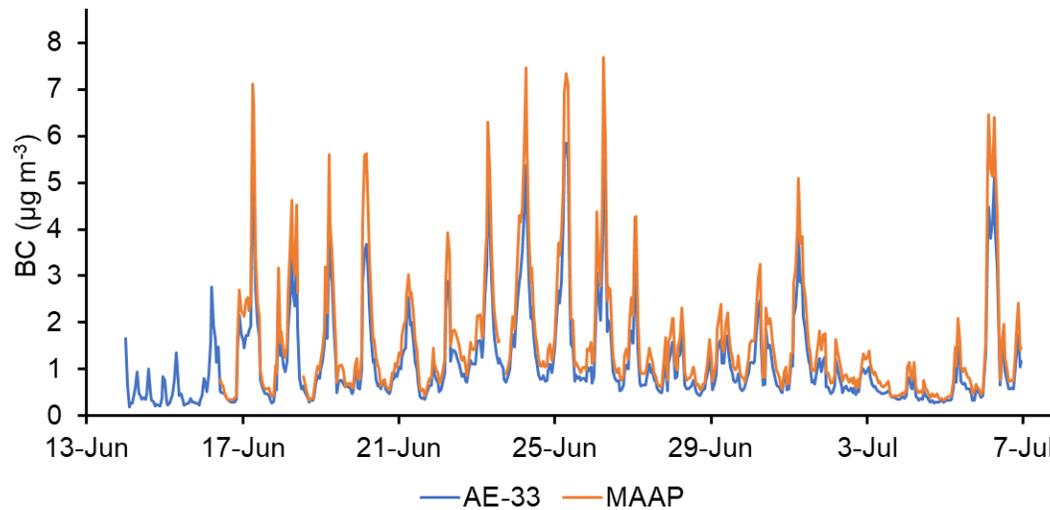
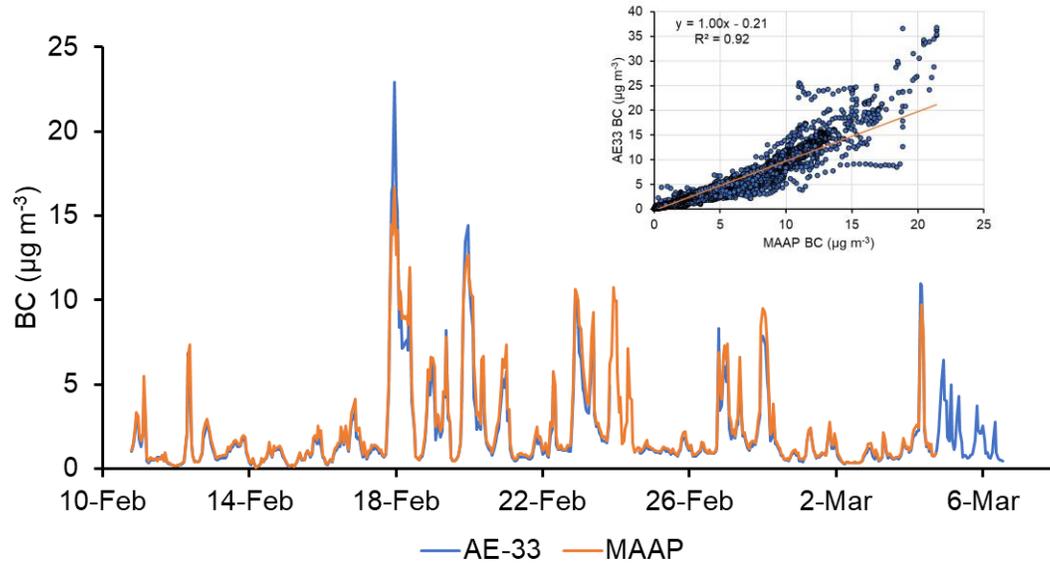
Study Design

- Aethlabs MA-200 (375, 470, 528, 625, 880 nm)
- Aethlabs MA-350 (375, 470, 528, 625, 880 nm)
- Haze Instruments CLAP (467, 529, 653 nm)
- AE-33 (370, 470, 520, 590, 660, 880, 950 nm)
- MAAP (637 nm)

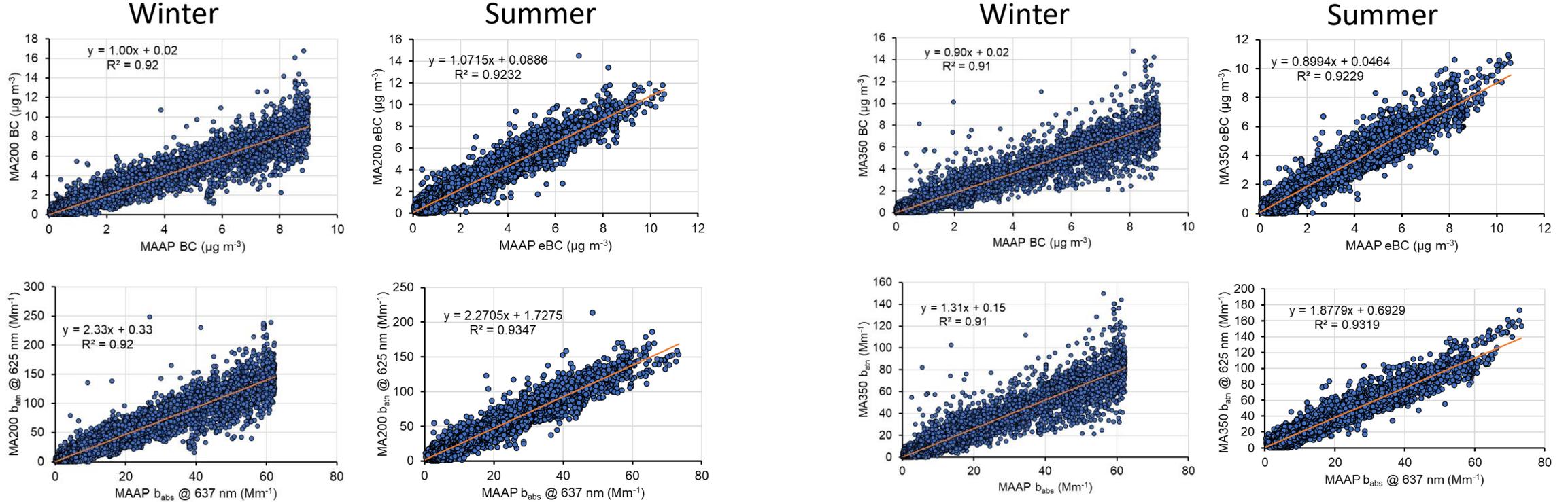


- 10 February - 06 March 2021
- 14 June – 06 July 2021
- 04 – 14 March 2022

BC and Absorption during the campaign

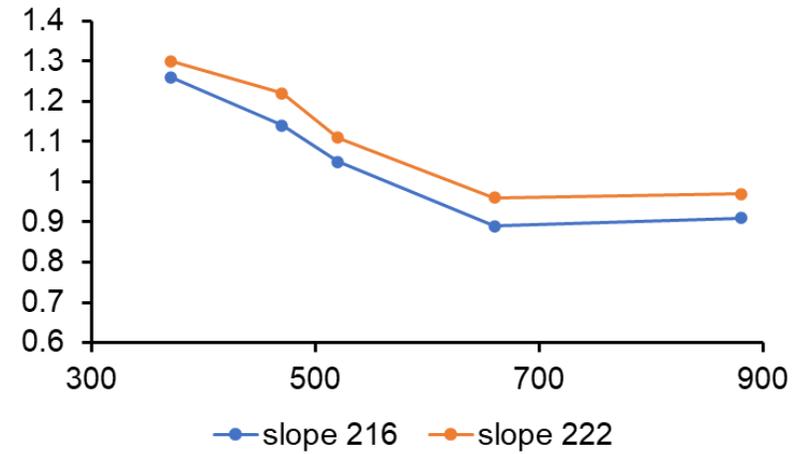
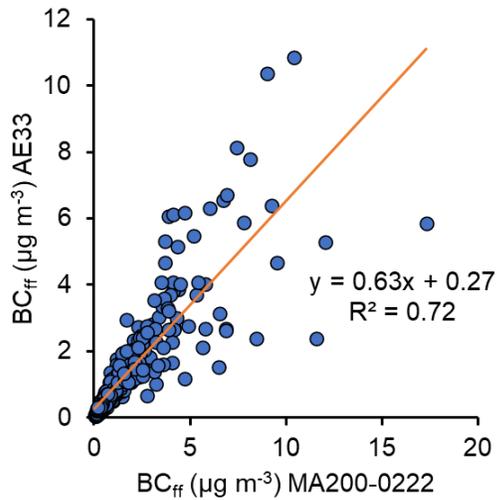
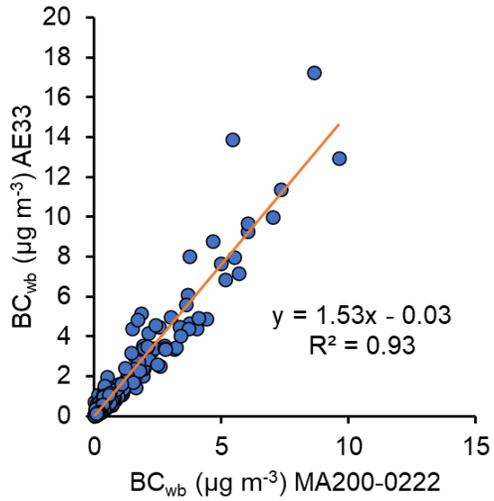
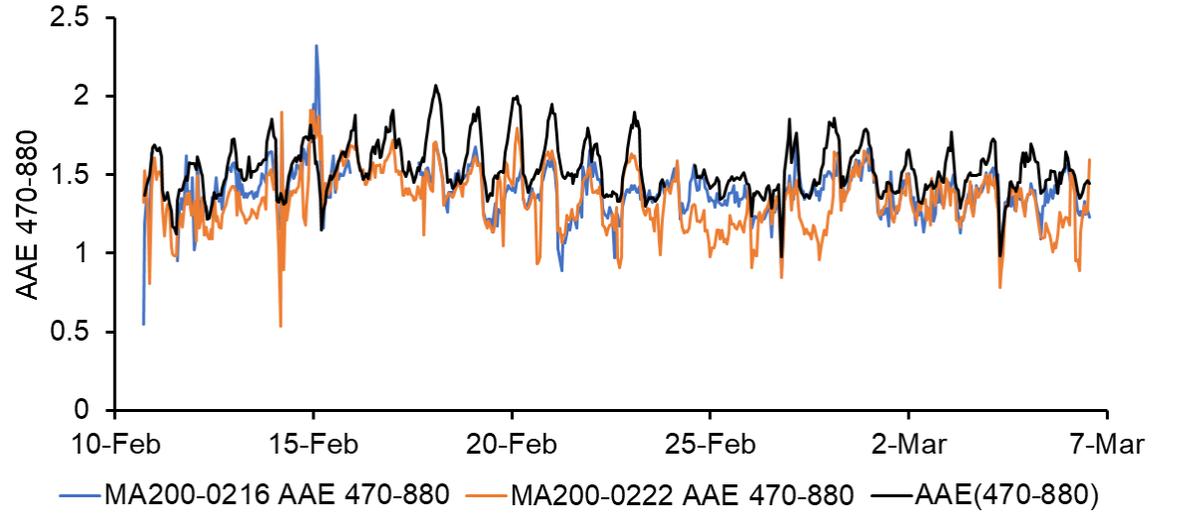
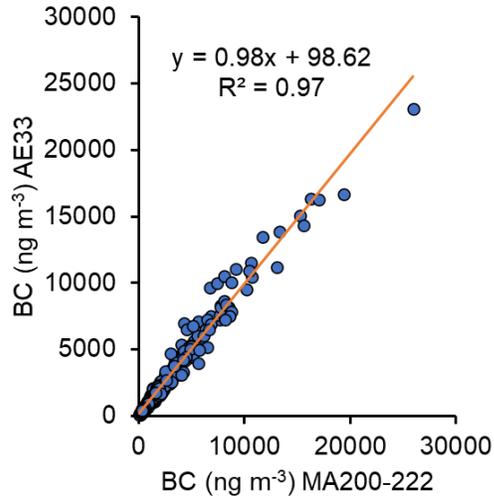
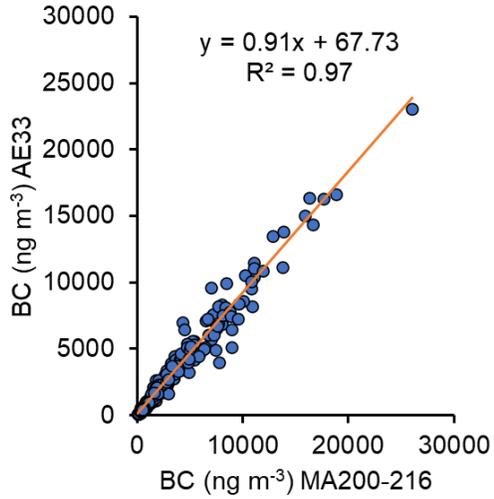


MA200 and MA350 Evaluation



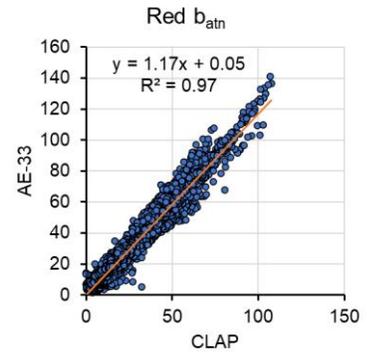
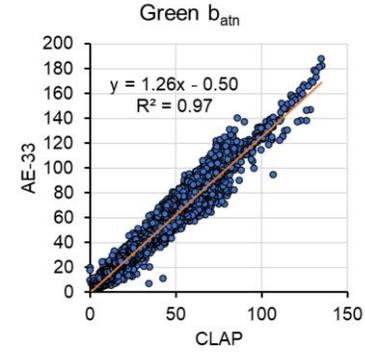
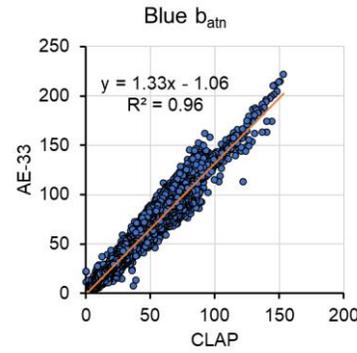
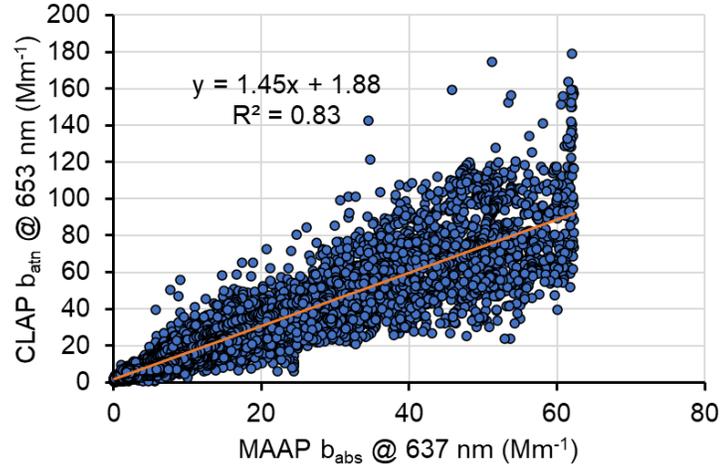
Calculated C_{ref} for mapping MAs in the 1.82 – 2.93 range during summertime

MA200 Semi Continuous

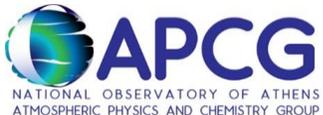
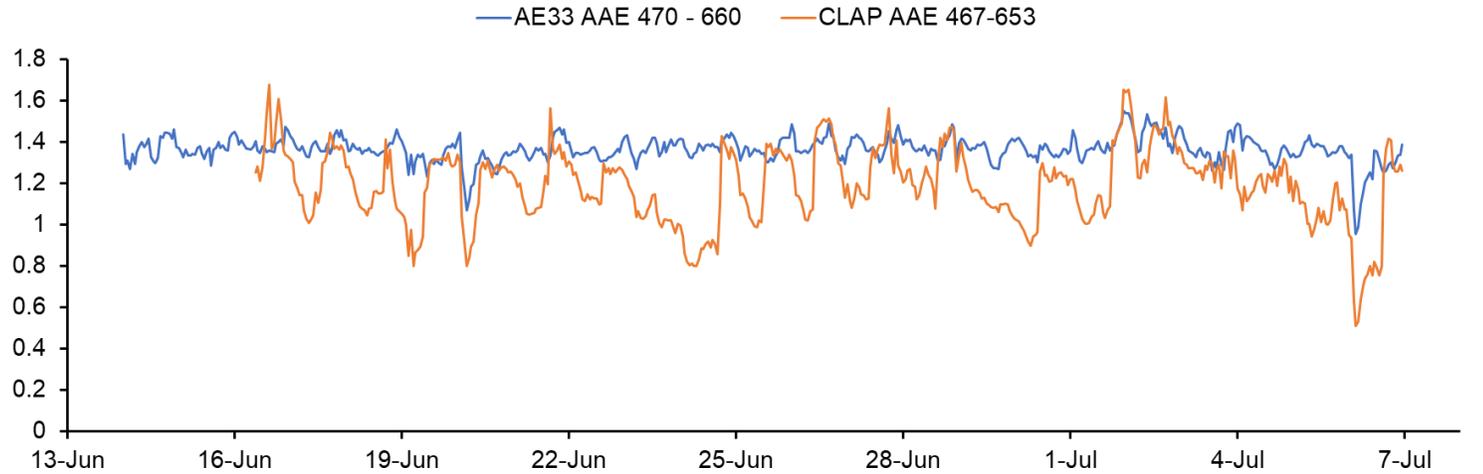
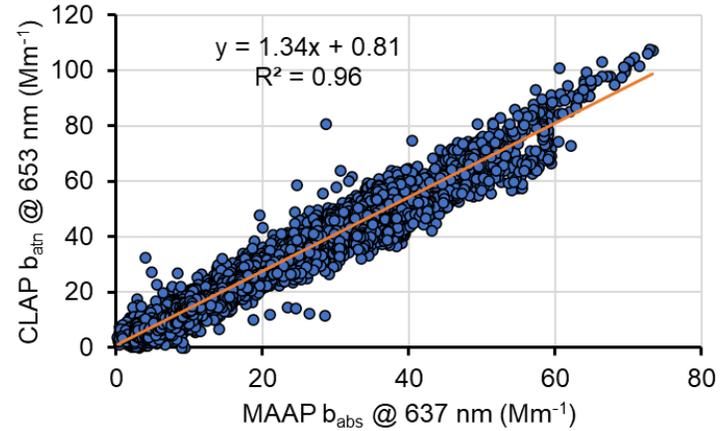


CLAP Evaluation

Winter

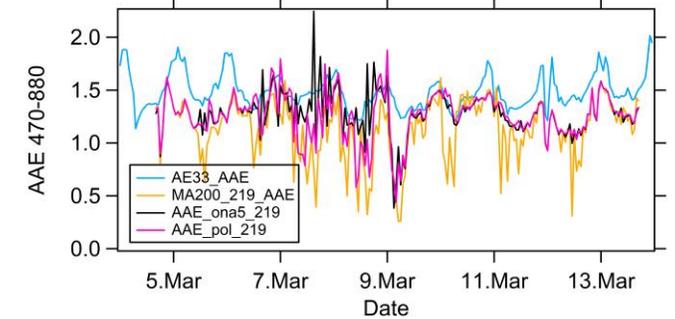
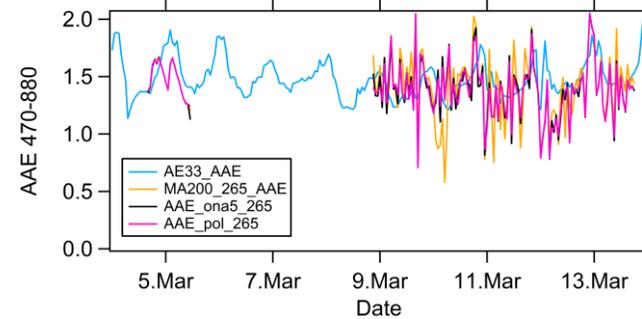
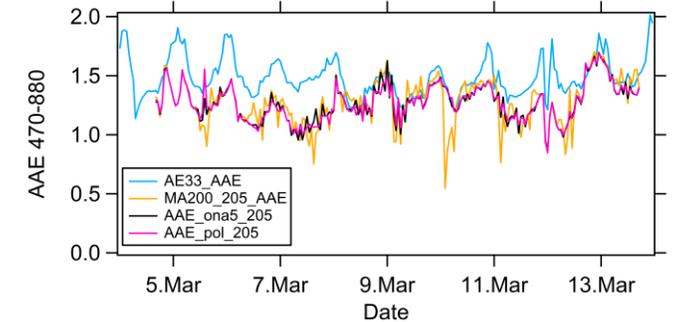
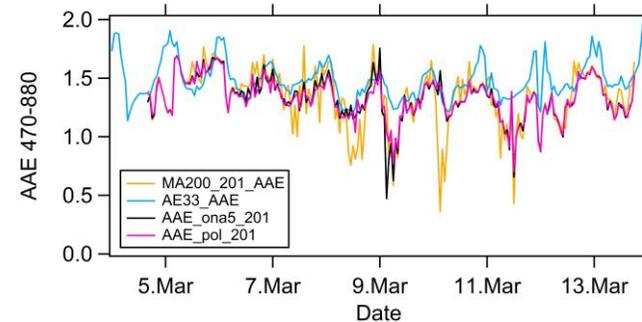
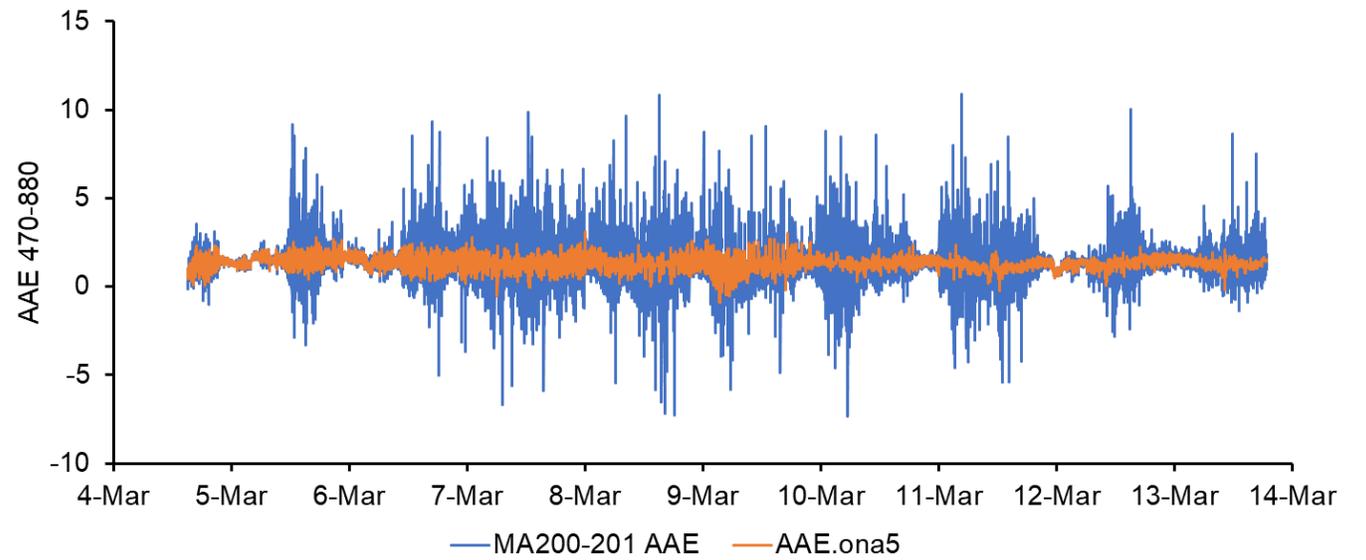
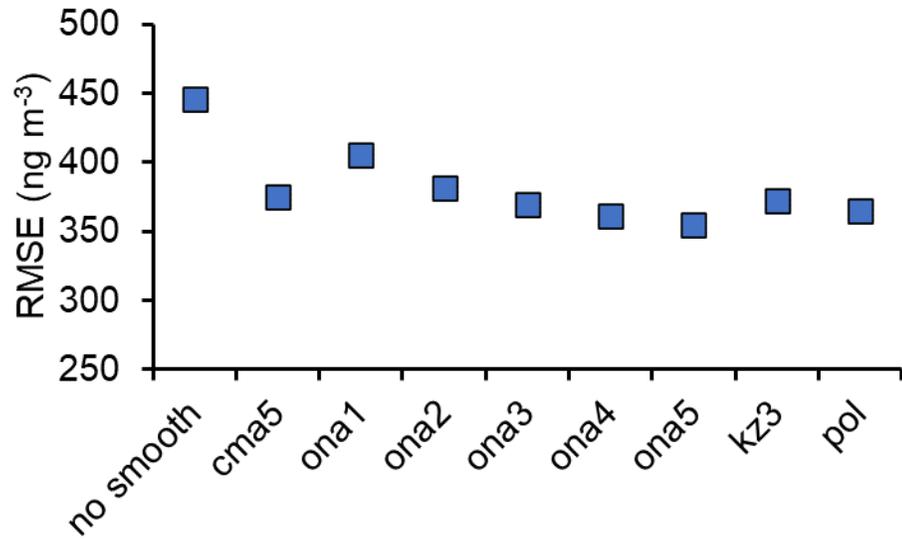


Summer



MA200 Data Smoothing

- Kolmogorov-Zurbenko low-pass filter
- Centered Moving Average
- 5 instances of the ONA algorithm
- Polynomial smoothing



- Excellent correlations observed for all photometers against “reference” instruments
- Significant variability in C_{ref} determination for the MA series instruments
- Even though b_{abs} spectrally are highly correlated, miniaturized instruments systematically “underestimate” coefficients while moving to lower wavelengths
- Significant impact on AAE calculation
- Noise reduction algorithms improve data quality significantly