Spectral Aerosol Optical Depth Retrievals by ground-based COCCON FTIR spectrometry

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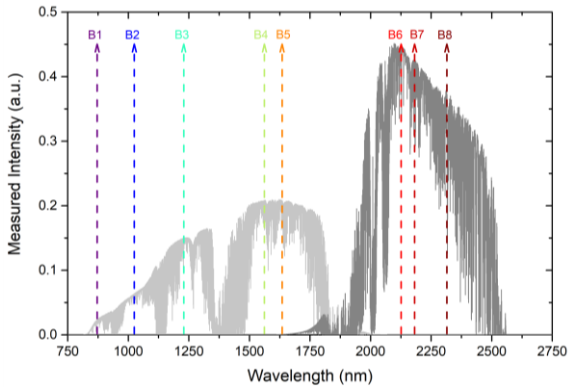
OBJECTIVES

1) Exploiting the COCCON EM27/SUN measurements to retrieve NIR & SWIR aerosol information.
2) Enhancing the FTIR multi-parameter capability for atmospheric monitoring: simultaneous gas and aerosol retrievals.

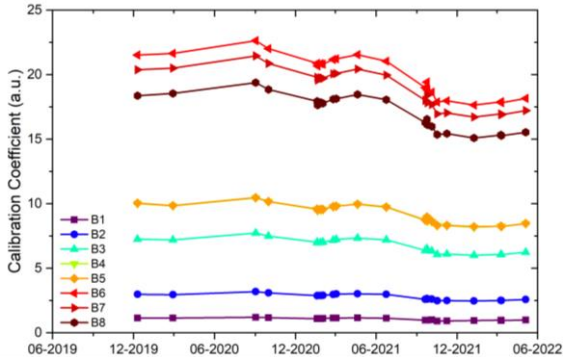
METHODOLOGY

8 FTIR Micro-Windows
(very high solar transmission)



Centered at 872.55, 1020.90, 1238.25, 1558.25, 1636.00, 2133.40, 2192.00, and 2314.20 nm

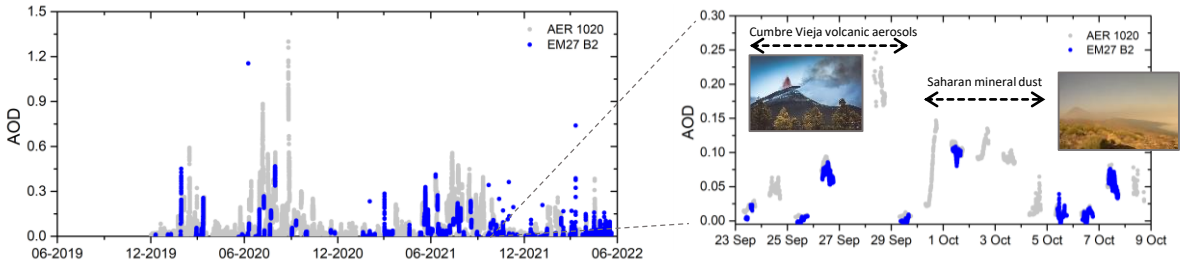
Continuous Langley-Plot calibration
(photometric stability)



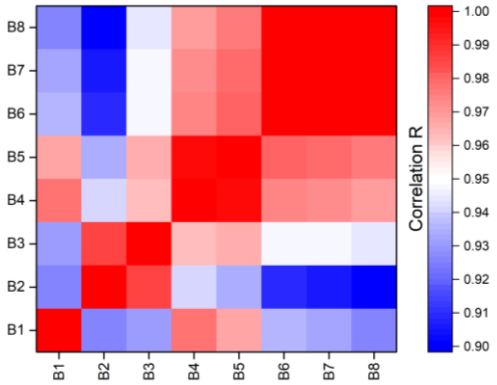
linear degradation rate of ~0.5%month^{-1}!
degradation of the external and exposed parts of the EM27/SUN

RESULTS & CONCLUSIONS

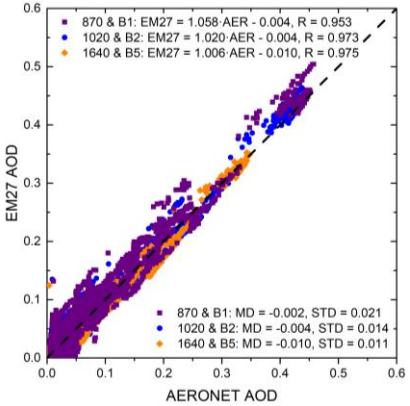
Long (2.5 years) Spectral Aerosol Optical Depth (AOD) measurements



Spectral AOD consistency
Cross-validation between EM27 AOD



Validation
Co-located AERONET AOD



- Low-resolution COCCON instruments are suitable for detecting the aerosol NIR & SWIR broadband signal and for retrieving precise gas concentrations.
- FTIR aerosol products can be used as proxy for atmospheric chemistry.
- Additional information to increase the spectral sensitivity to large particles.

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Reference: Barreto, Á.; García, O.E.; Schneider, M.; García, R.D.; Hase, F.; Sepúlveda, E.; Almansa, A.F.; Cuevas, E.; Blumenstock, T., Spectral Aerosol Optical Depth Retrievals by Ground-Based Fourier Transform Infrared Spectrometry. Remote Sens. 2020, 12, 3148.
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