The QUATRAM Campaign
QUAlity and TRaceabiliy of Atmospheric aerosol Measurements

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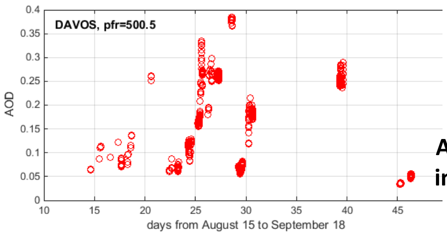
Measurement traceability and data quality are essential requirements by the WMO for monitoring atmospheric aerosol optical properties by International radiometer networks (Kazadzis, 2018). However, it is really important developing and validating new "on site" calibration procedures, to be compared with the programs of traceability to CIMO defined standard instruments and methods.
"On site" methodologies allow frequent traceability of measurements and avoid internal inevitable changes of the equipment due to their shipping, that can alter also the most accurate calibration of master instruments.

The QUATRAM campaign (http://www.euroskyrad.net/quatram.html) is aimed to evaluating both the homogeneity and comparability among measurements performed by equipment of different International Networks and/or manufactures, and the accuracy of new "on site" calibration procedures (Campanelli, 2004)

Networks/Instruments involved in QUATRAM are:
ESR/SKYNET: 4 PREDE/POM sun-sky photometers; AERONET: CIMEL 318 photometer; PANDONIA: Pandora spectrometer; WMO: Precision Filter Radiometer (PFR); Multi Filter Rotating Shadowband Radiometers (MFRSR), Middleton photometers

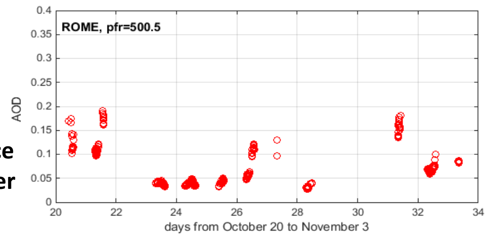
DAVOS
QUATRAM 1ST PHASE

ROME
QUATRAM 2ND PHASE



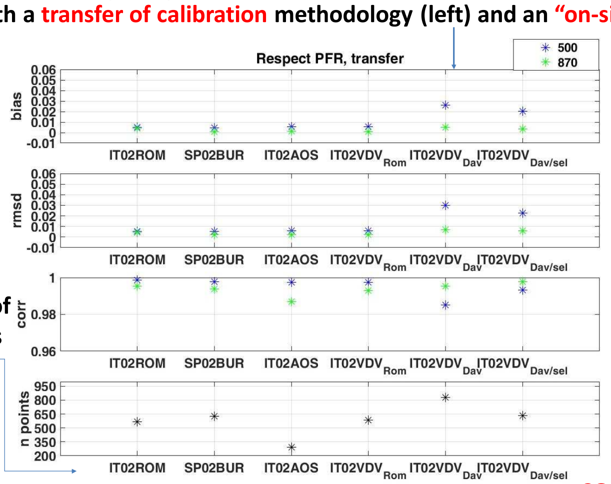
	<AOD>±std at 500 nm	<AOD>±std at 870 nm
Davos	0.1510 ± 0.0869	0.0769 ± 0.0497
Rome	0.0621 ± 0.0365	0.0282 ± 0.0176

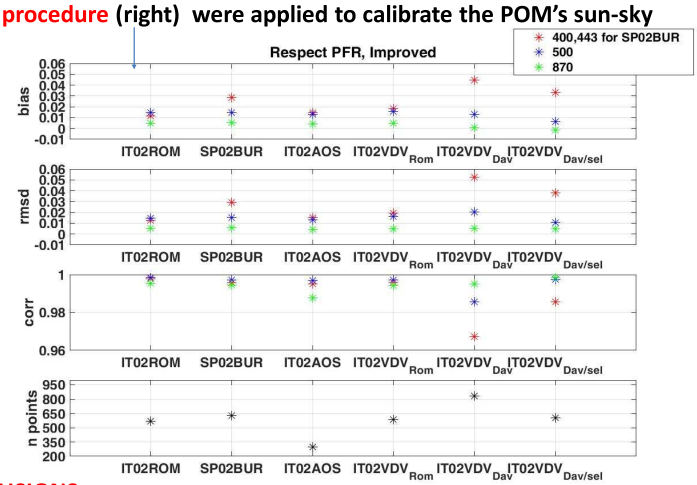
AOD measured by PFR (considered as the reference instrument) in both the locations, showed a greater turbidity in Davos respect to Rome



Both a transfer of calibration methodology (left) and an "on-site" procedure (right) were applied to calibrate the POM's sun-sky

Names of the POM's





CONCLUSIONS

The transfer methodology Rome showed, as expected, very good agreement between POM's and the reference PFR (BIAS and RMSD below 0.01 at 500 an 0.005 at 870 nm). Davos both the parameters increase mostly at 500 nm, even after the selection of points likely contaminated by clouds (IT02VDV_Dav/sel).

Improved on-site methodology Rome showed slightly greater BIAS and RMSD (0.015 at 500 nm, and below 0.01 at 870 nm). Davos the tendency is opposite respect to the transfer method, with a better agreement both before and after the selection of supposed cloud contaminated points (BIAS and RMSD below 0.01 at 500 nm and close to 0 at 870 nm).

For higher AOD the "on site" methodology works better (in Davos in this case) whereas the for lower AOD the transfer of calibration has a very good results (in Rome in this case). The reason is that in the "on site" method, the calibration constant is obtained by a modified Langley plot where on x axis the product of airmass to AOD is used. The latter is retrieved from Mie inversion of almucantar measurements, that in case of low turbidity has more uncertainty.

FUTURE STEPS:

1. application of the "on site" method to Pandora and Cimel. 2. Intercomparison of AOD from Middleton and MFRSF 3. Repeat the campaign

REFERENCES: Kazadzis,,https://doi.org/10.5194/acp-18-2395-2018, 2018; Campanelli M., Applied Optics, Vol 43 n. 3, 20 January 2004;