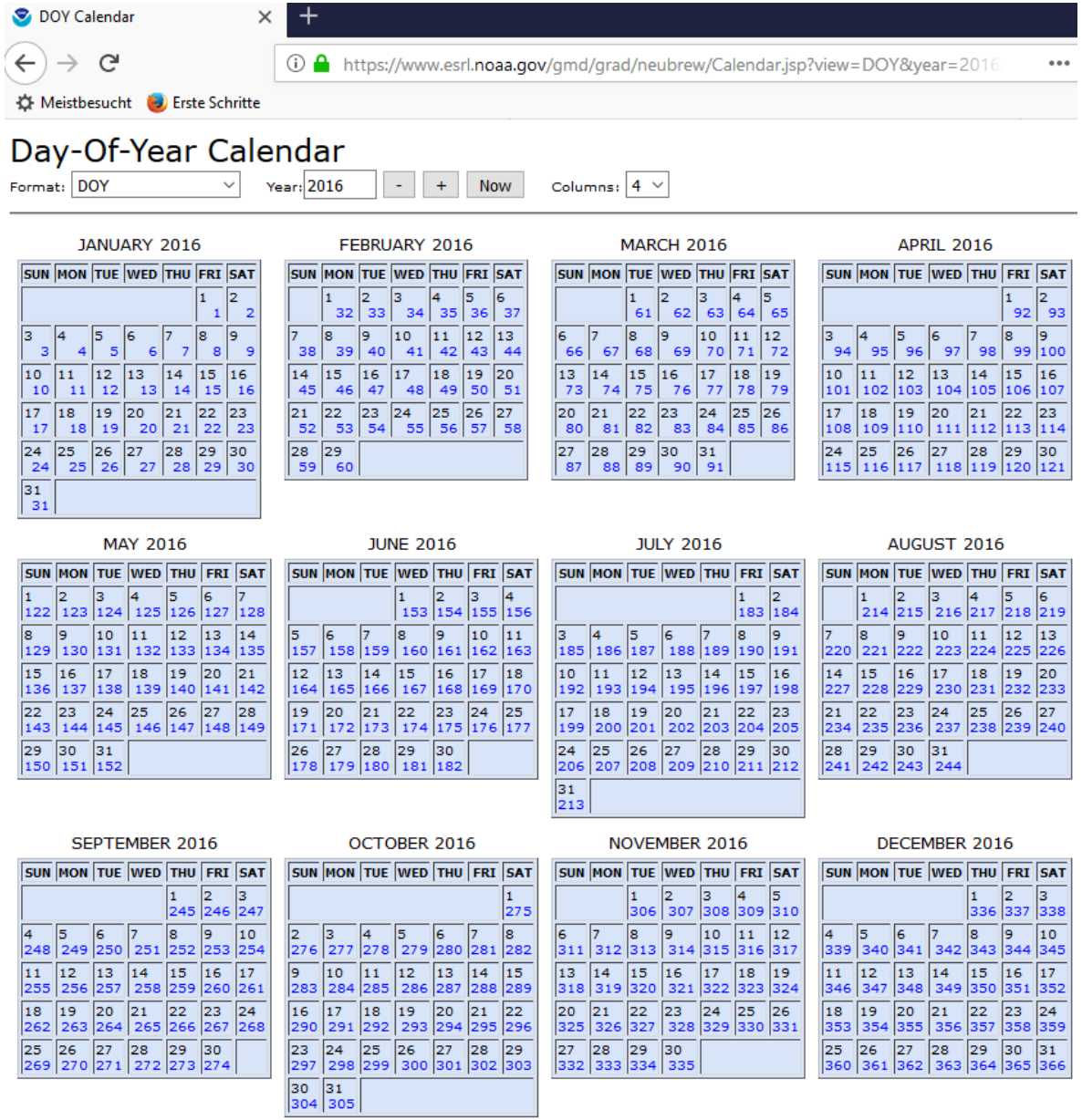
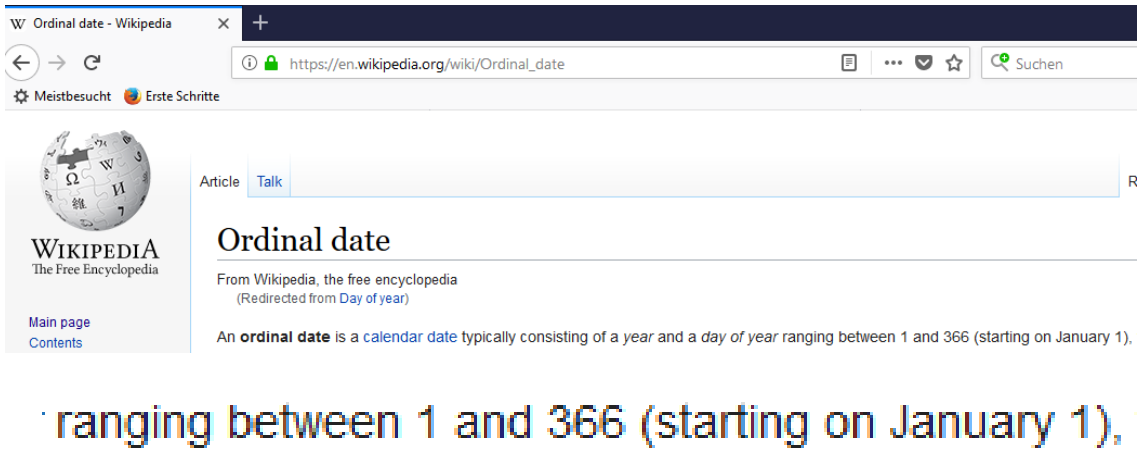
Day of year (DOY)

First hit on google:



Wikipedia:



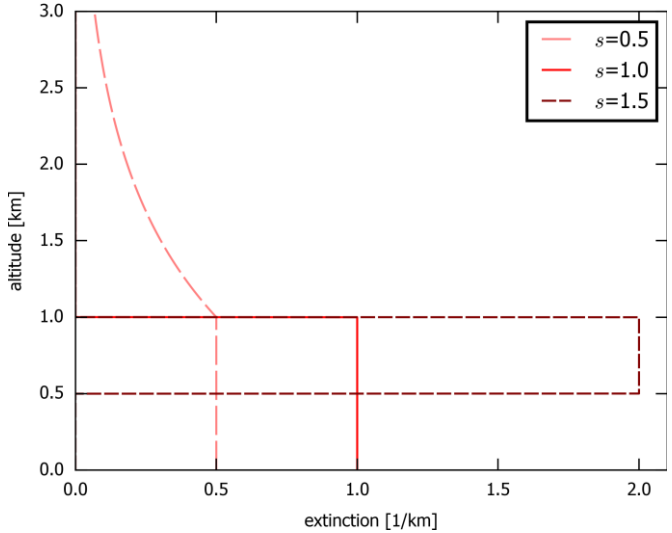
- Within CINDI: 0.0 means 1st of January, 0:00
- Do not change a running system ...
- ... but change naming?
  “zero-based day in year“?
  NOT doy!
- Add warning to headers
- Use real date in presentations

AOD and aerosol extinction profiles during CINDI-2 derived with MAPA

Steffen Beirle, Steffen Dörner, Sebastian Donner, Thomas Wagner

MPIC Mainz

MAPA: MAinz Profile Algorithm



- Profile parameterization by 3 parameters:
  c (column), h (height), s (shape)
- RTM: McArtim
- AMF: LUT for different viewing & sun geometries and c/h/s
- Profile retrieval based on MC:
  try out parameter combinations and take the best
- To be implemented in FRM4DOAS processing chain

MAPA flags

- All results are written to output
- MAPA provides „warning“ and „error“
- FRM4DOAS: standardized flagging scheme for various instruments & conditions!
- Low warning thresholds, high error thresholds
- Flagging thresholds v0.81 developed and optimized for CINDI2 (and FRM4DOAS)
- Coming weeks: further tests (Mainz, AQABA, Mongolia, ATTO, China, Mohali, …)

MAPA flags

Flags indicate

- poor agreement of dSCDs
- no surface-near profile
- Large variability in column parameters
  -> Different parameter sets yield similar dSCDs
  -> For these cases, MAPA is not sensitive

O_4 scaling factor (SF)

Why should we need it? No idea.

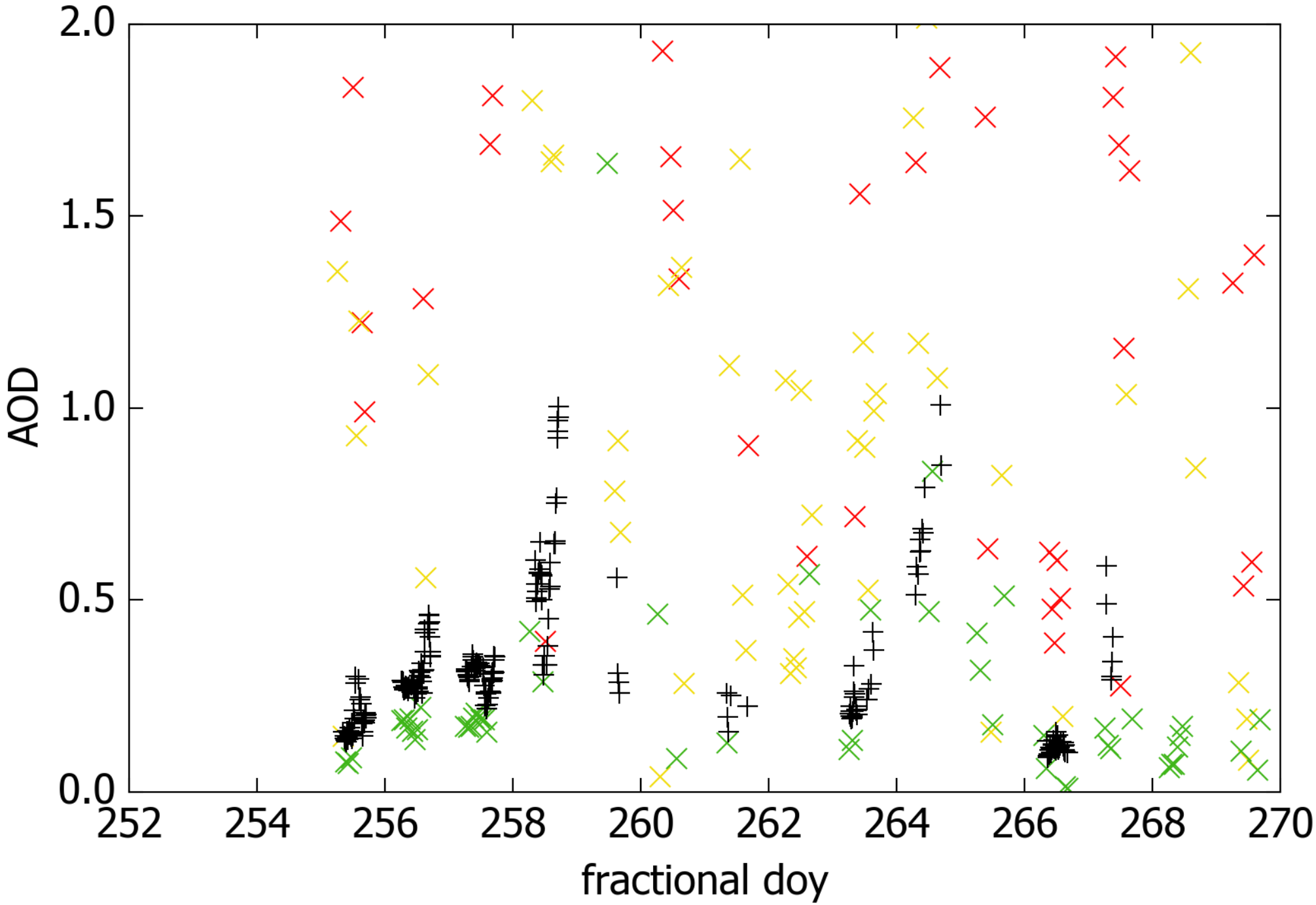
Do we need it? Yes!

- MAPA determines the best matching VCD for both trace gases and O_4 fit
- Not MC, but analytical (does not affect speed)
- SF = ratio of a-priori and a-posteriori O_4 VCD

MAPA analysis for CINDI-2

- A-priori O_4 VCD based on T and p profiles from ECMWF
- MAPA v0.81
- Runs with
  - SF fixed to 1, 0.9, 0.8
  - fitted SF
- dSCDs from MPIC and inter-instrumental median

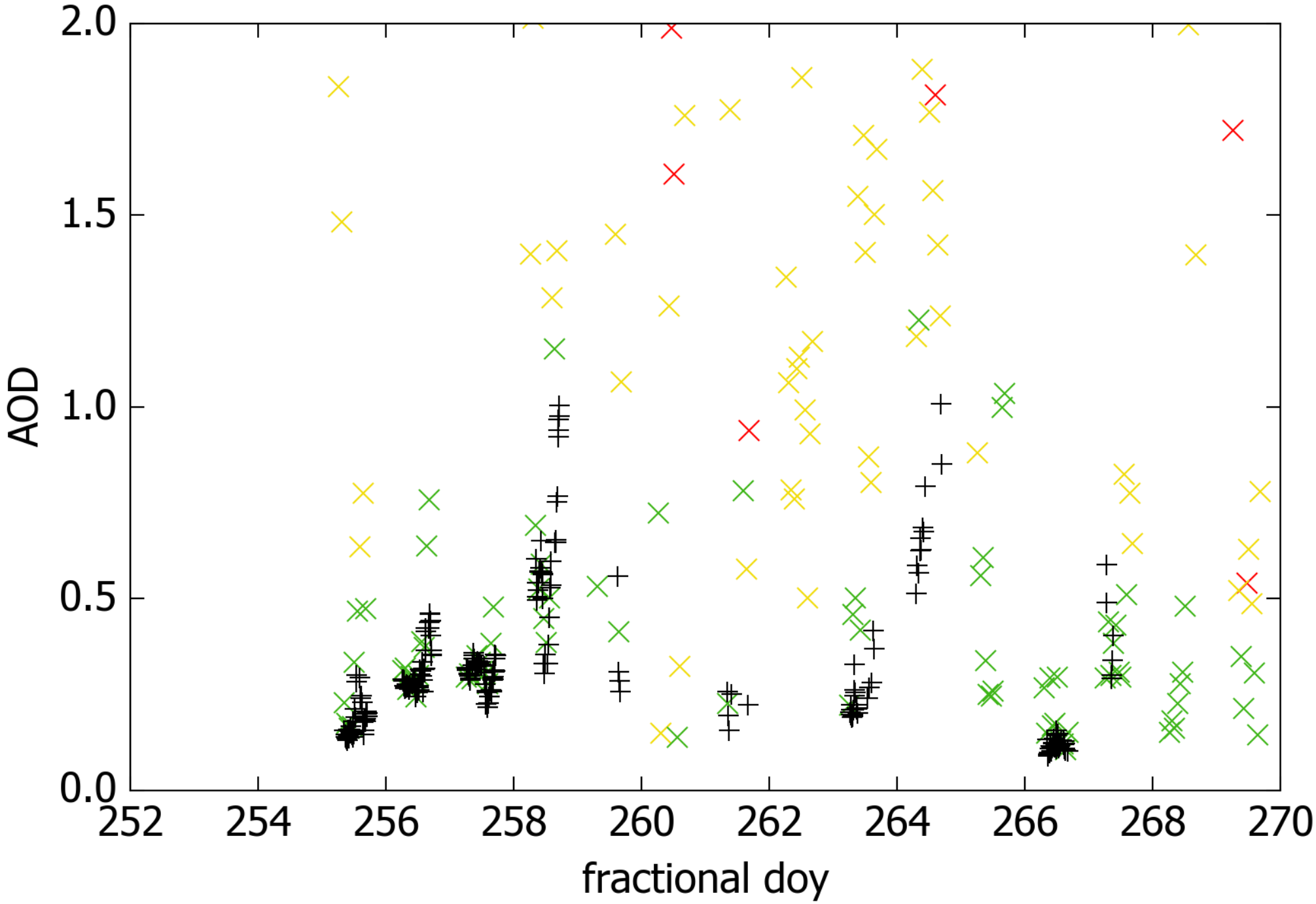
CINDI
Median SCD
UV
Aerosol



+: External
x: MAPA
x: OK
x: Warning
x: Error

CINDI
Median SCD
UV
Aerosol

SF 0.8



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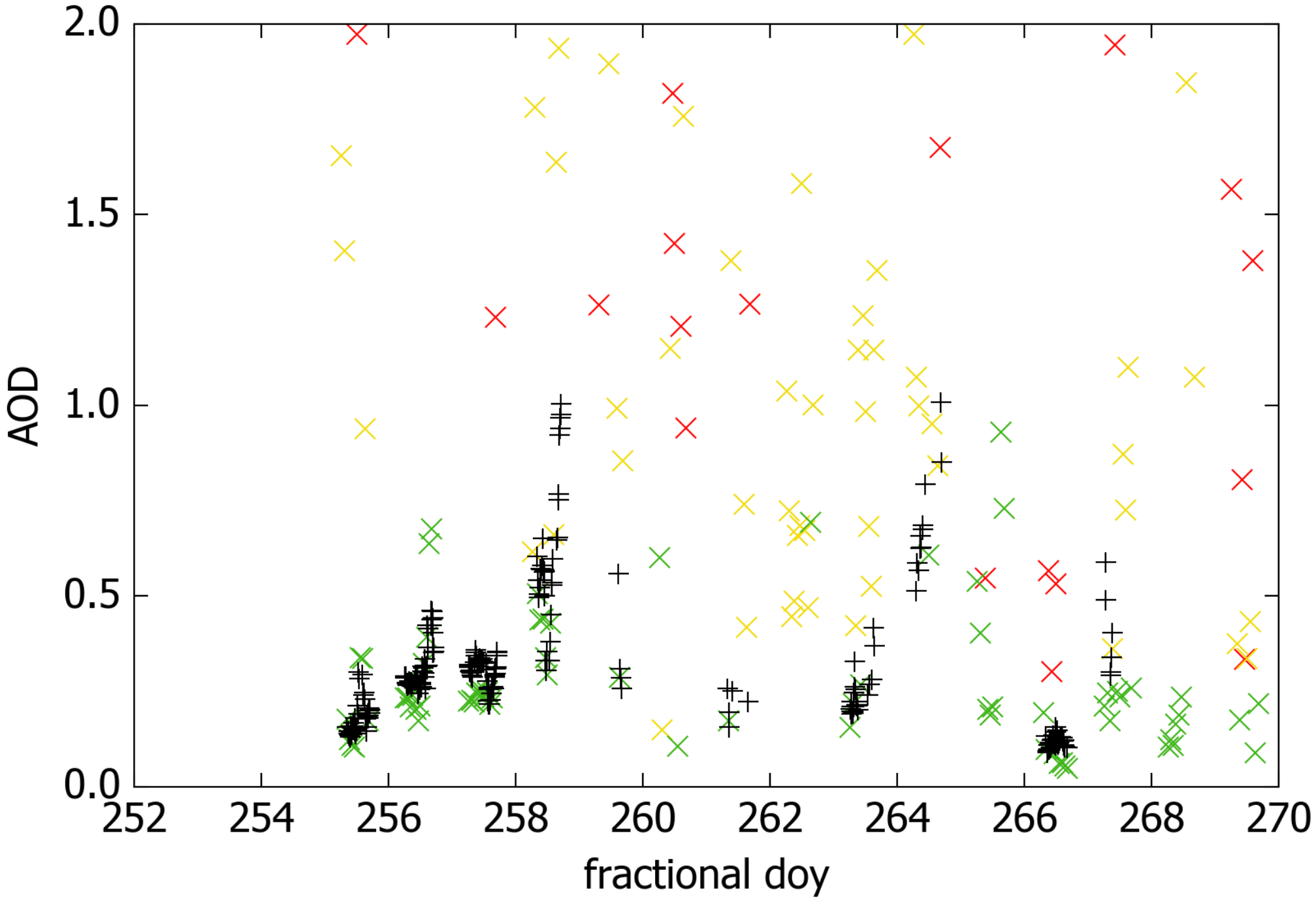
x: MAPA
x: OK
x: Warning
x: Error

CINDI
Median SCD
UV
Aerosol

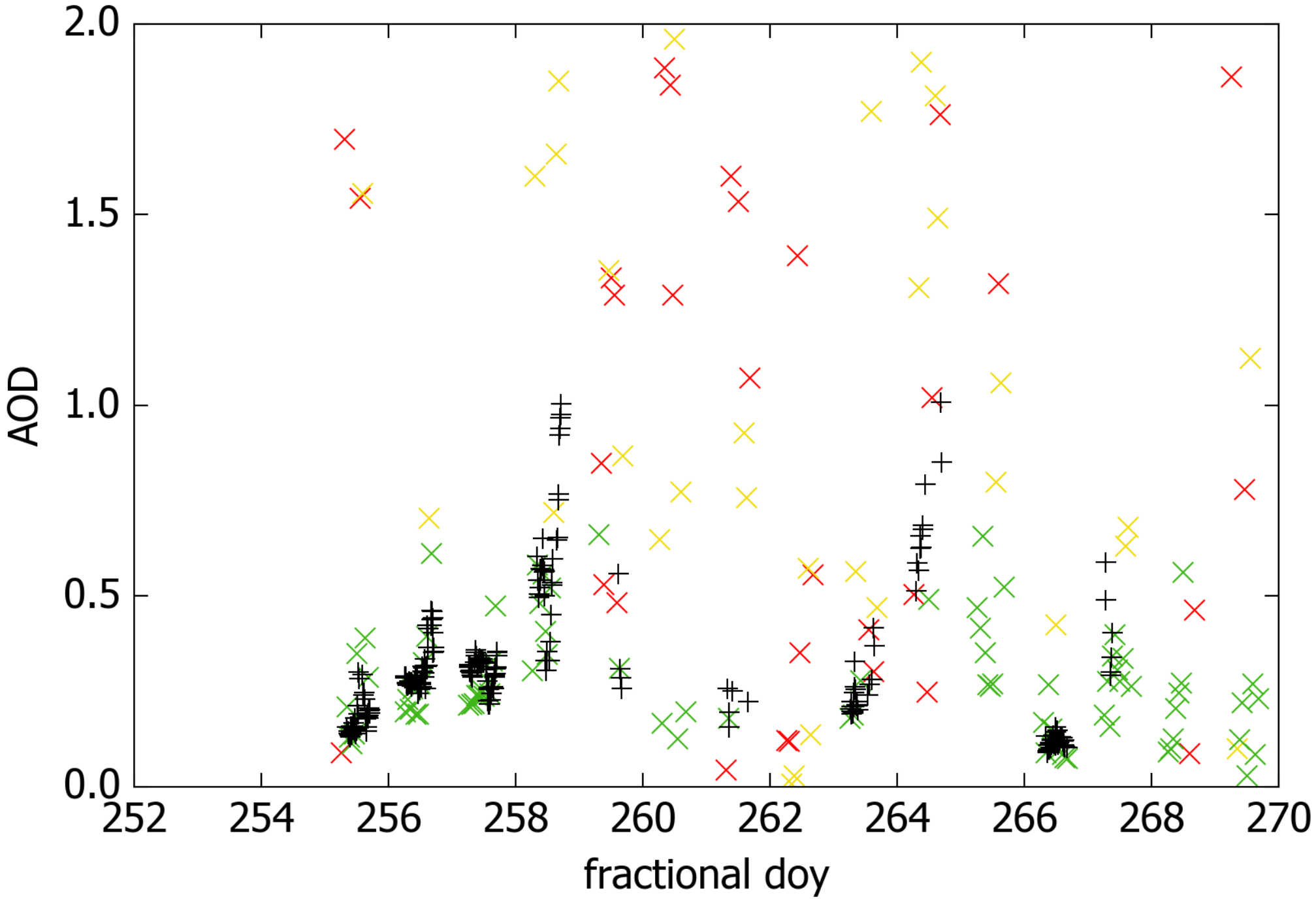
SF 0.9



+: External
x: MAPA
x: OK
x: Warning
x: Error

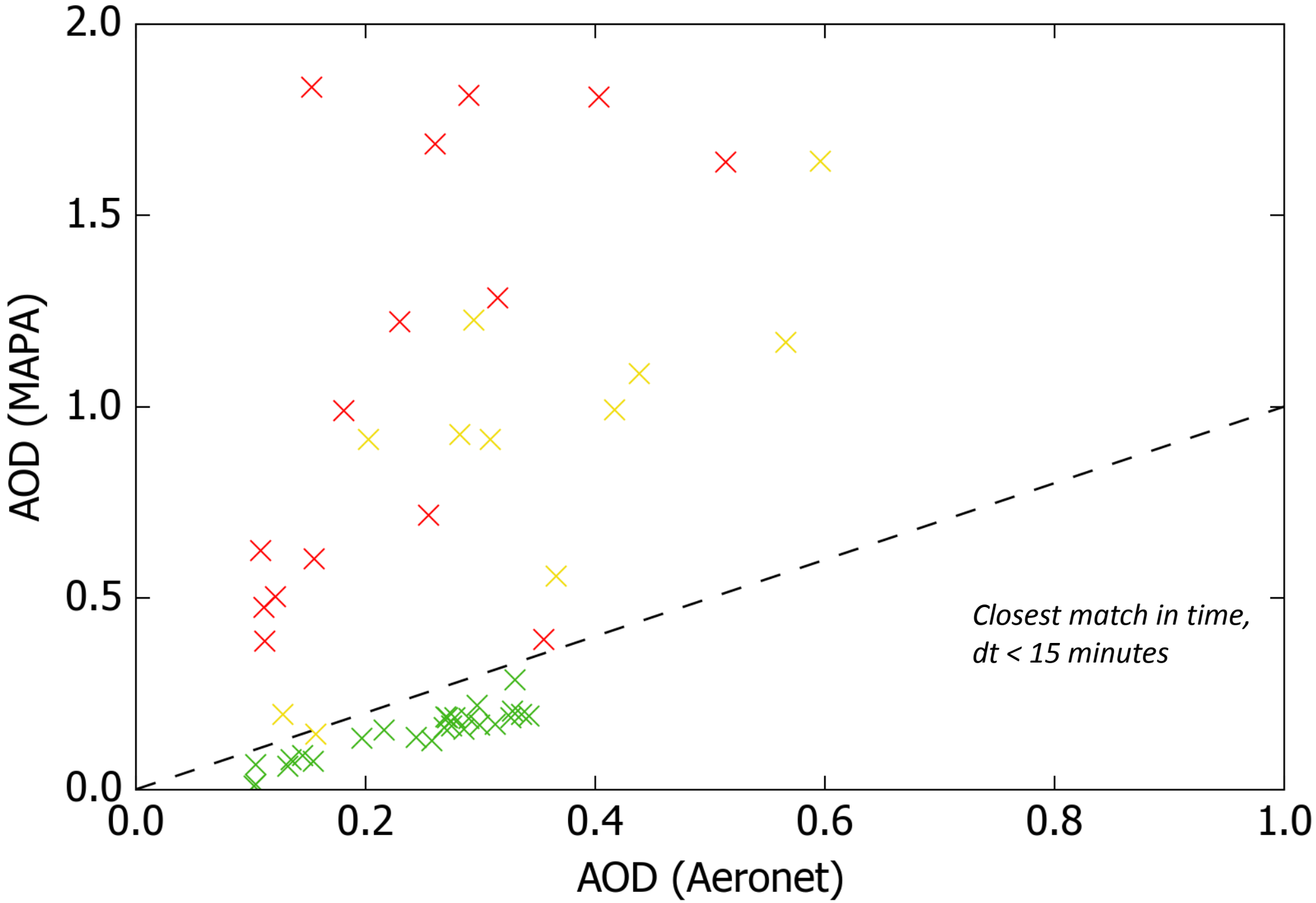
CINDI
Median SCD
UV
Aerosol

Fitted SF



+: External
x: MAPA
x: OK
x: Warning
x: Error

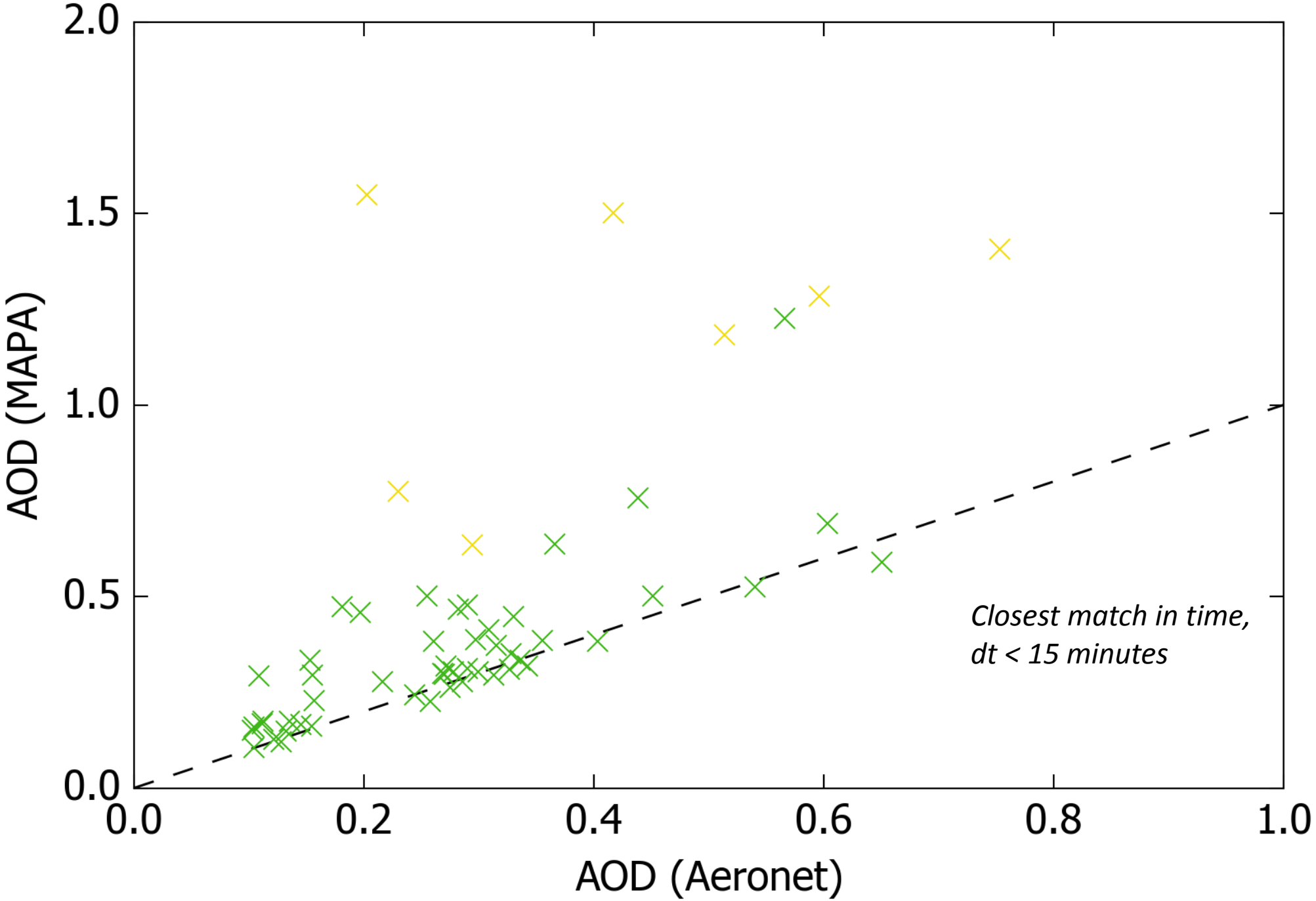
CINDI
Median SCD
UV
Aerosol



+: External
x: MAPA
x: OK
x: Warning
x: Error

CINDI
Median SCD
UV
Aerosol

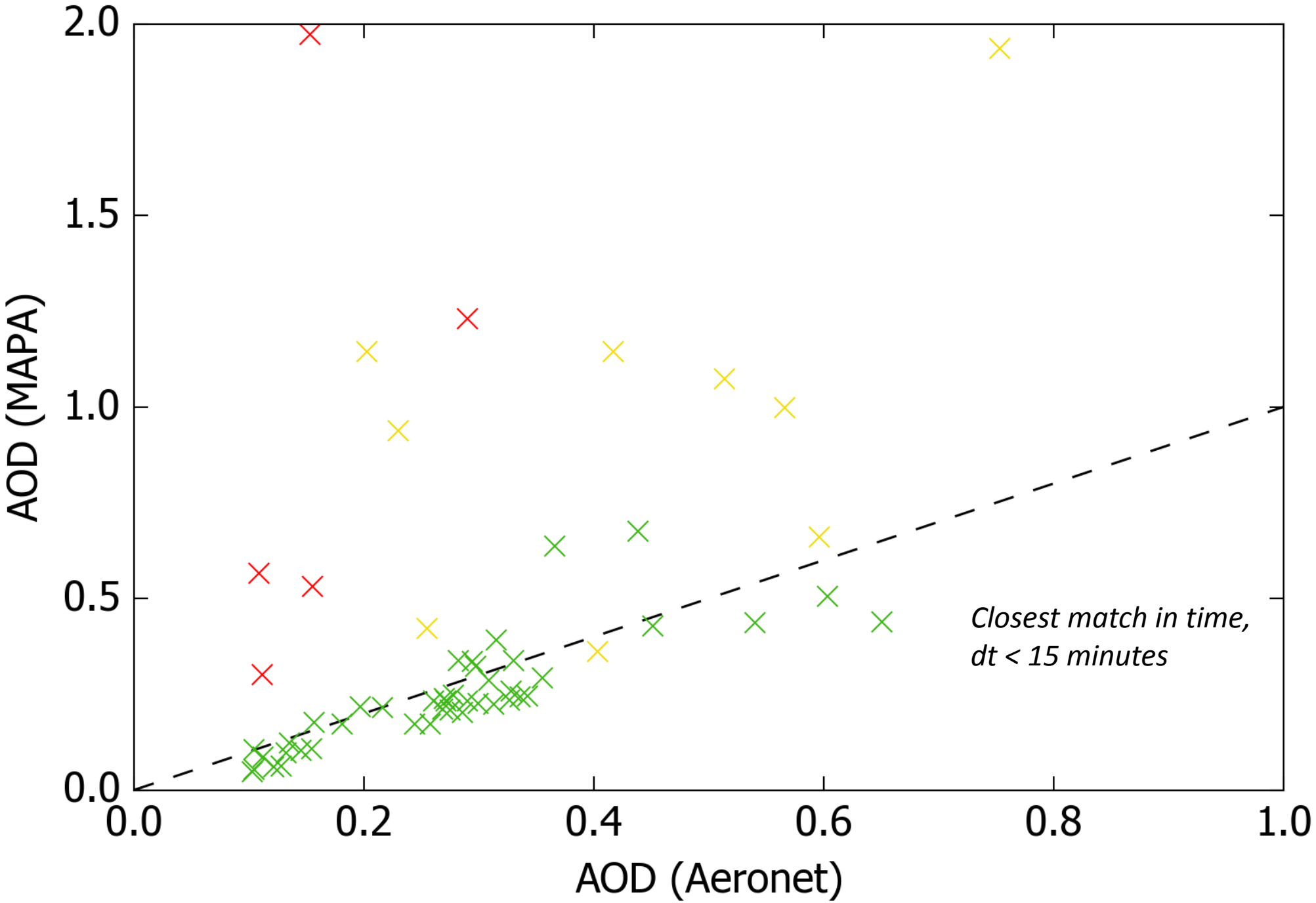
SF 0.8



+: External
x: MAPA
x: OK
x: Warning
x: Error

CINDI
Median SCD
UV
Aerosol

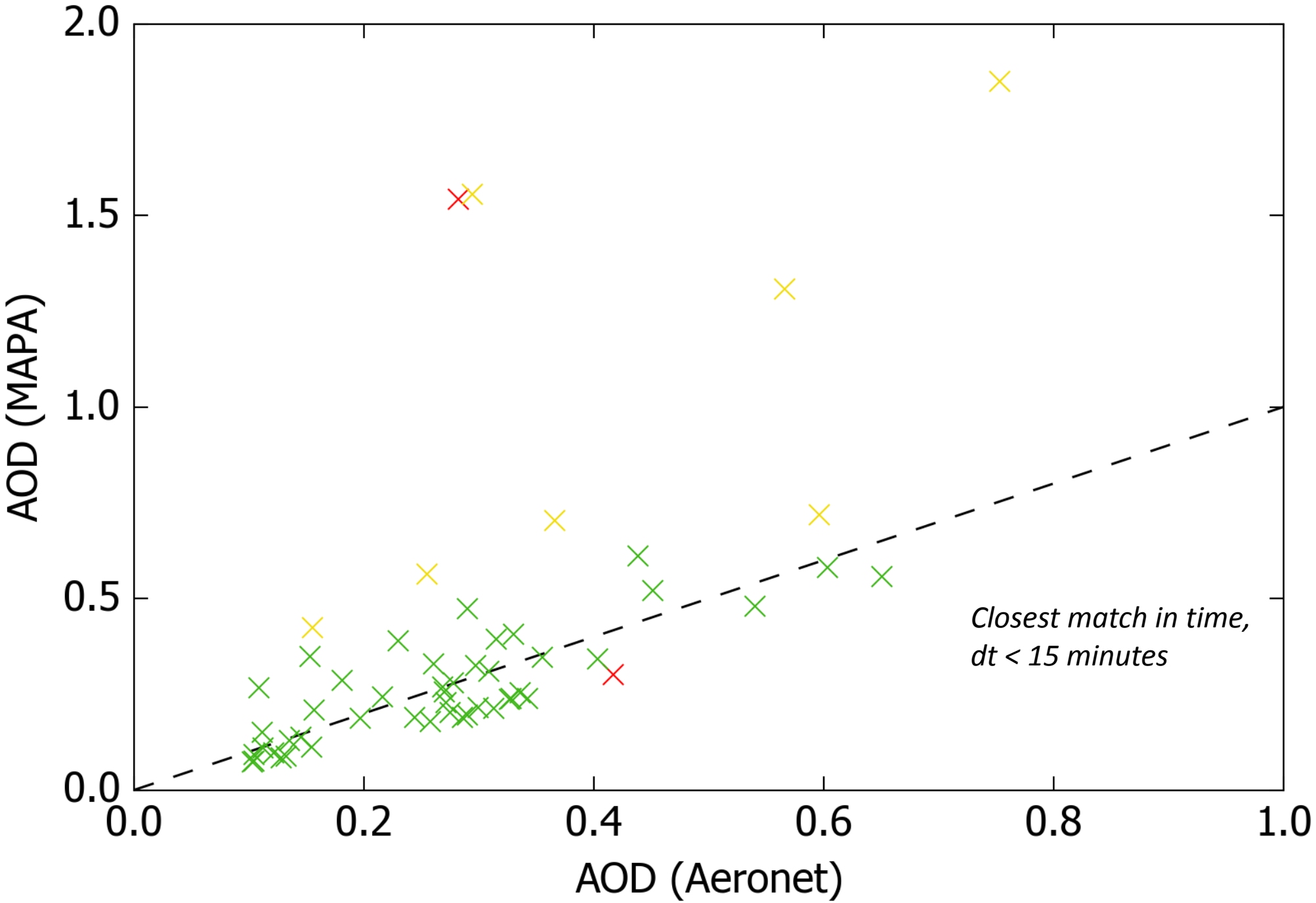
SF 0.9



+: External
x: MAPA
x: OK
x: Warning
x: Error

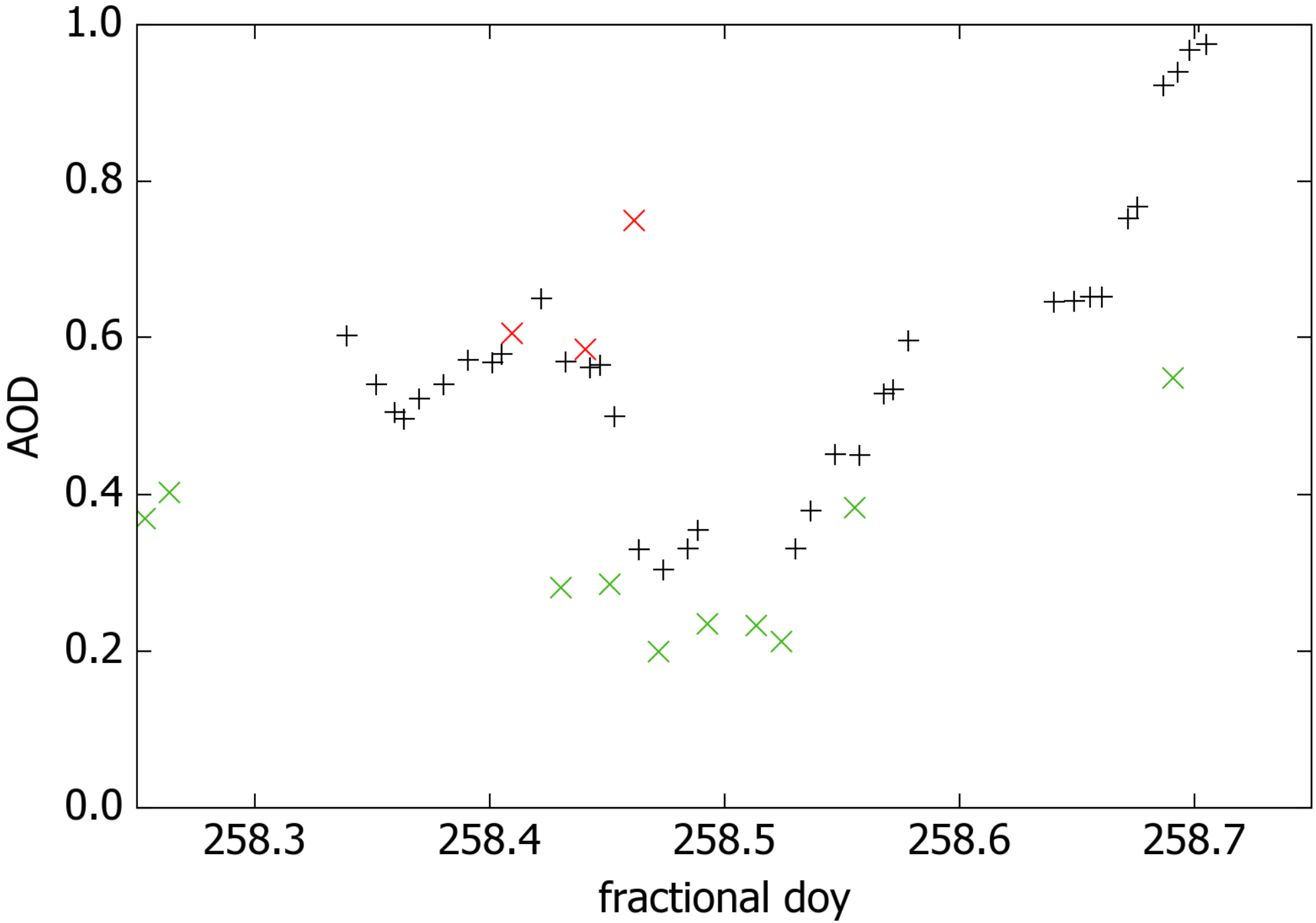
CINDI
Median SCD
UV
Aerosol

Fitted SF



+: External
x: MAPA
x: OK
x: Warning
x: Error

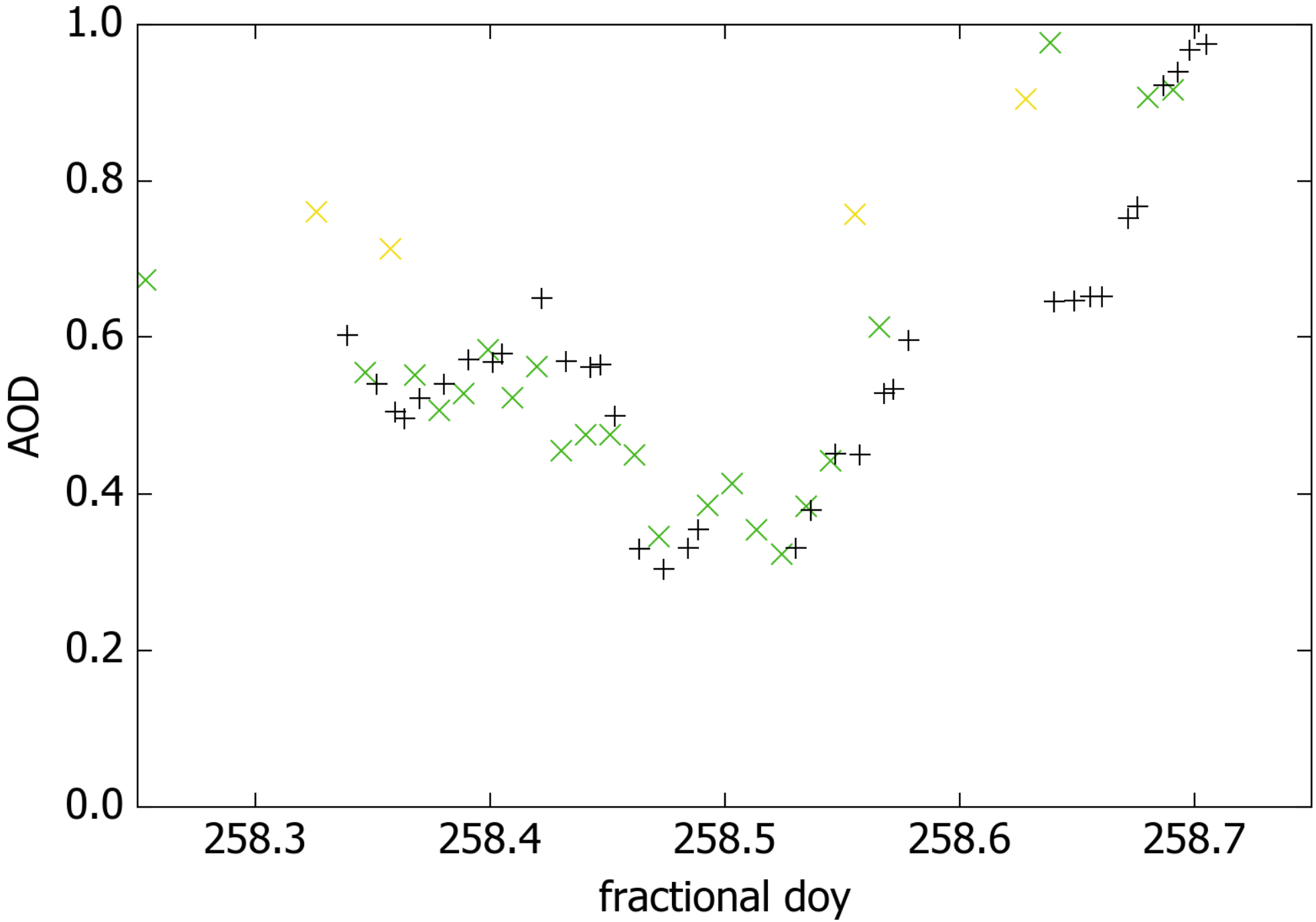
CINDI
MPIC SCD
UV
Aerosol



+: External
x: MAPA
x: OK
x: Warning
x: Error

CINDI
MPIC SCD
UV
Aerosol

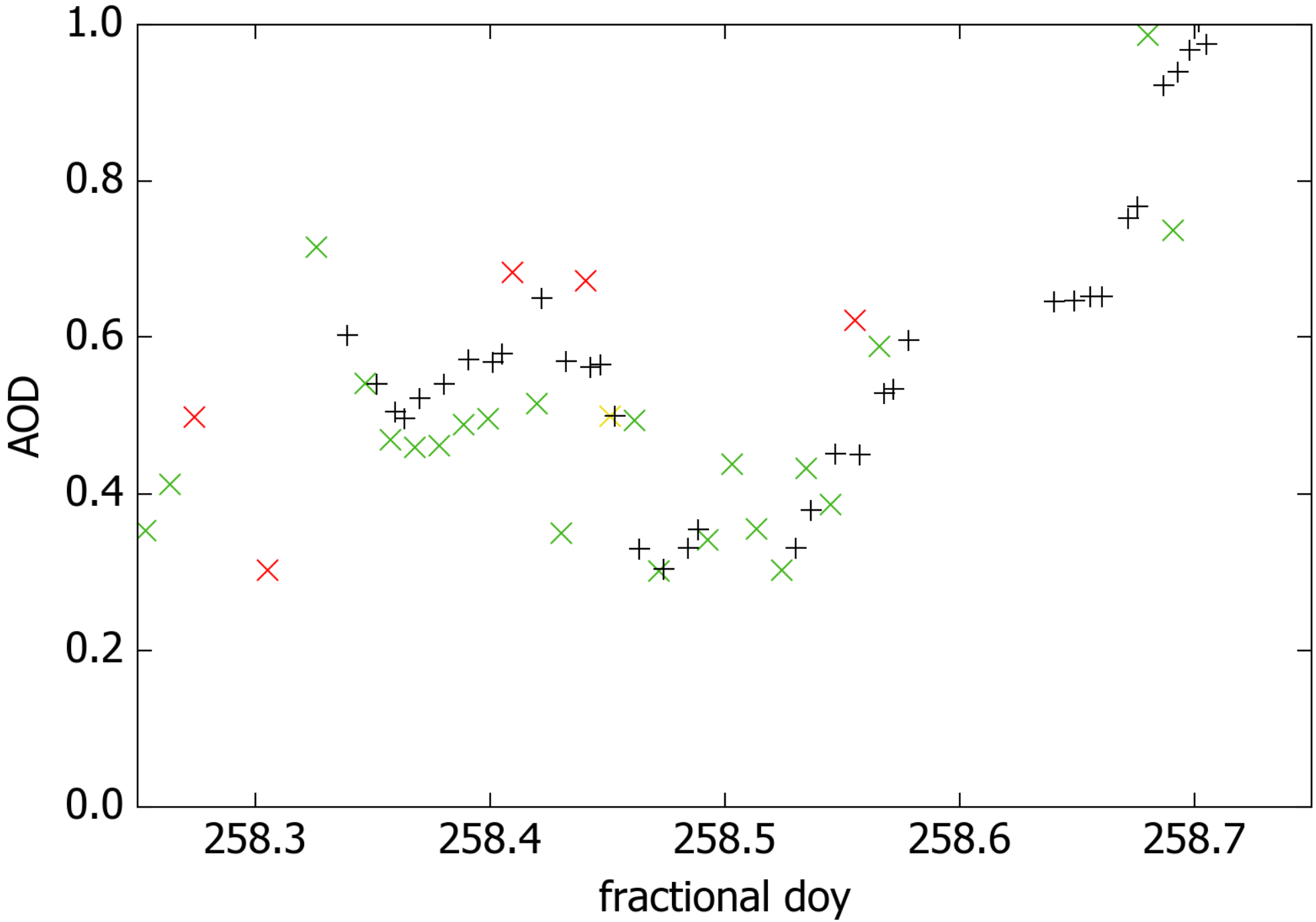
SF 0.8



+: External
x: MAPA
x: OK
x: Warning
x: Error

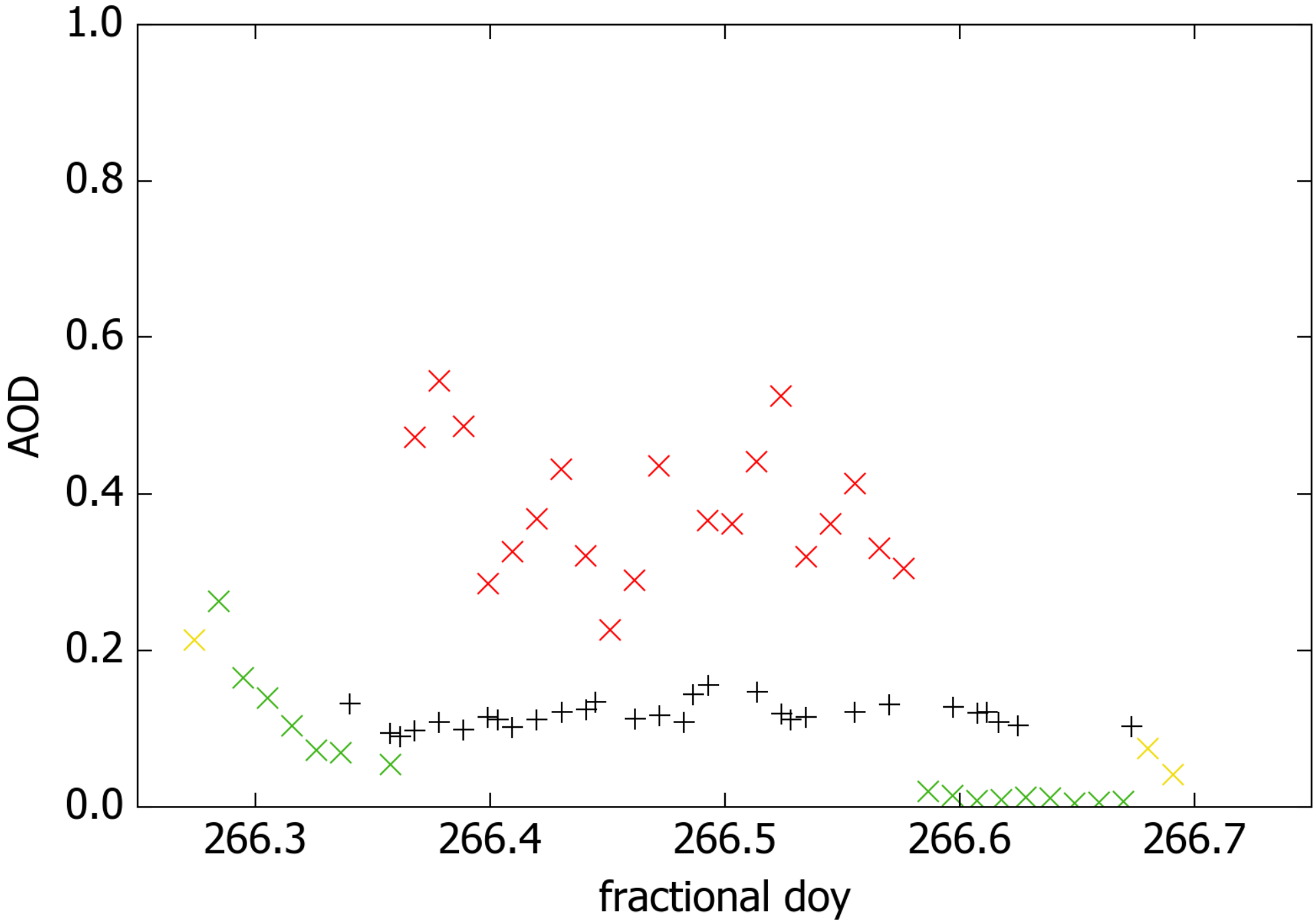
CINDI
MPIC SCD
UV
Aerosol

Fitted SF



+: External
x: MAPA
x: OK
x: Warning
x: Error

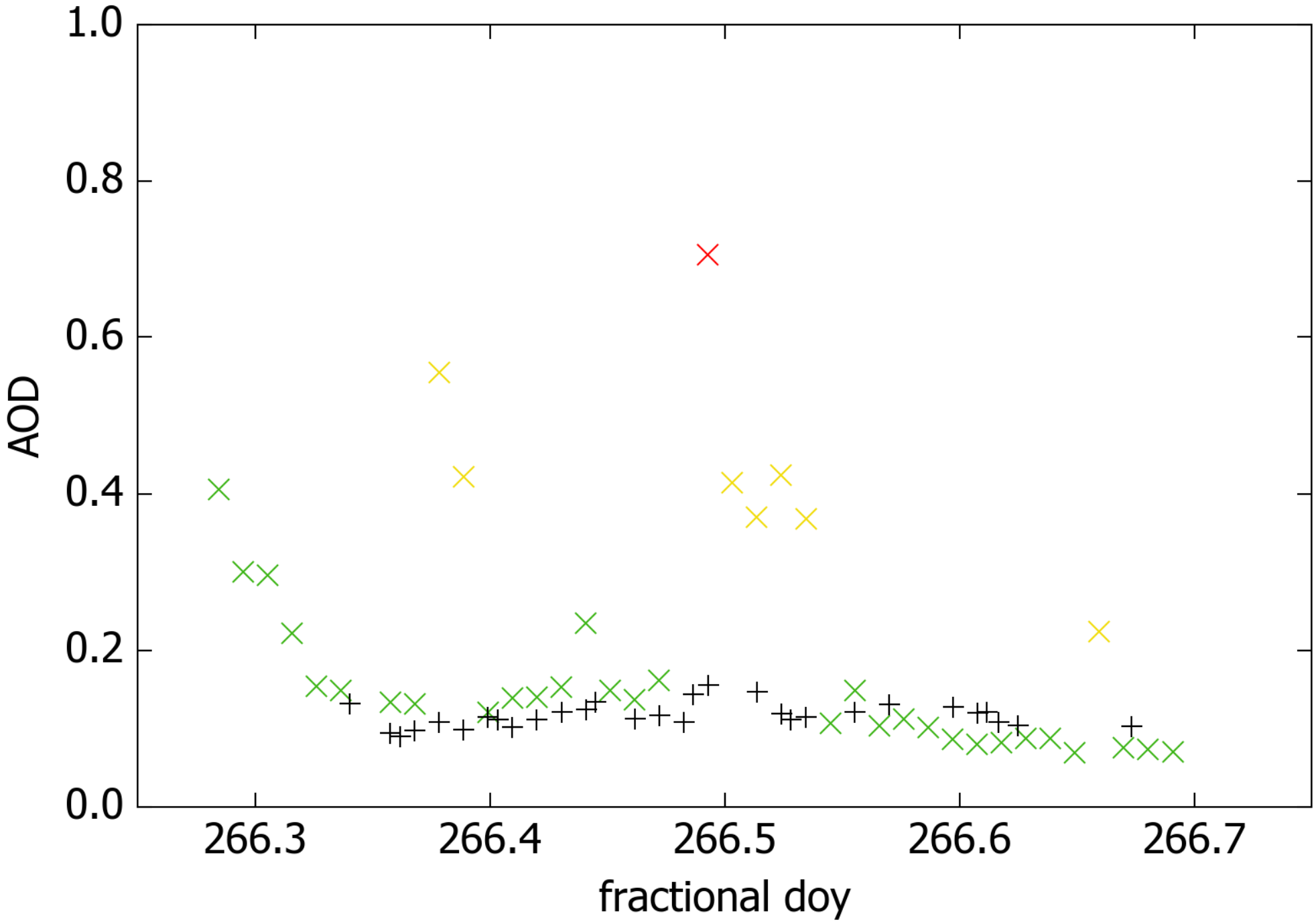
CINDI
MPIC SCD
UV
Aerosol



+: External
x: MAPA
x: OK
x: Warning
x: Error

CINDI
MPIC SCD
UV
Aerosol

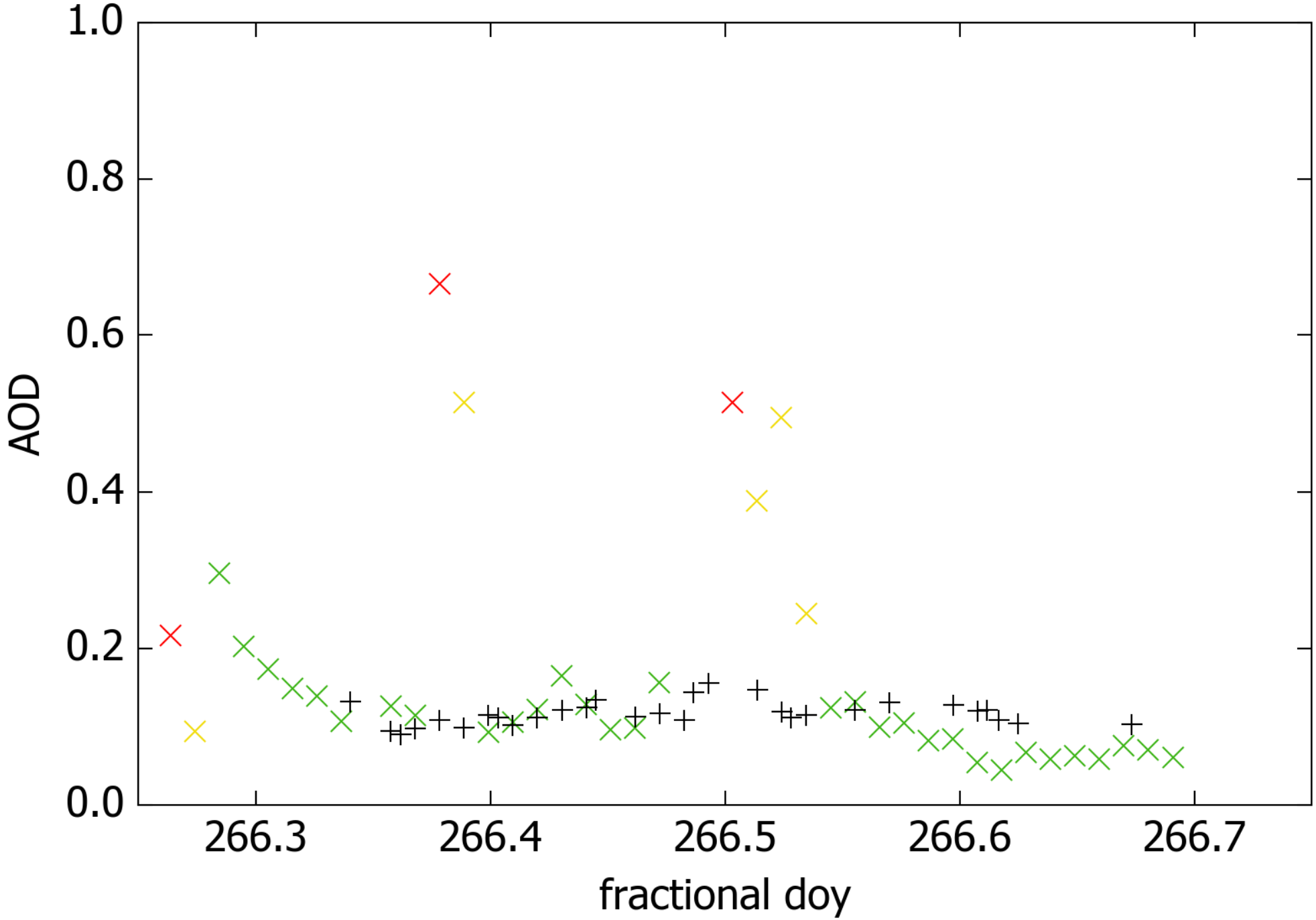
O4 scaling factor 0.8



+: External
x: MAPA
x: OK
x: Warning
x: Error

CINDI
MPIC SCD
UV
Aerosol

Free O4 scaling factor



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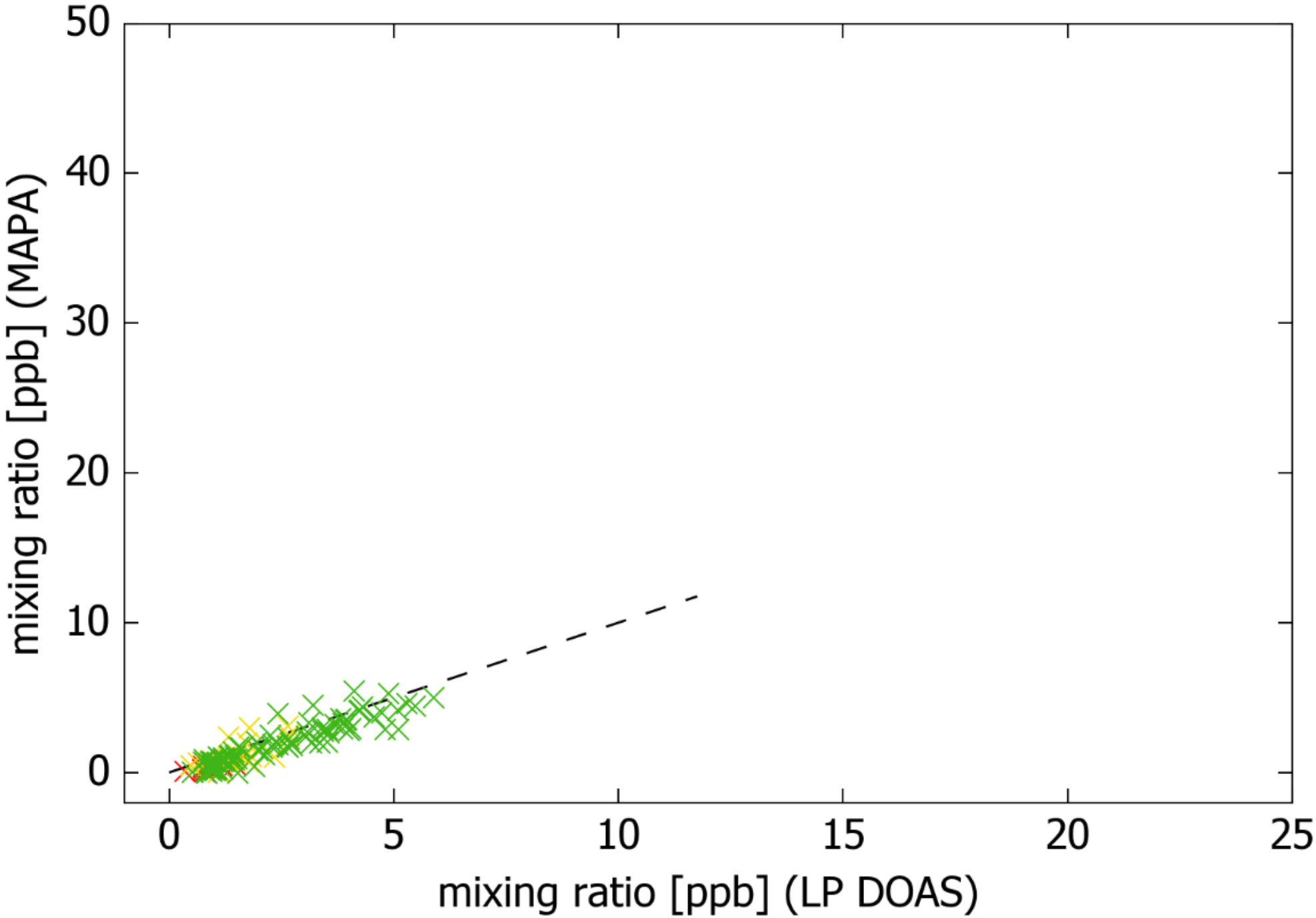
x: MAPA
x: OK
x: Warning
x: Error

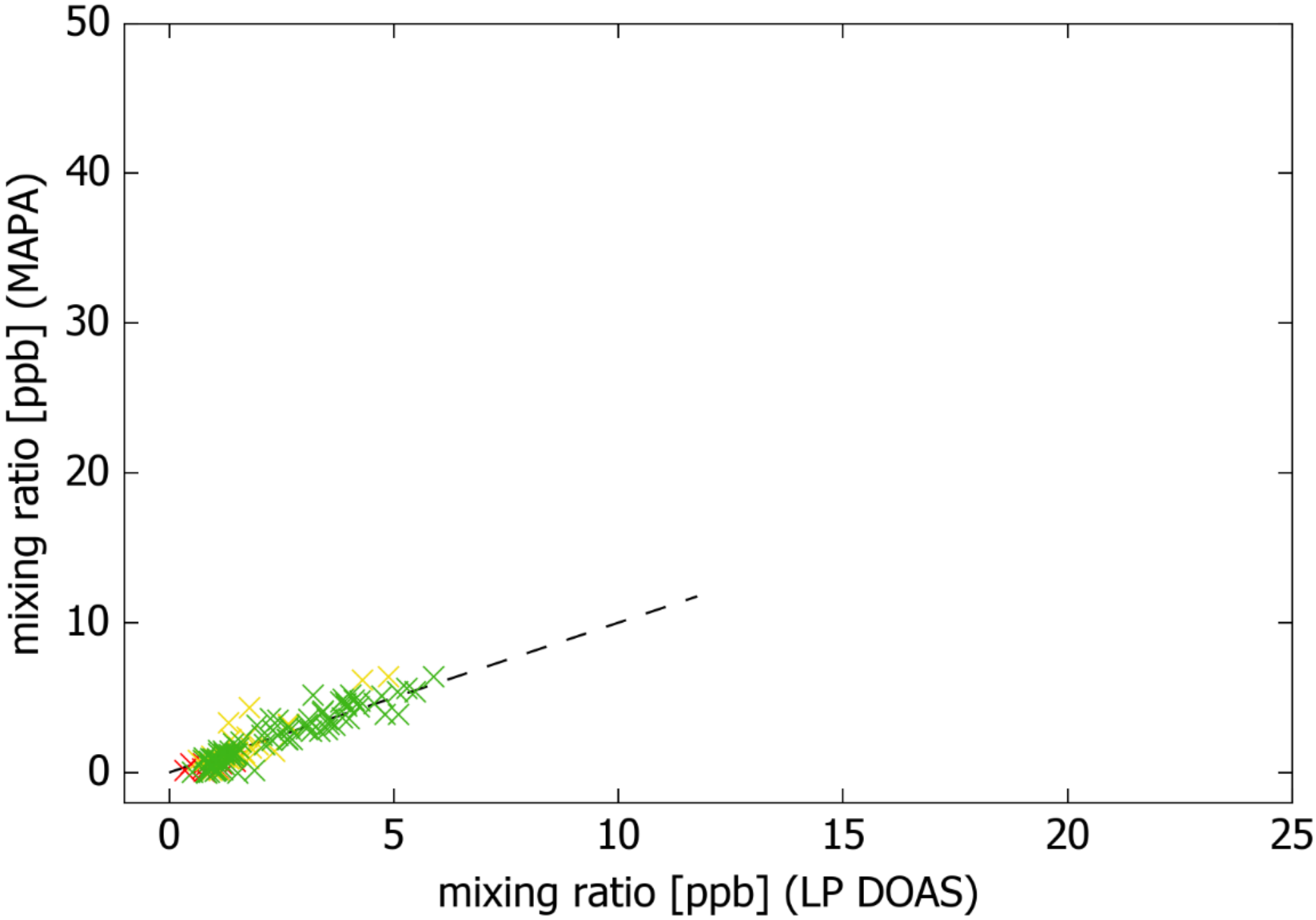
CINDI
Median SCD
UV
HCHO



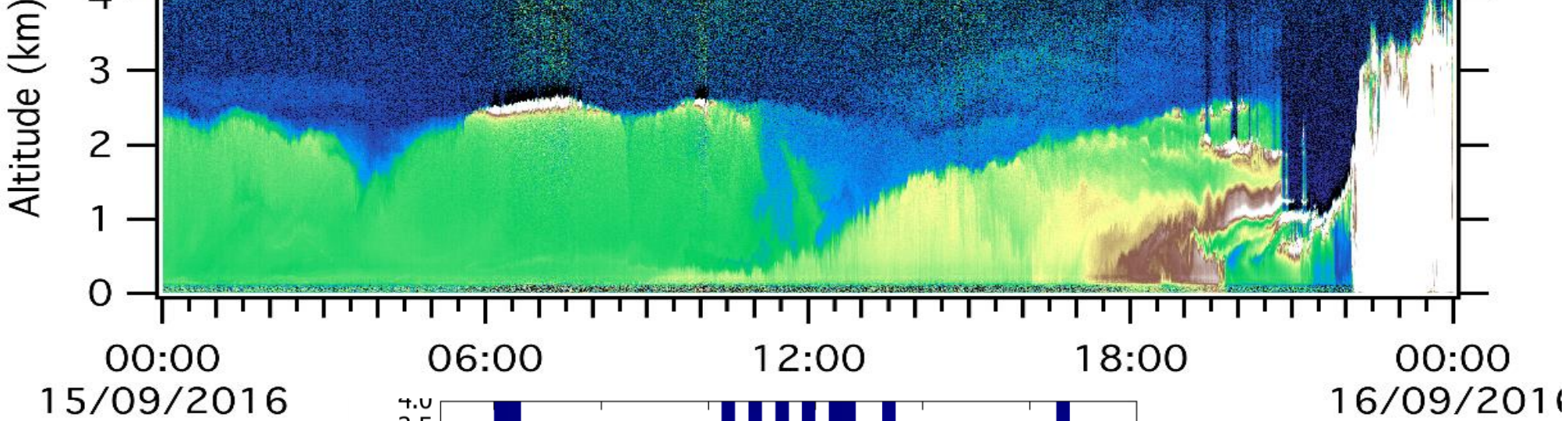
+: External
x: MAPA
x: OK
x: Warning
x: Error

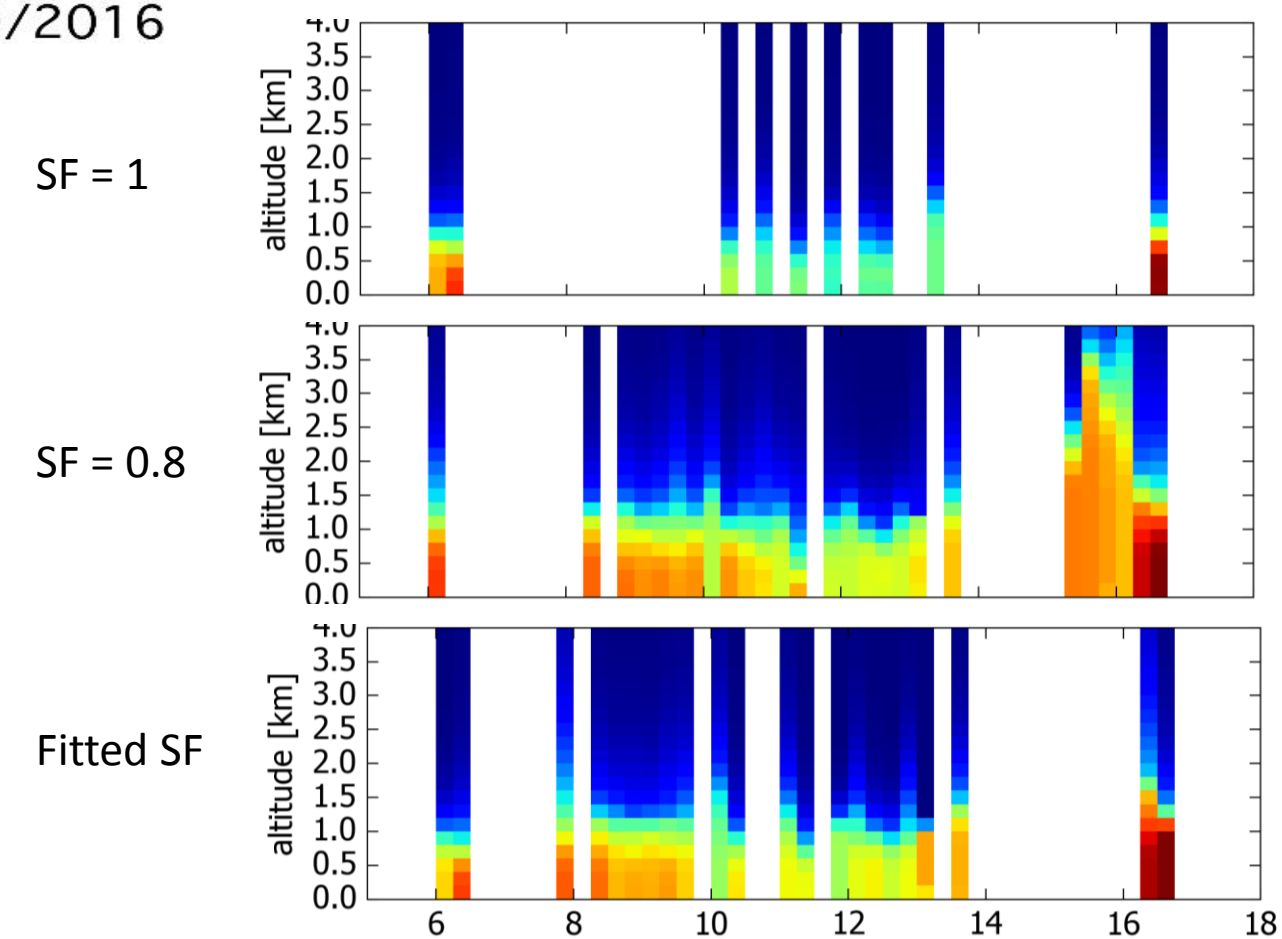
CINDI
Median SCD
UV
HCHO

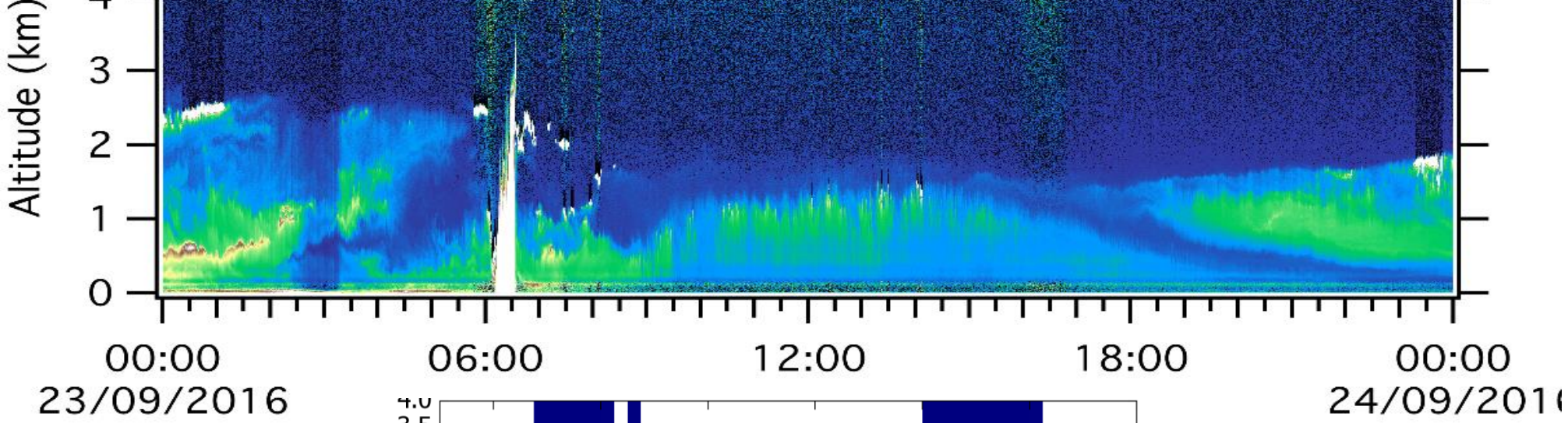
SF 0.8

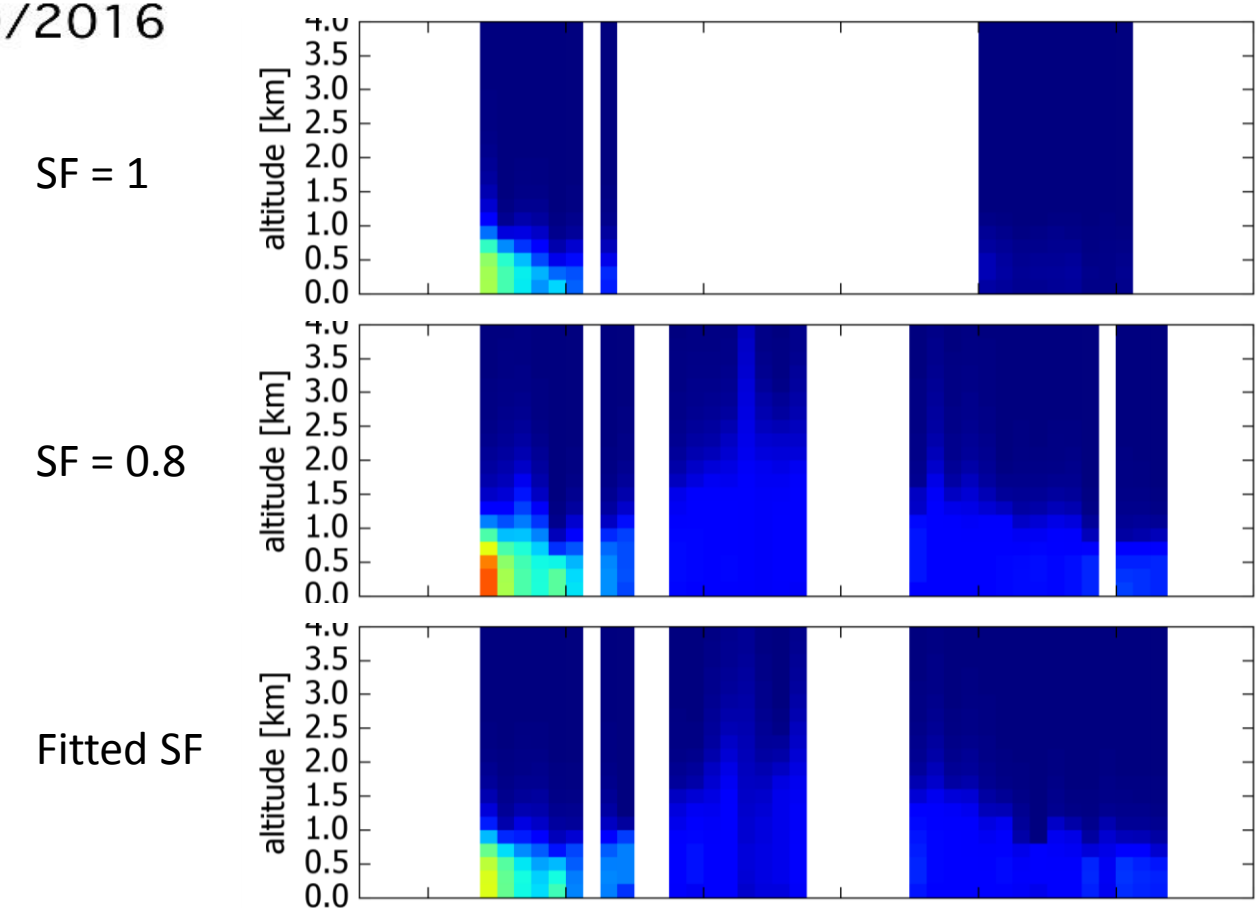


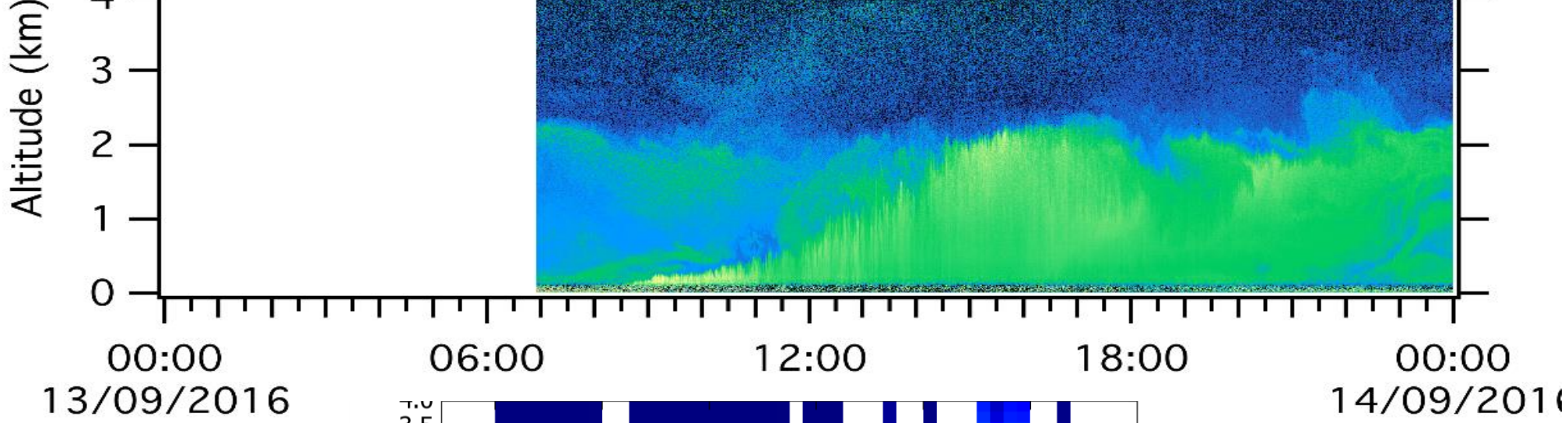
+: External
x: MAPA
x: OK
x: Warning
x: Error

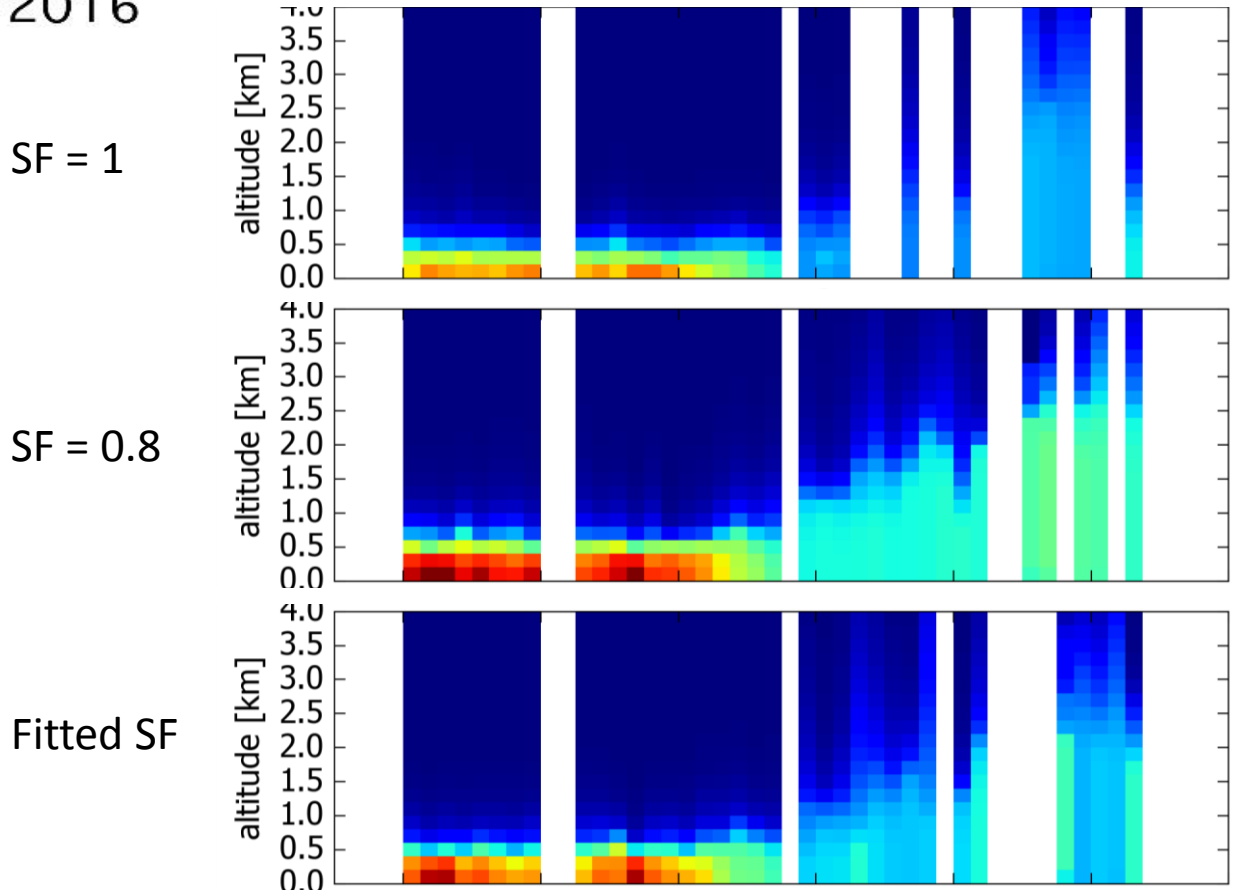

Altitude (km)
0
1
2
3
4
00:00
15/09/2016
06:00
12:00
18:00
00:00
16/09/2016

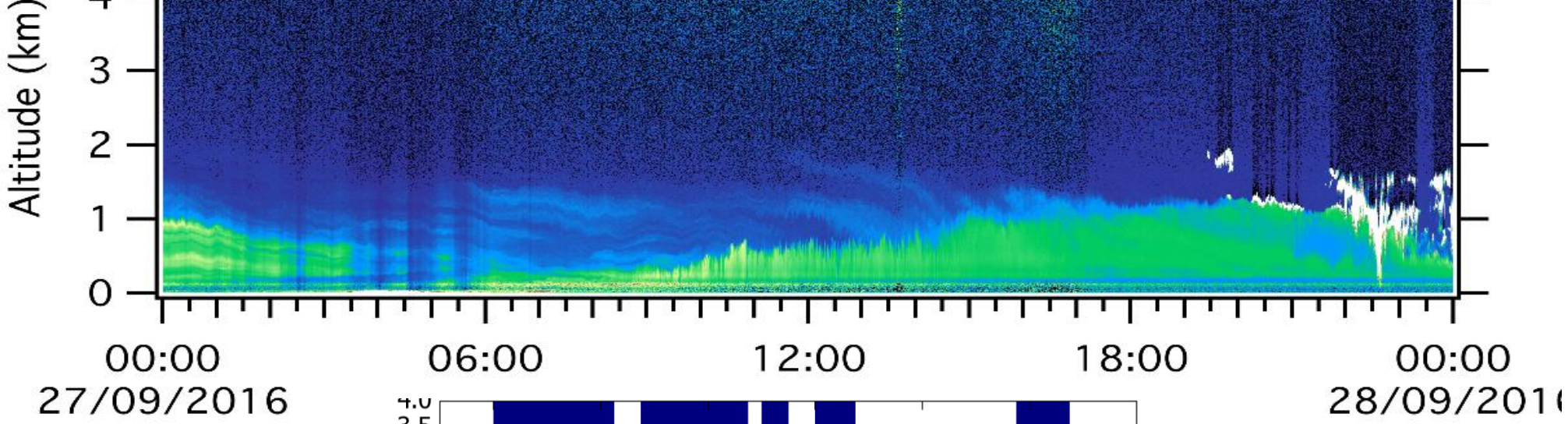

SF = 1
SF = 0.8
Fitted SF
altitude [km]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
6
8
10
12
14
16
18

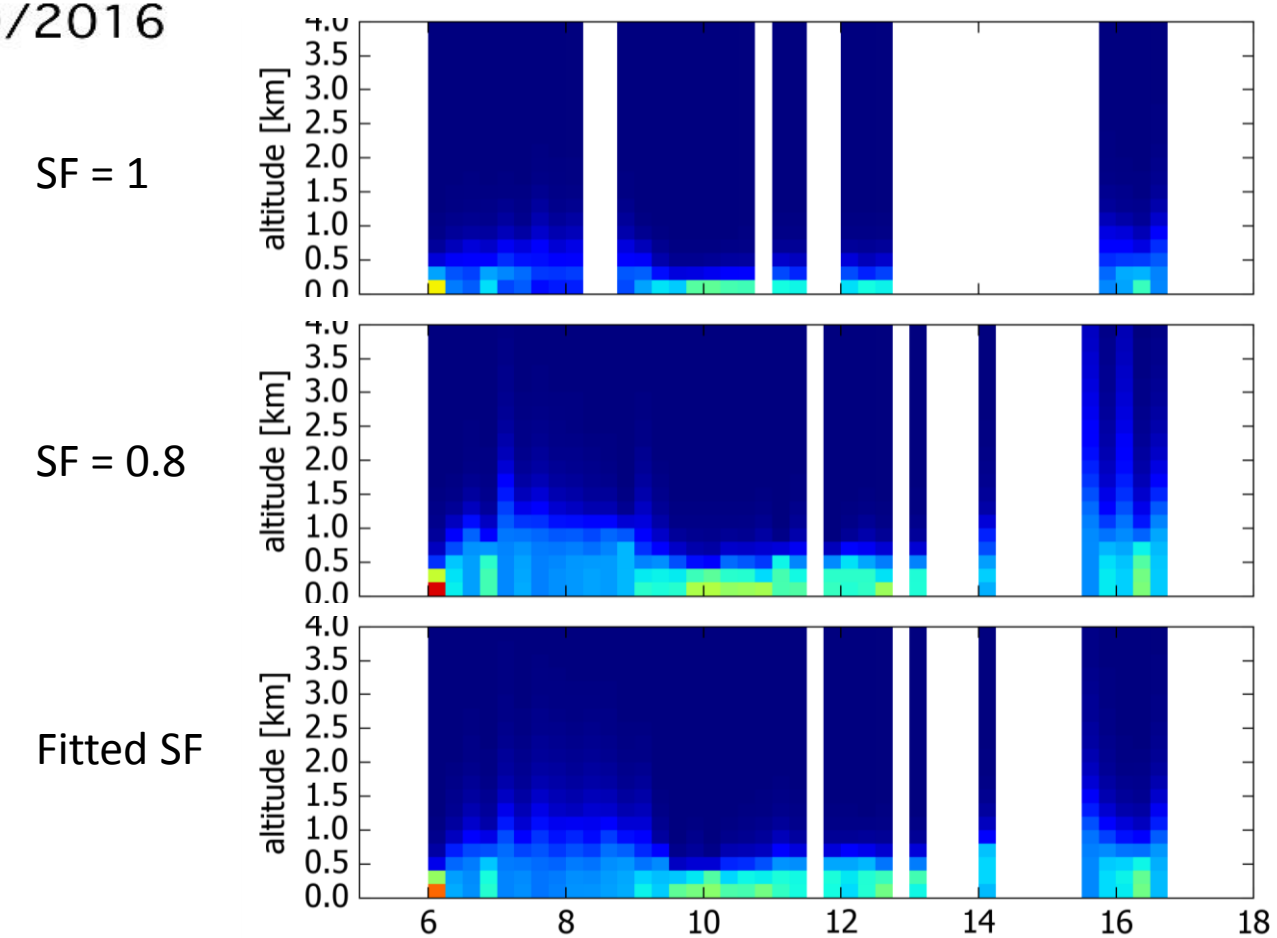

Altitude (km)
0
1
2
3
4
00:00
23/09/2016
06:00
12:00
18:00
00:00
24/09/2016


SF = 1
SF = 0.8
Fitted SF
altitude [km]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0


Altitude (km)
0
1
2
3
4
00:00
13/09/2016
06:00
12:00
18:00
00:00
14/09/2016


SF = 1
SF = 0.8
Fitted SF
altitude [km]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0


Altitude (km)
0
1
2
3
4
00:00
27/09/2016
06:00
12:00
18:00
00:00
28/09/2016


SF = 1
SF = 0.8
Fitted SF
altitude [km]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
6
8
10
12
14
16
18

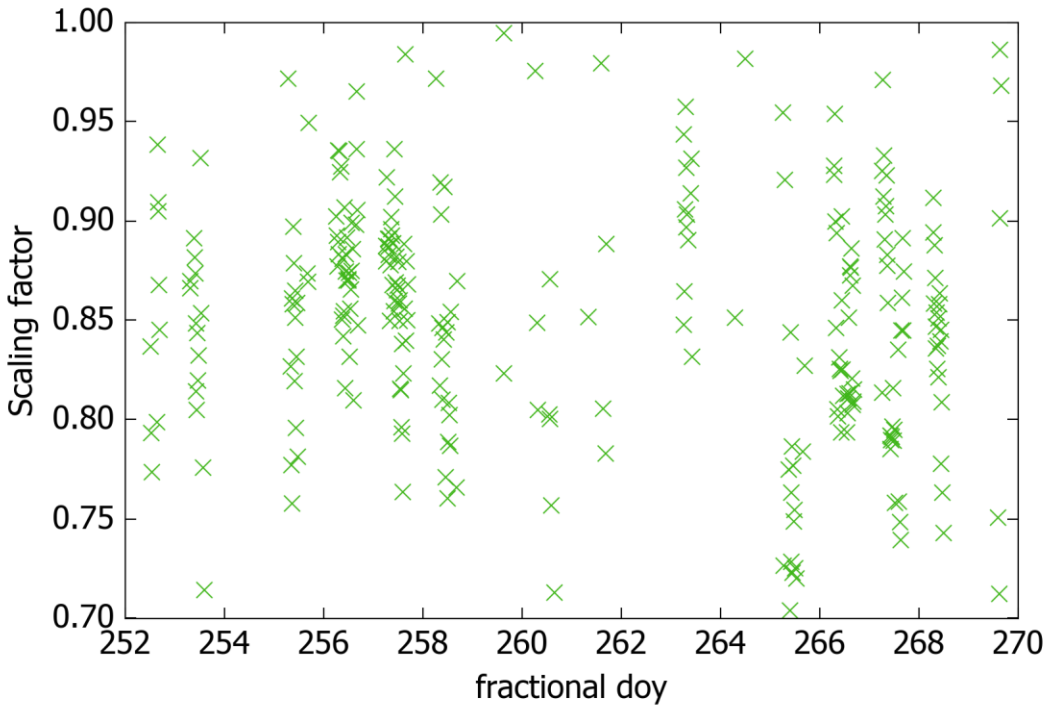
The scaling factor affects the flags!

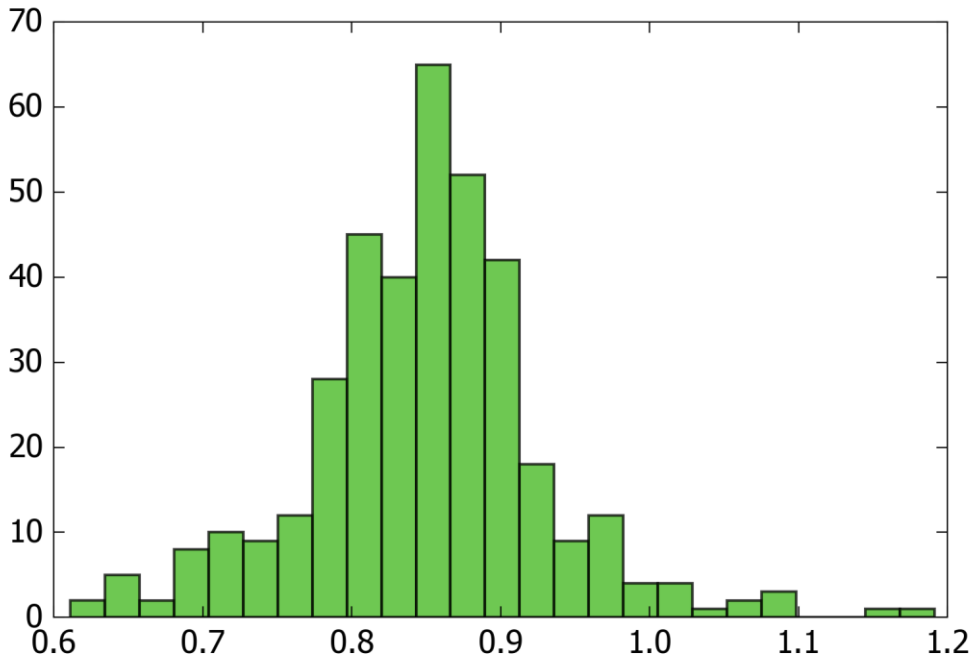
The largest change occurs in flags „LT“ and „col1“:
Out of 886 profiles, the number of valid profiles is

	SF 1.0	SF 0.8	Fitted SF
LT (80% of aod below 4 km)	486	666	679
col1 (low std of aod in MC ensemble)	454	659	533
total	237	358	375

MPIC DSCDs, UV

Fitted SF



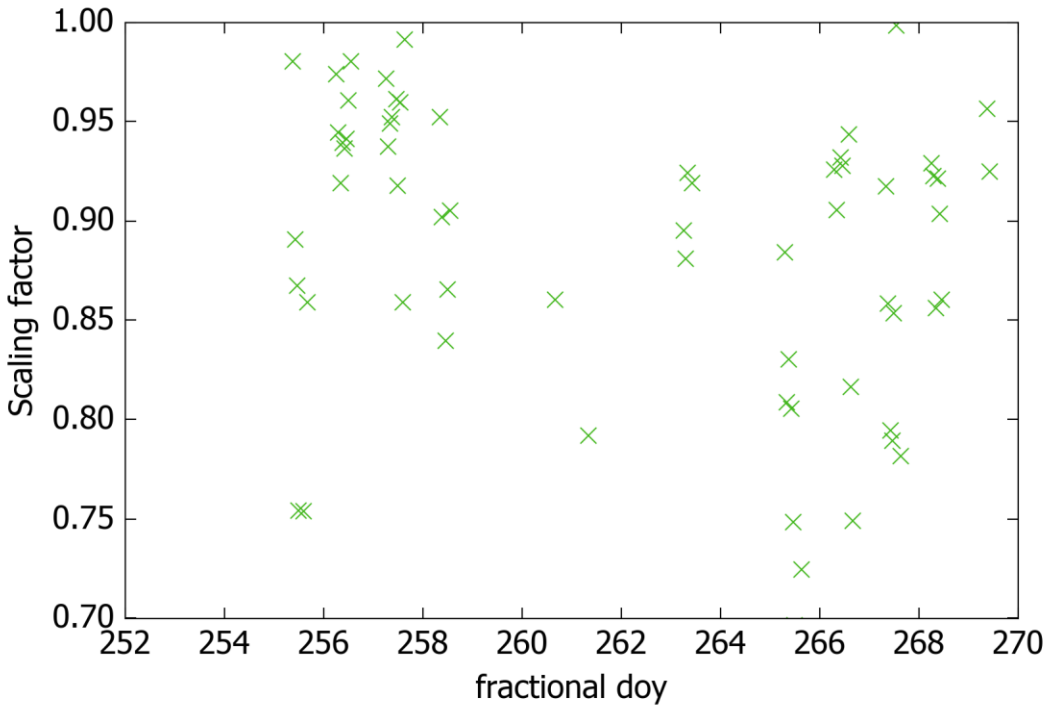


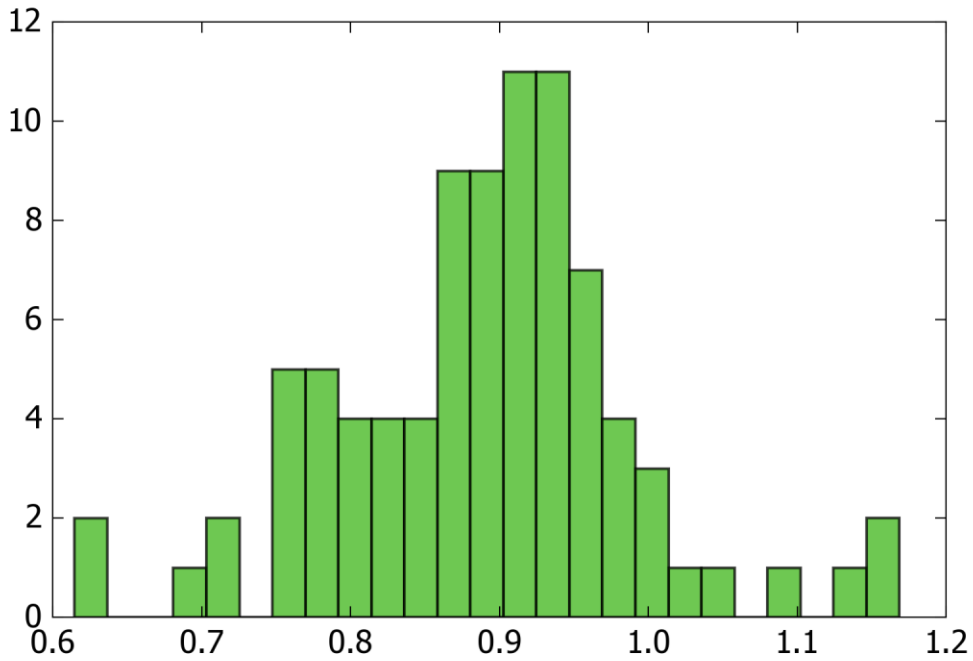
0.85±0.08

(mean±stdev)

MPIC DSCDs, UV

Fitted SF



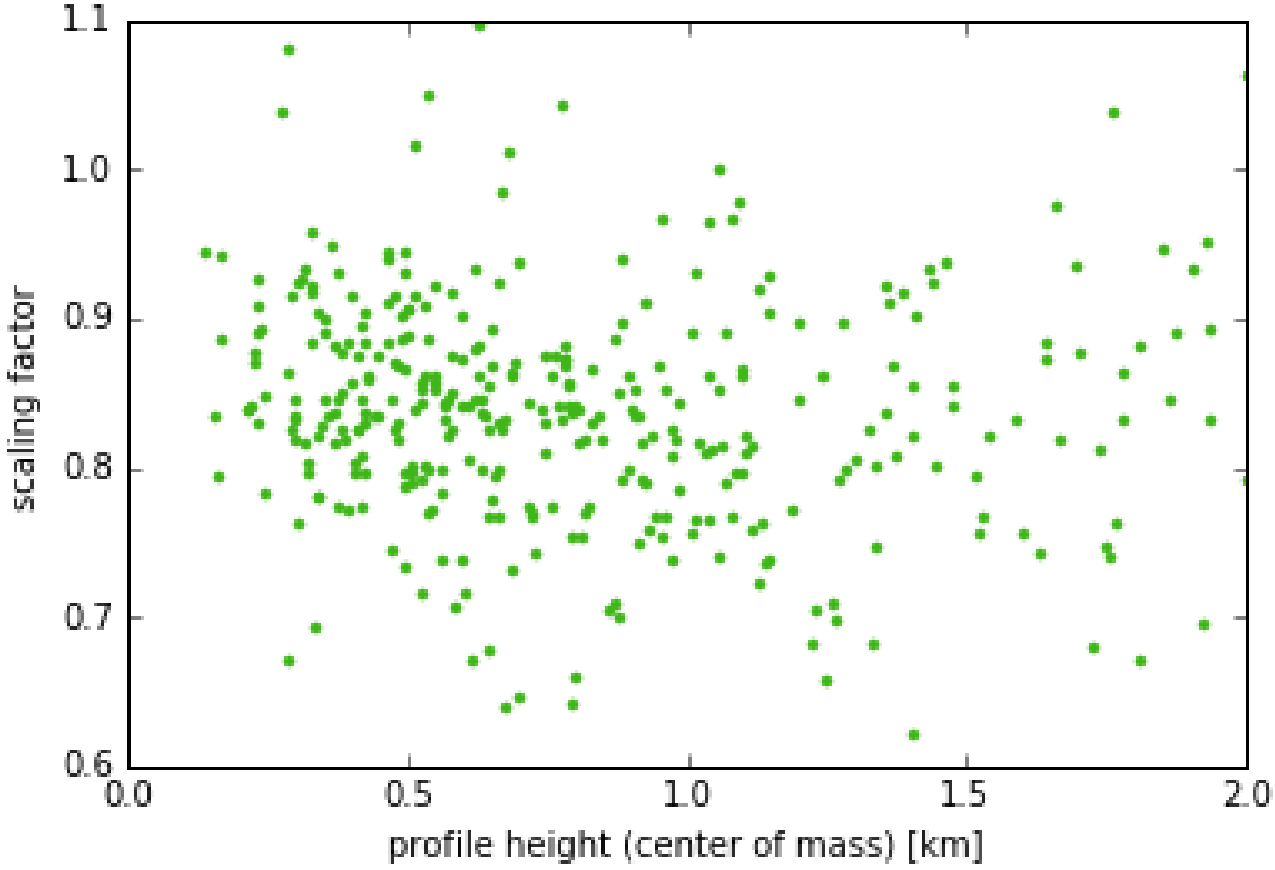


0.89±0.10

(mean±stdev)

Median DSCDs, VIS

- SF needed for low profile heights as well!



Symmary of MAPA results for CINDI-2:

- We need a SF of about 0.8-0.9 to reach good agreement to aeronet measurements
- Without scaling factors, many results (even for golden days!) are flagged, and remaining results are biased low
- Further studies to be done (other instruments, other place+time)
- Within operational FRM4DOAS:
  Three versions (SF 1, 0.8, fitted)