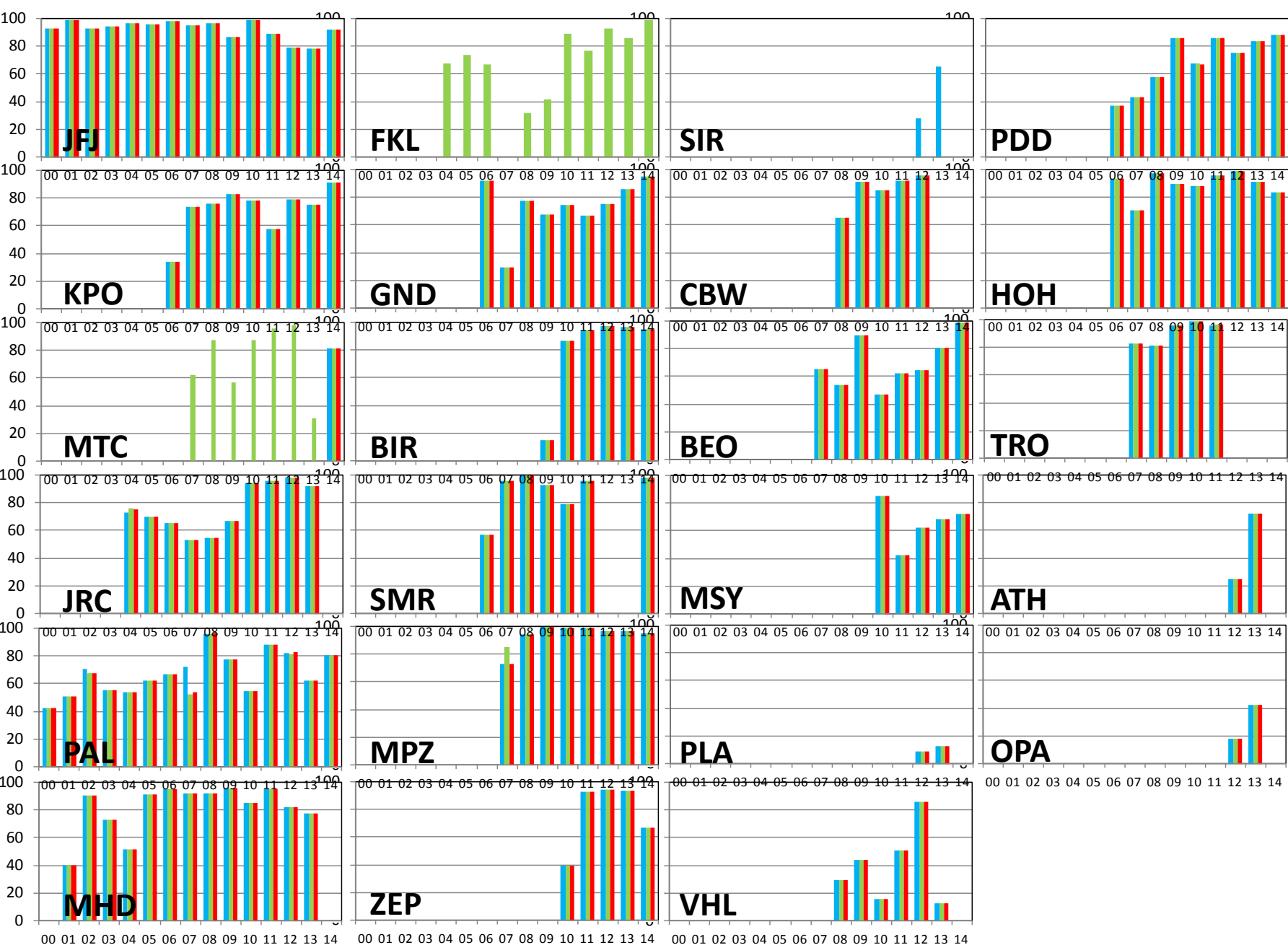


Phenomenology of aerosol scattering

- 27 ACTRIS stations providing scattering data (nephelometer)

| Country | Station | Level | 2010 | 2011 | 2012 | 2013 | 2014 |
|---------|------------------|-------|------|------|------|------|------|
| BG | BEO Moussala | 0 | 12 | 12 | 12 | 12 | 12 |
| | | 1 | 12 | 12 | 12 | 12 | 12 |
| | | 2 | 12 | 12 | 12 | 12 | 12 |
| BO | Chacaltaya | 0 | NA | NA | 12 | 7 | 0 |
| | | 1 | NA | NA | 12 | 7 | 0 |
| | | 2 | NA | NA | 12 | 7 | 0 |
| CH | Jungfraujoch | 0 | 0 | 12 | 12 | 12 | 12 |
| | | 1 | 12 | 12 | 12 | 12 | 12 |
| | | 2 | 12 | 12 | 12 | 12 | 12 |
| CZ | Kresin | 0 | NA | NA | 0 | 0 | 0 |
| | | 1 | NA | NA | 0 | 0 | 0 |
| | | 2 | NA | NA | 8 | 12 | 12 |
| DE | Hohenpeissenberg | 0 | 11 | 12 | 12 | 12 | 11 |
| | | 1 | 0 | 0 | 0 | 0 | 11 |
| | | 2 | 11 | 12 | 12 | 12 | 12 |
| DE | Melpitz | 0 | 12 | 12 | 12 | 12 | 12 |
| | | 1 | 12 | 12 | 12 | 12 | 12 |
| | | 2 | 12 | 12 | 12 | 12 | 12 |
| ES | Granada | 0 | 12 | 12 | 12 | 12 | 12 |
| | | 1 | 12 | 12 | 12 | 12 | 12 |
| | | 2 | 12 | 12 | 12 | 12 | 12 |
| ES | Montsec | 0 | NA | NA | NA | 12 | 12 |
| | | 1 | NA | NA | NA | 12 | 12 |
| | | 2 | NA | NA | NA | 12 | 12 |
| ES | Montseny | 0 | 12 | 12 | 12 | 12 | 12 |
| | | 1 | 12 | 12 | 12 | 12 | 12 |
| | | 2 | 12 | 12 | 12 | 12 | 12 |
| FI | Hyytiälä | 0 | 0 | 12 | 12 | 12 | 12 |
| | | 1 | 0 | 12 | 12 | 12 | 12 |
| | | 2 | 12 | 12 | 12 | 12 | 12 |
| FI | Pallas | 0 | 0 | 0 | 12 | 12 | 12 |
| | | 1 | 0 | 0 | 12 | 12 | 12 |
| | | 2 | 12 | 12 | 12 | 12 | 12 |
| FR | SIRTA | 0 | NA | NA | 12 | 12 | 12 |
| | | 1 | NA | NA | 12 | 12 | 0 |
| | | 2 | NA | NA | 12 | 12 | 0 |
| FR | OPE | 0 | NA | NA | 4 | 12 | 0 |
| | | 1 | NA | NA | 4 | 12 | 0 |
| | | 2 | NA | NA | 4 | 12 | 0 |
| FR | Puy de Dome | 0 | 12 | 12 | 12 | 12 | 12 |
| | | 1 | 12 | 12 | 12 | 12 | 12 |
| | | 2 | 12 | 12 | 12 | 12 | 12 |
| GR | Finokalia | 0 | 0 | 12 | 12 | 12 | 12 |
| | | 1 | 0 | 12 | 12 | 12 | 12 |
| | | 2 | 12 | 12 | 12 | 12 | 12 |
| GR | DEM Athens | 0 | NA | NA | 12 | 12 | 0 |
| | | 1 | NA | NA | 12 | 12 | 0 |
| | | 2 | NA | NA | 12 | 12 | 0 |
| HU | K-Pustza | 0 | 12 | 12 | 12 | 12 | 12 |
| | | 1 | 12 | 12 | 12 | 12 | 12 |
| | | 2 | 12 | 12 | 12 | 12 | 12 |
| IE | Mace Head | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 1 | 0 | 12 | 12 | 12 | 0 |
| | | 2 | 0 | 12 | 12 | 12 | 0 |
| IT | JRC Ispra | 0 | 0 | 12 | 12 | 12 | 0 |
| | | 1 | 0 | 12 | 12 | 12 | 0 |
| | | 2 | 12 | 12 | 12 | 12 | 0 |
| IT | Mt.Cimone | 0 | 0 | 12 | 12 | 12 | 0 |
| | | 1 | 12 | 12 | 12 | 12 | 0 |
| | | 2 | 12 | 12 | 12 | 12 | 0 |
| LT | Preila | 0 | NA | NA | 1 | 12 | 0 |
| | | 1 | NA | NA | 1 | 12 | 0 |
| | | 2 | NA | NA | 1 | 12 | 0 |
| NL | Cabauw | 0 | 12 | 12 | 12 | 12 | 4 |
| | | 1 | 12 | 12 | 12 | 12 | 4 |
| | | 2 | 12 | 12 | 12 | NA | 4 |
| NO | Birkesnes | 0 | 12 | 12 | 12 | 12 | 12 |
| | | 1 | 12 | 12 | 12 | 12 | 12 |
| | | 2 | 12 | 12 | 12 | 12 | 12 |
| NO | Zeppelin | 0 | 12 | 12 | 12 | 12 | 12 |
| | | 1 | 12 | 0 | 0 | 0 | 0 |
| | | 2 | 12 | 12 | 12 | 12 | 12 |
| SE | Vavihill | 0 | 6 | 12 | 12 | 12 | 0 |
| | | 1 | 0 | 12 | 12 | 12 | 0 |
| | | 2 | 0 | 12 | 12 | 12 | 0 |
| SE | Aspvreten | 0 | NA | NA | NA | NA | NA |
| | | 1 | NA | NA | NA | NA | NA |
| | | 2 | 12 | 12 | NA | NA | NA |
| NO | Trollhaugen | 0 | NA | NA | NA | NA | 12 |
| | | 1 | NA | NA | NA | NA | 12 |
| | | 2 | NA | NA | NA | NA | 12 |

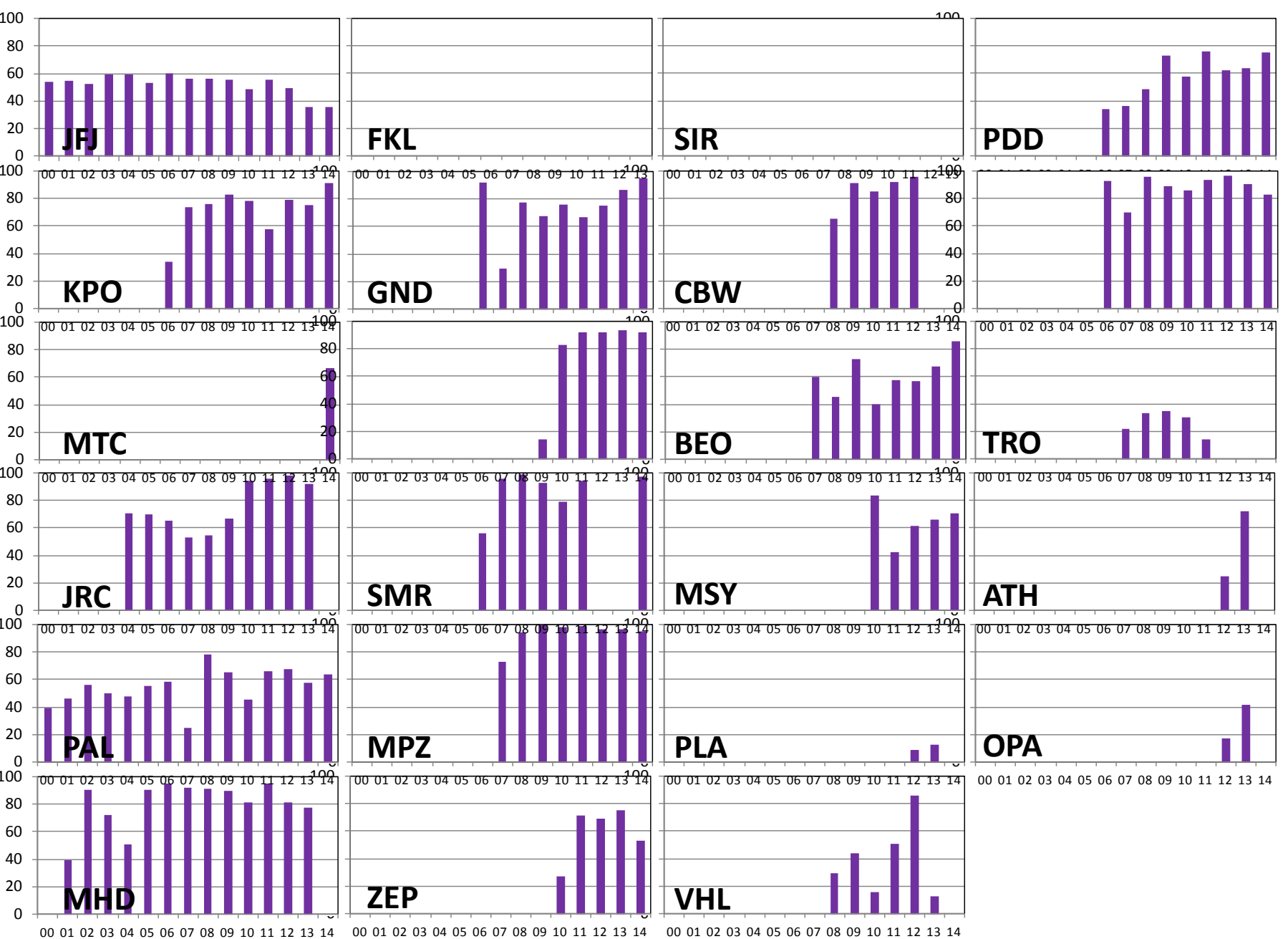
- **Aerosol parameters:** Scattering and backscattering (3λ). Scattering Angstrom Exponent (SAE), Backscatter fraction (B/S) and/or Asymmetry parameter (g).



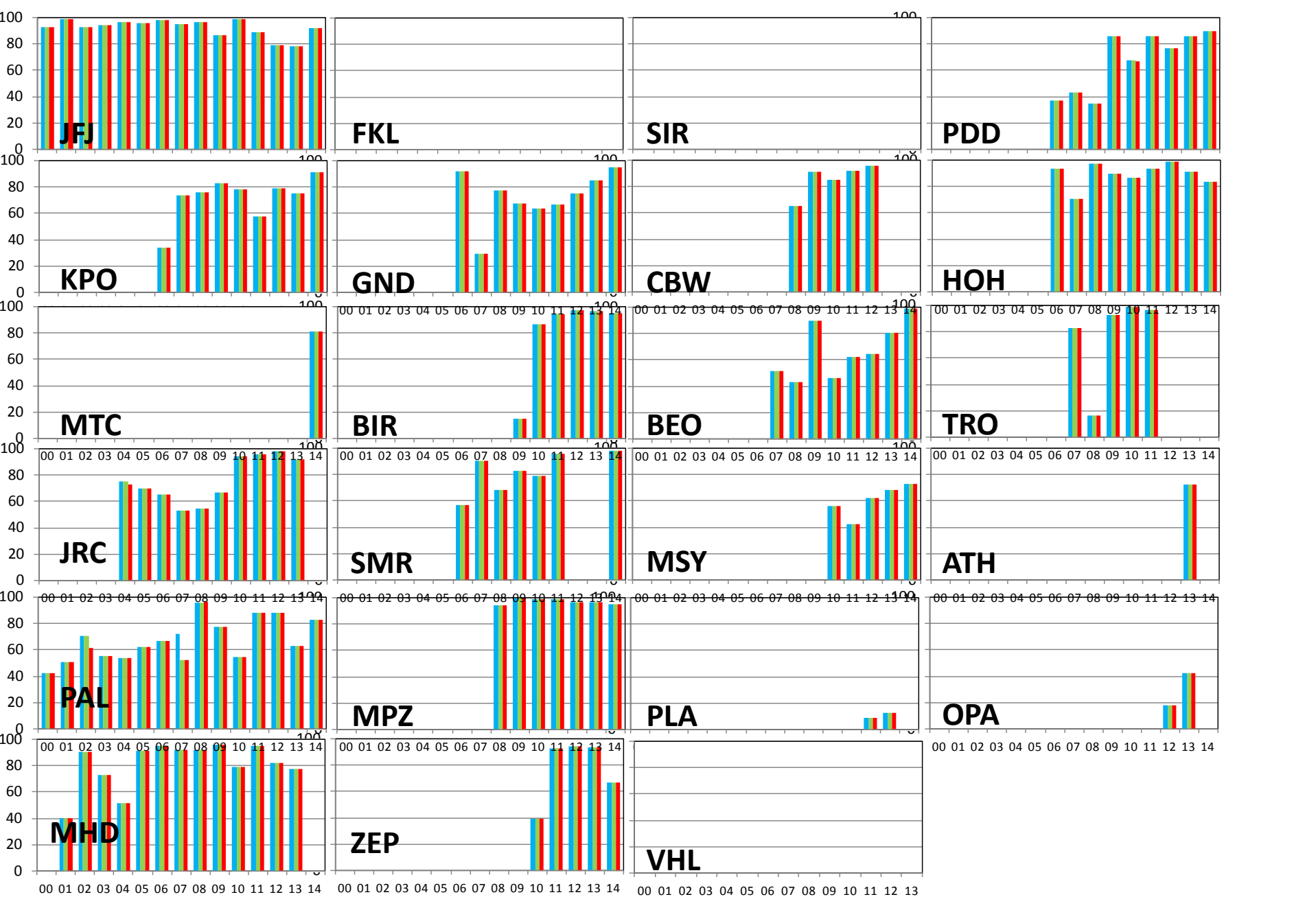
■ Scatt blue

■ Scatt green

■ Scatt red



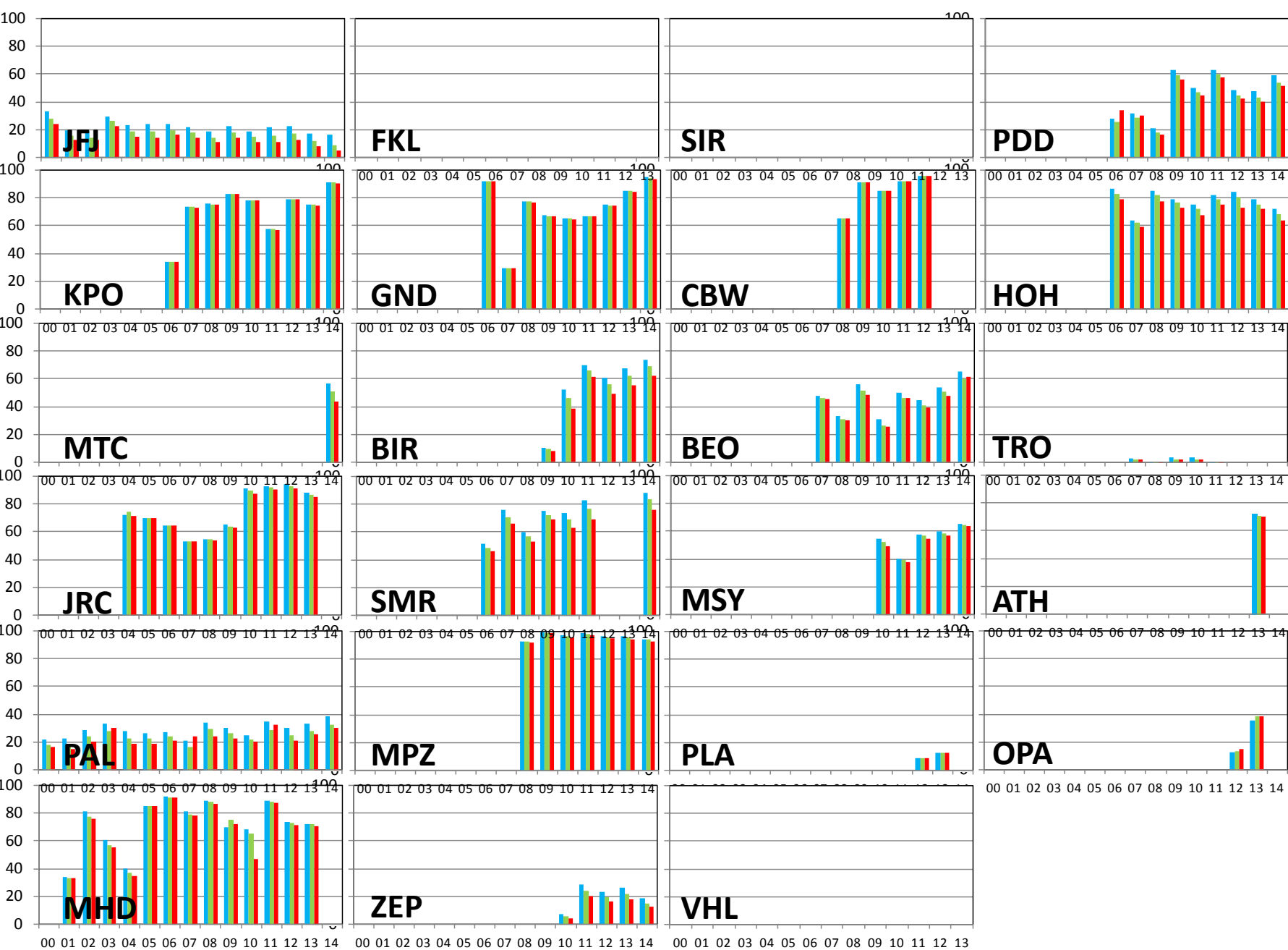
Scattering Angstrom Exponent (scattering > 0.8 Mm⁻¹)



Backsc blue

Backsc green

Backsc red



 *g* blue

 *g* green

 *g* red

Data treatment

- Data were downloaded from EBAS database (2013 / 2014).
- Data were submitted to my personal QC to check for possible additional issues.
- Very few issues at most of the stations.

The screenshot shows a JIRA issue page for the issue 'some data issues observed at MSY'. The issue is in the 'Resolved' state with a 'Fixed' resolution. The issue details include a description, attachments, and a list of activity comments.

Issue Details:

- Type: Issue
- Priority: Major
- Status: Resolved
- Resolution: Fixed

Description:

Hi marco-
you've already seen this list and answered my questions, but I'm uploading it here for the purposes of testing the JIRA system.
I'm not sure if it's appropriate for me to suggest due dates or priority levels for this, but for the purposes of testing I did.

cheers!
betsy
betsy.andrews@noaa.gov

Attachments:

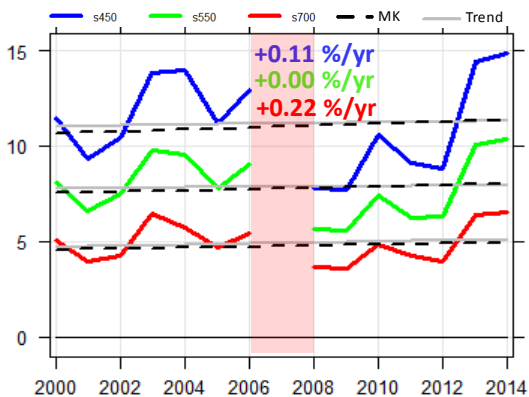
| Attachment Name | Size | Created |
|---------------------------------|------|-------------------|
| msy_edit_directives | 1 KB | 19 Sep 2015 02:13 |
| msy_edit_directives_Marco_2.txt | 1 KB | 29 Sep 2015 09:28 |
| msy_edit_directives_Marco.txt | 1 KB | 21 Sep 2015 12:57 |

Activity:

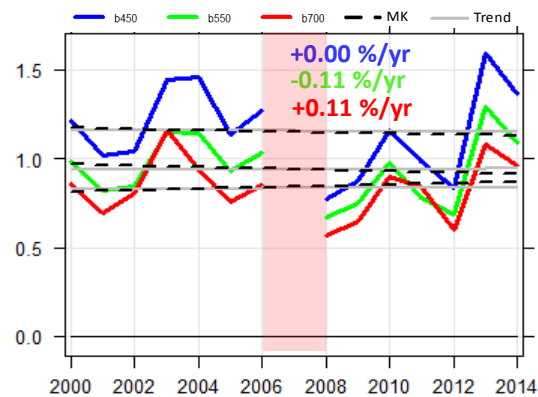
- Marco Pandolfi made changes - 21. Sep 2015 12:51
Status: Open [1] In Progress [3] New Value
- Marco Pandolfi added a comment - 21. Sep 2015 12:57
Hi.
- Marco Pandolfi made changes - 21. Sep 2015 12:57
Attachment: msy_edit_directives_Marco.txt [11083]
- Marco Pandolfi added a comment - 21. Sep 2015 12:56
Hi Betsy,
Please, find attached the answers to your comments for Montseny station.
Thanks
Marco
- Marco Pandolfi made changes - 29. Sep 2015 09:28
Attachment: msy_edit_directives_Marco_2.txt [11163]
- Marco Pandolfi added a comment - 29. Sep 2015 09:29
Hi Betsy,
Please, find attached the MSY_issues_file updated with my comments on MAAP issues.
Cheers
Marco
- Elisabeth Andrews added a comment - 01. Oct 2015 17:38
Hi marco-
at long last i am back on JIRA, thanks for your answers to my questions about MSY maap and nephelometer data!

PALLAS (year 2007 removed)

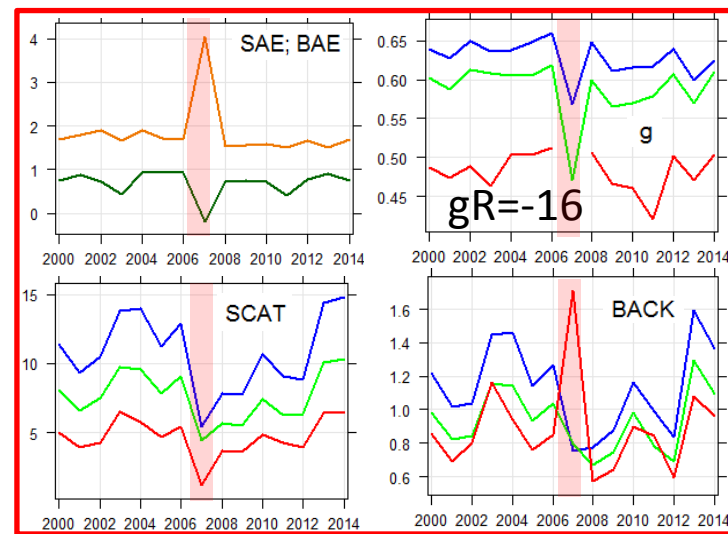
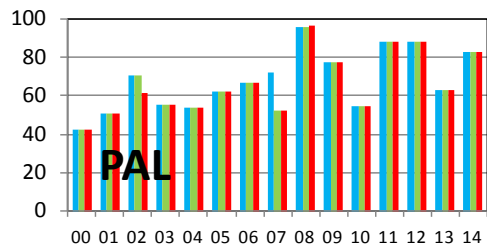
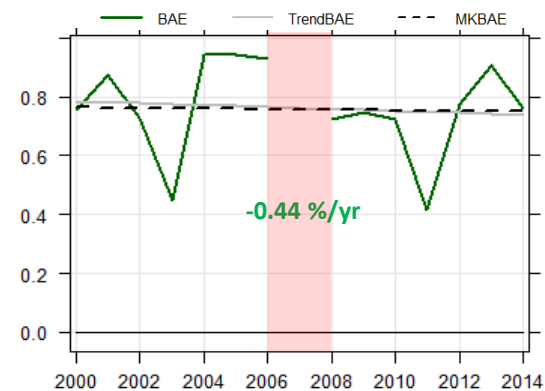
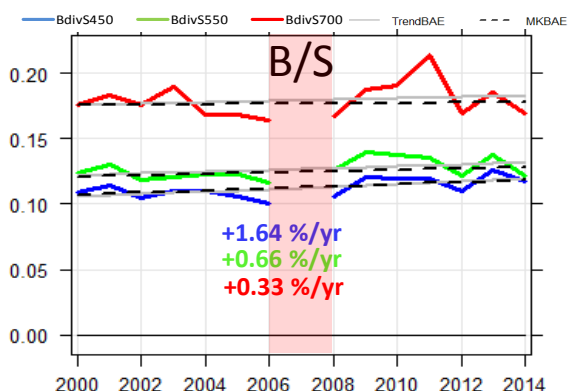
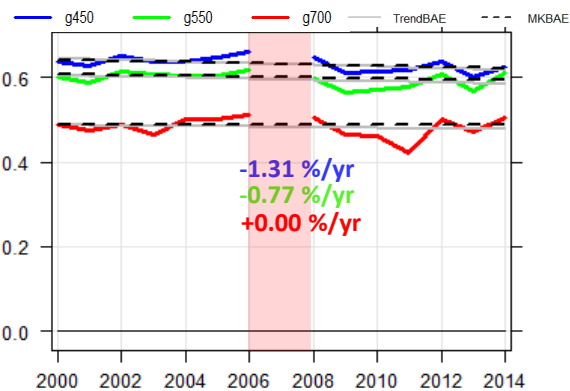
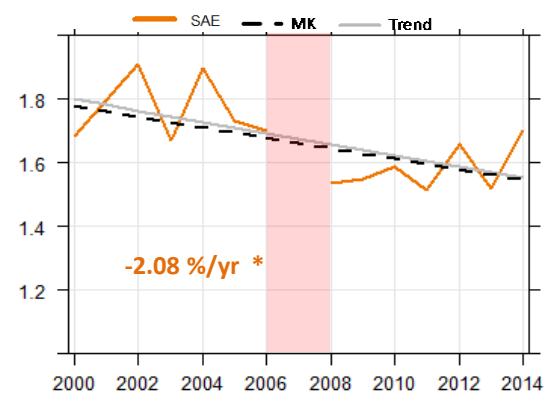
Scattering



backscattering

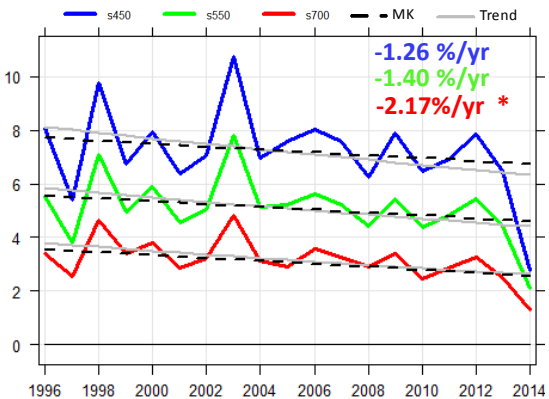


SAE

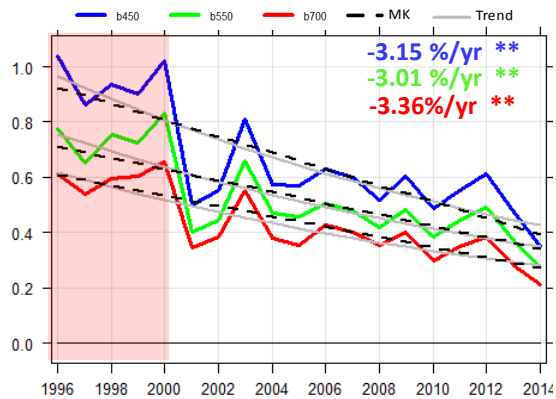


JFJ

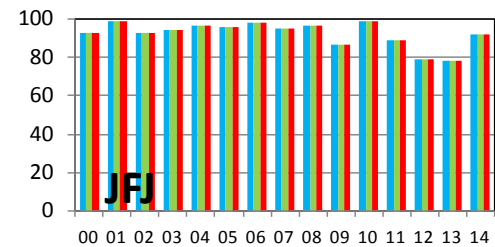
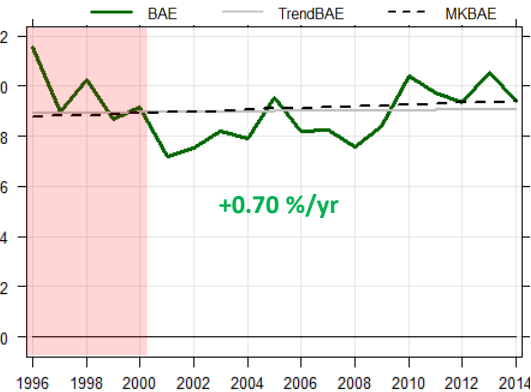
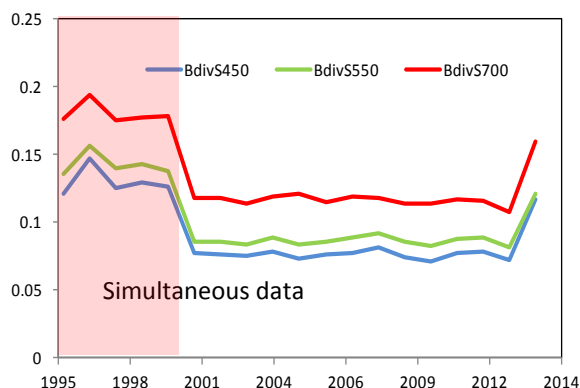
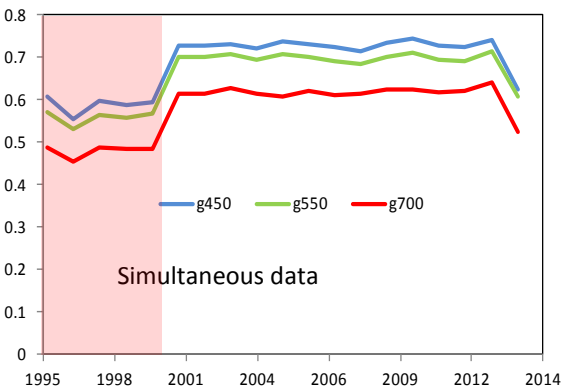
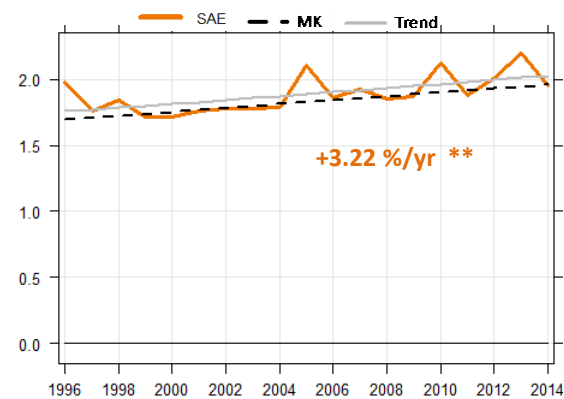
Scattering



backscattering

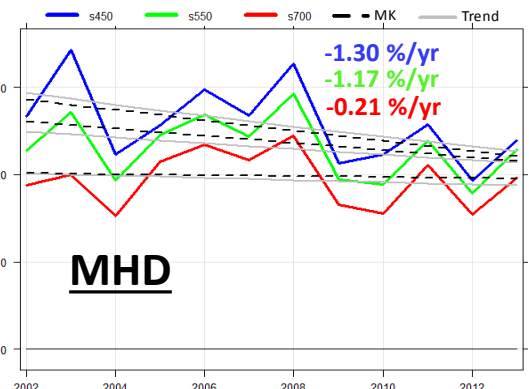


SAE

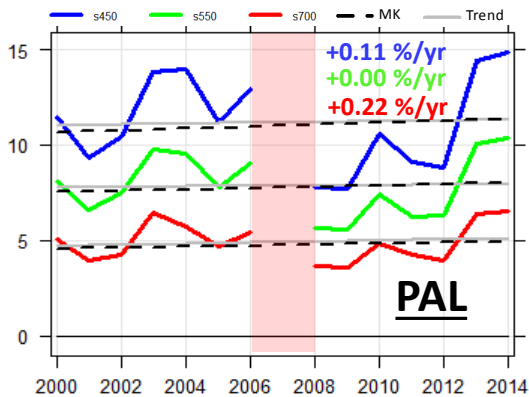


TRENDS

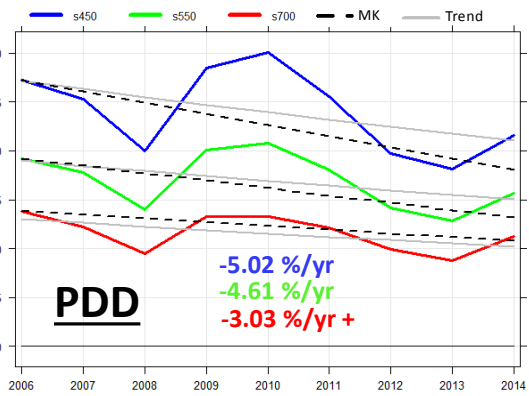
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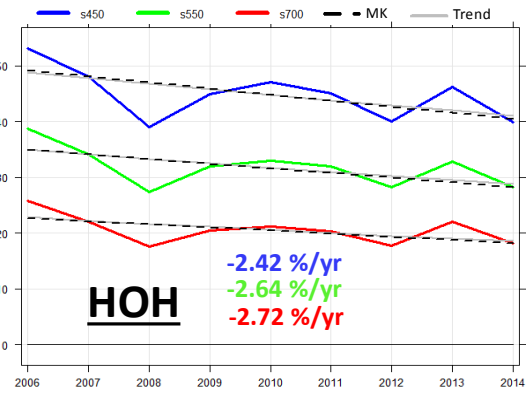
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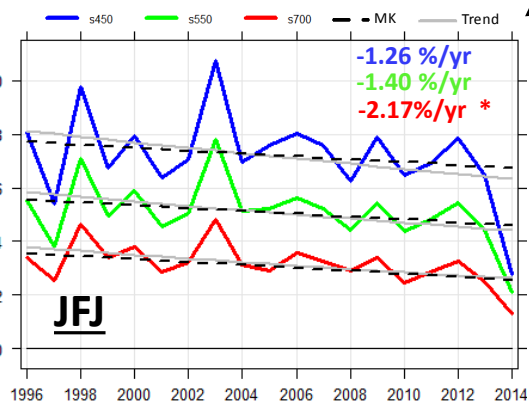
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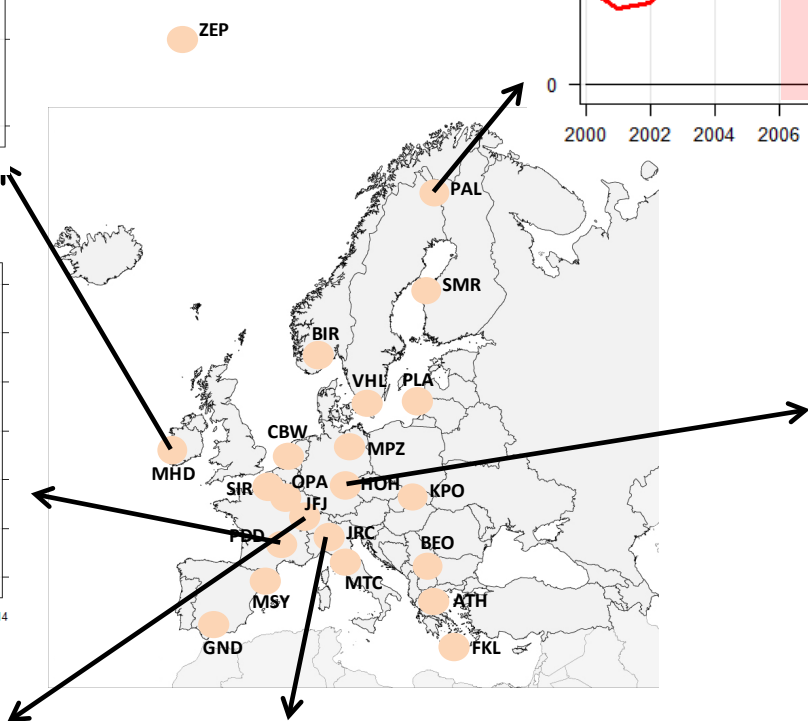
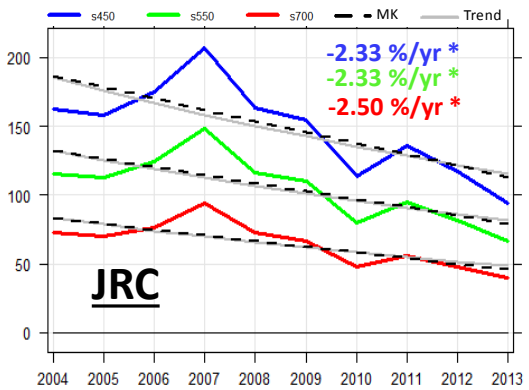
Scattering



Scattering

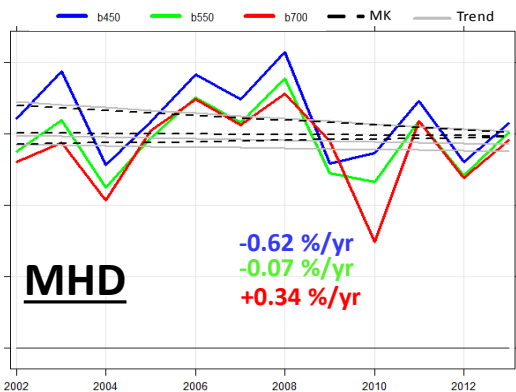


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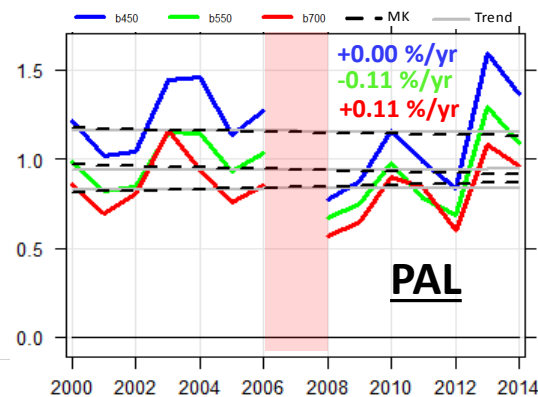


● TRO

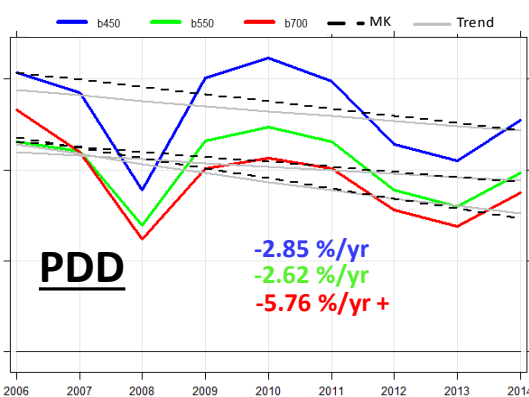
backscattering



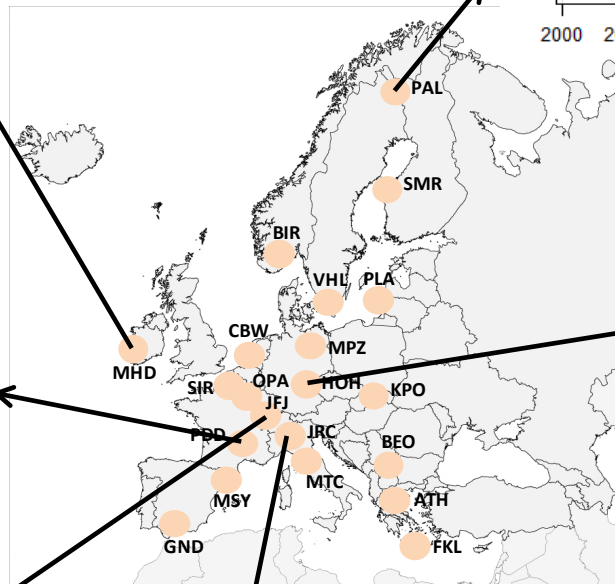
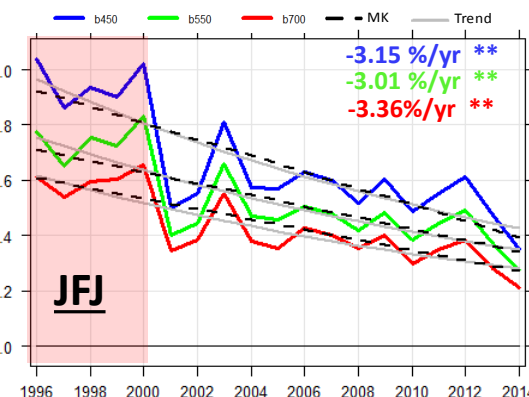
backscattering



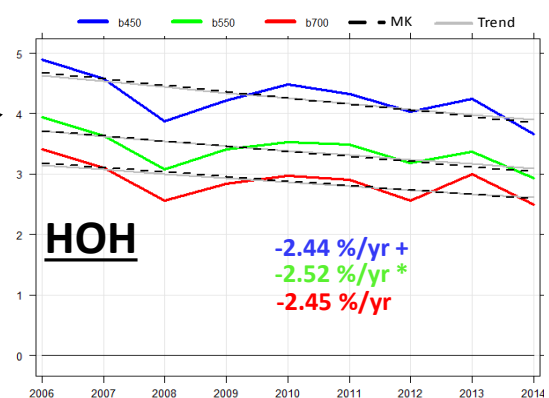
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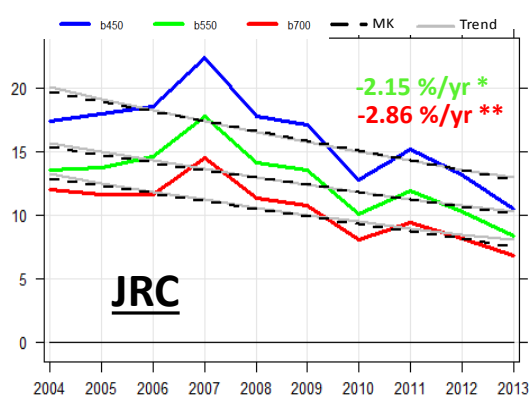
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backscattering

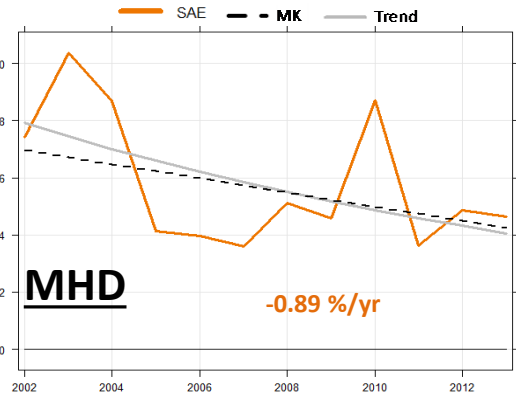


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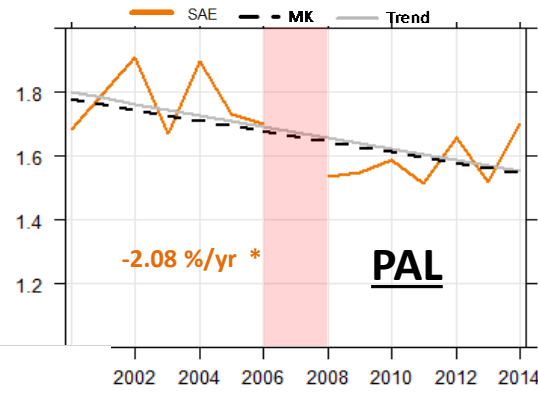


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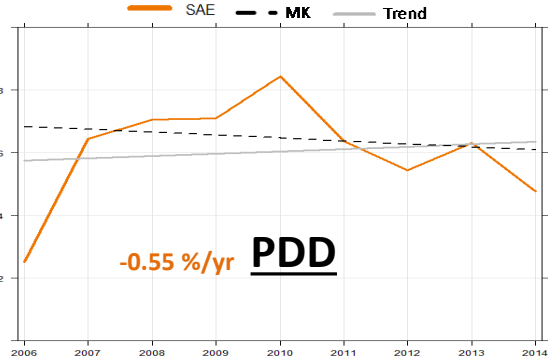
SAE



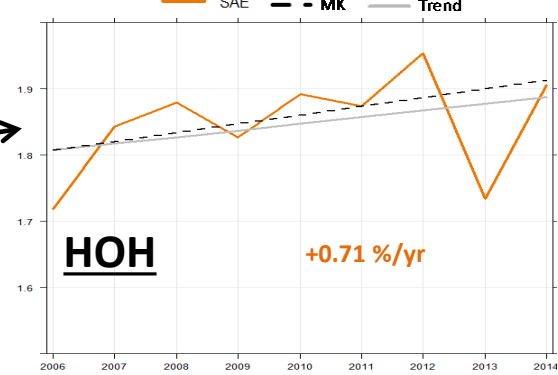
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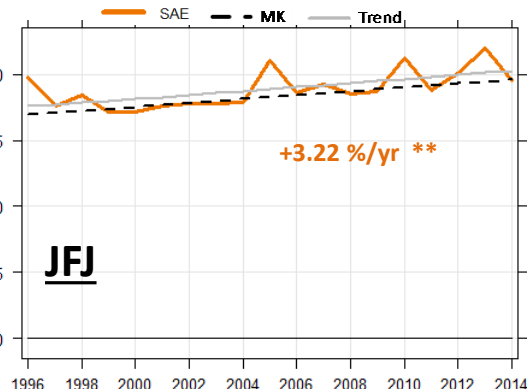
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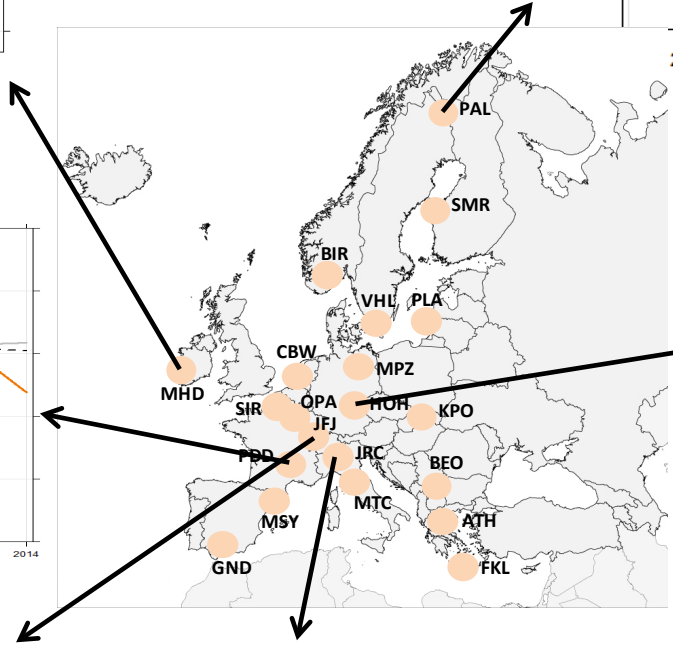
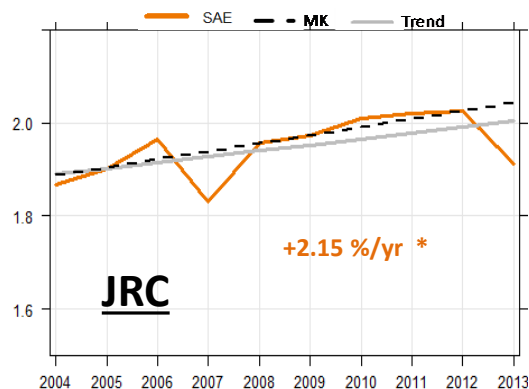
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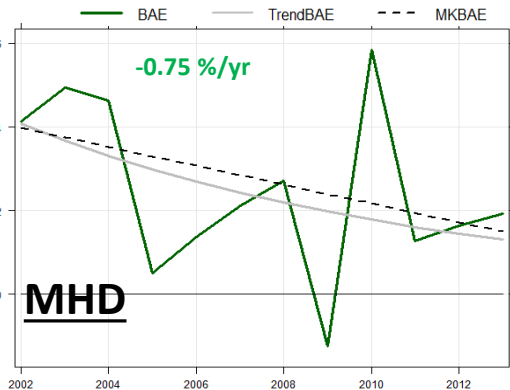
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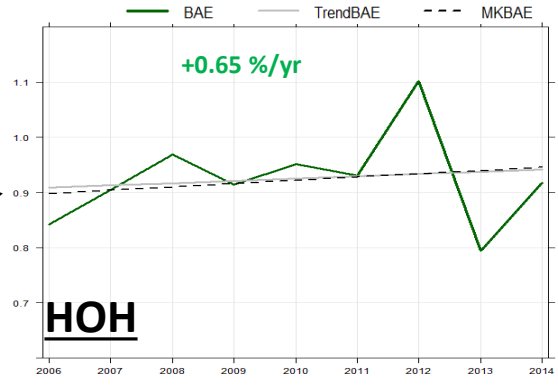
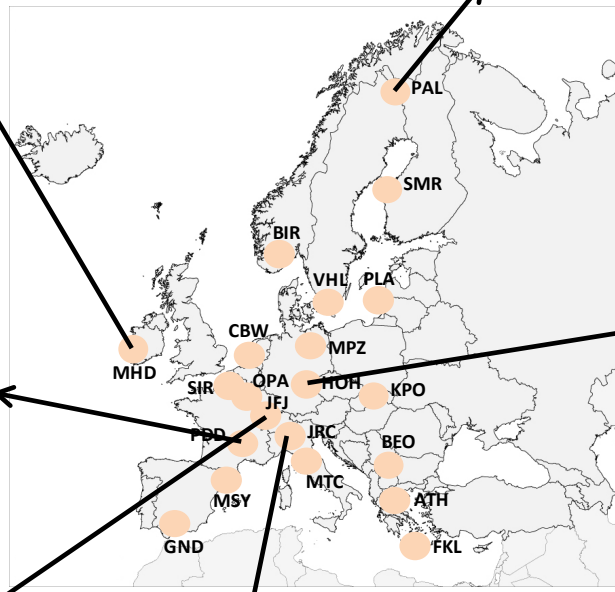
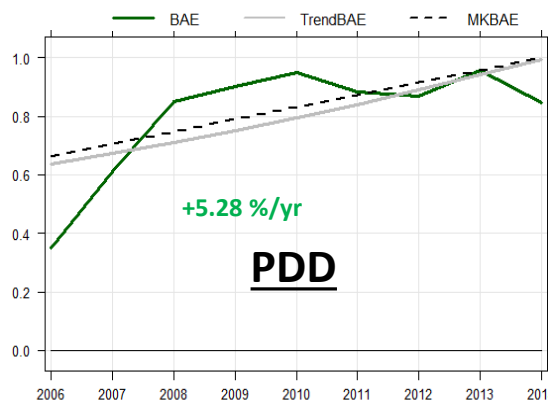
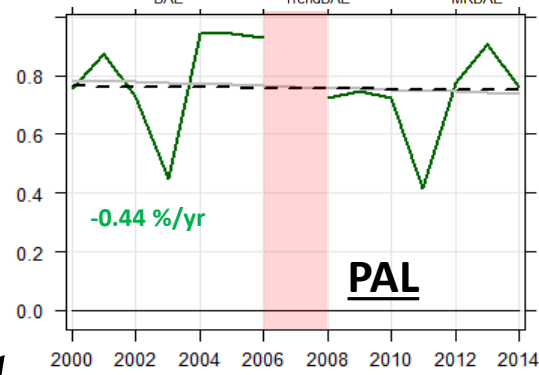
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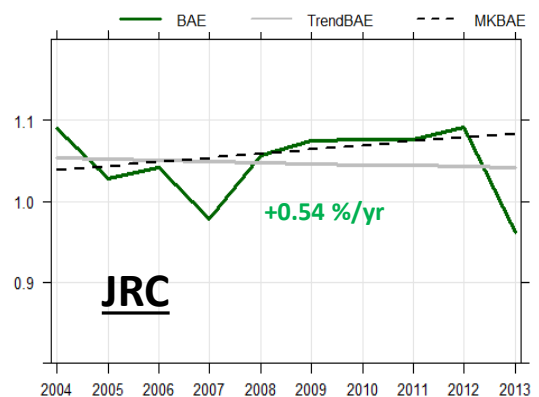
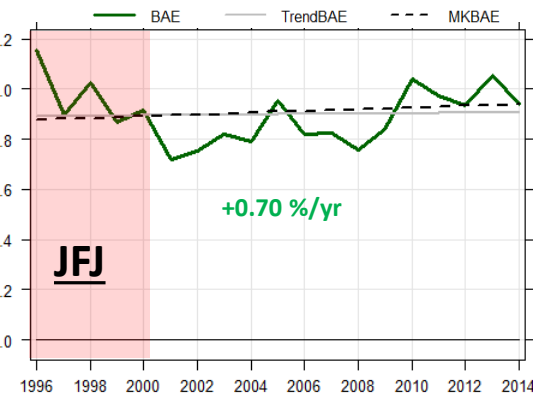
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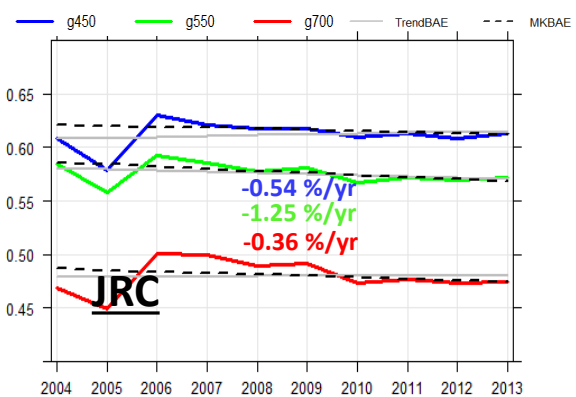
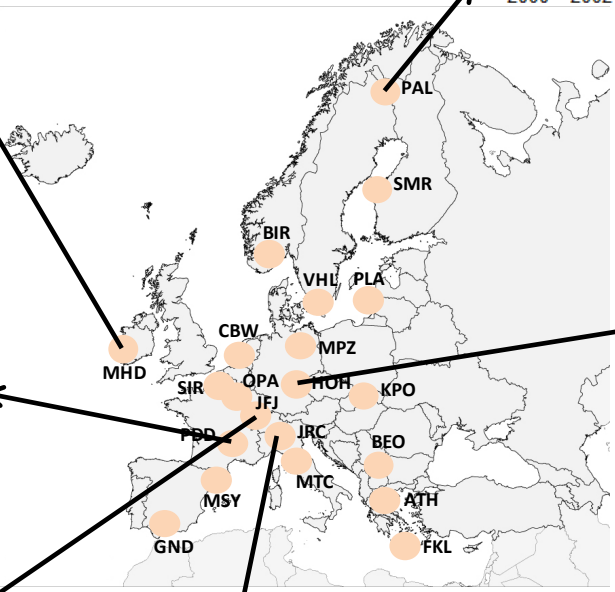
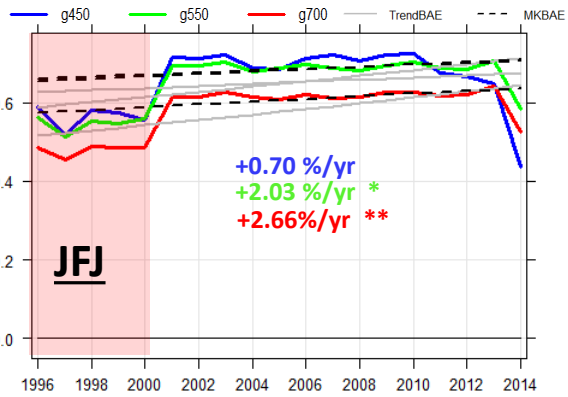
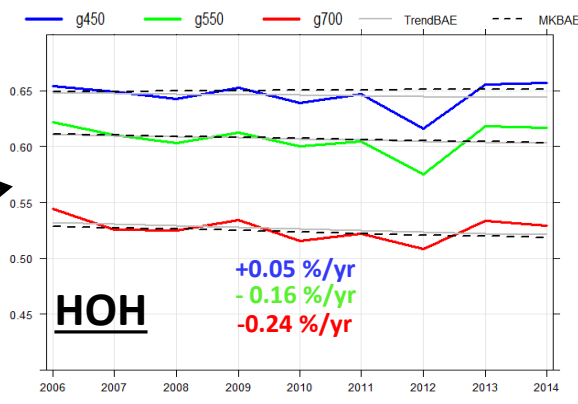
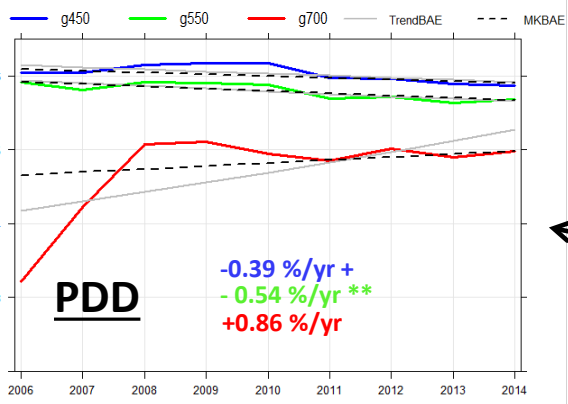
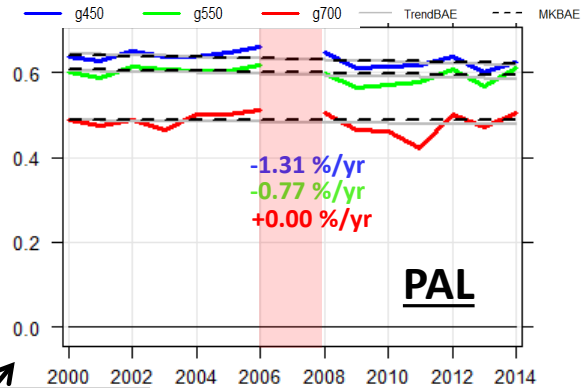
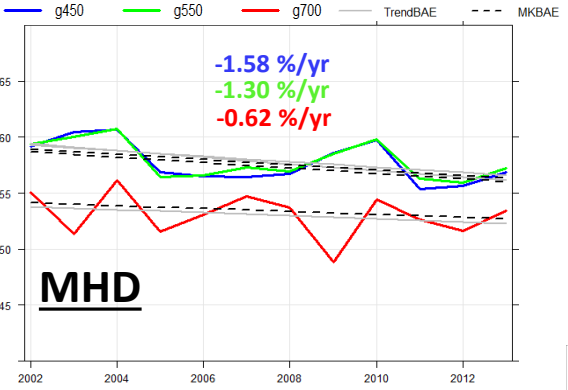


BAE



TRO





gg

ZEP

TRO

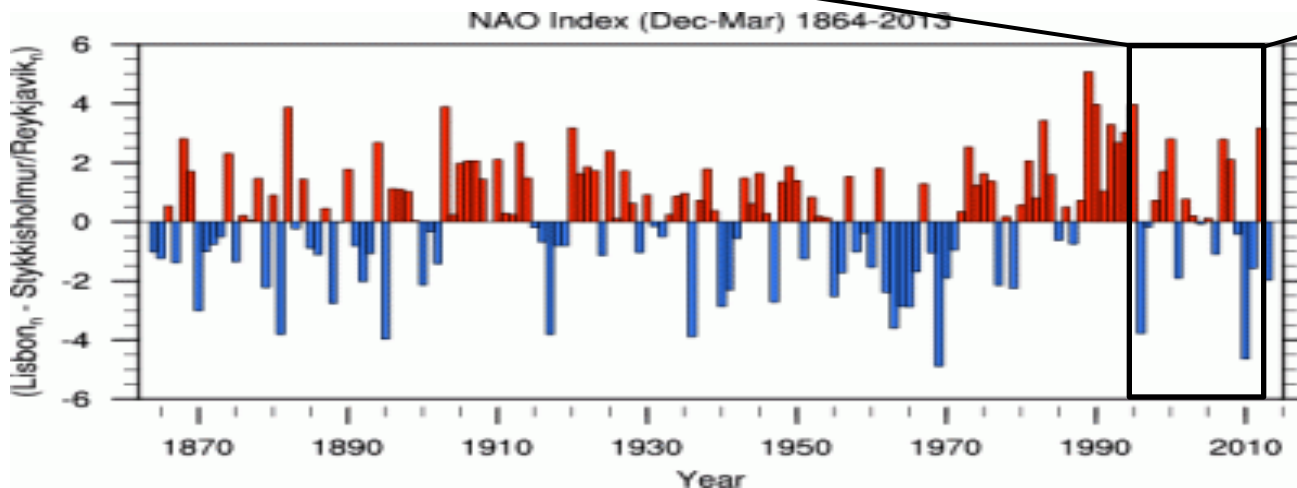
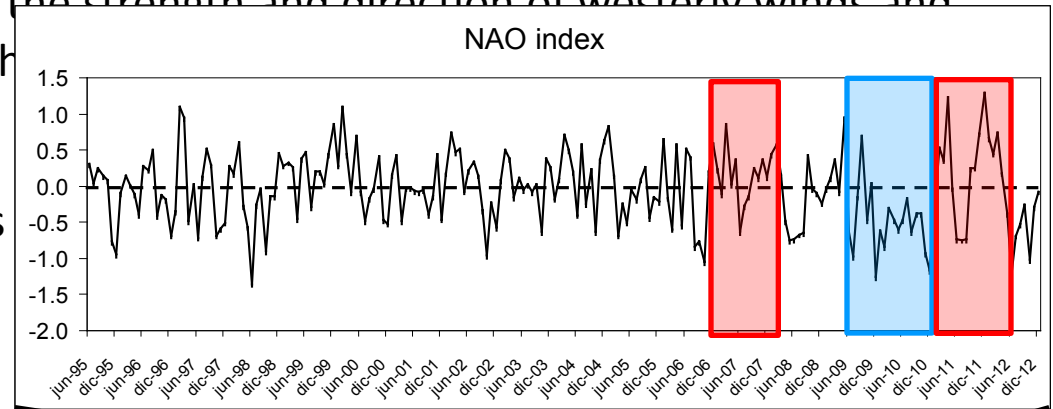
EFFECT OF NAOi ?

NAO index

North Atlantic Oscillation (NAO):

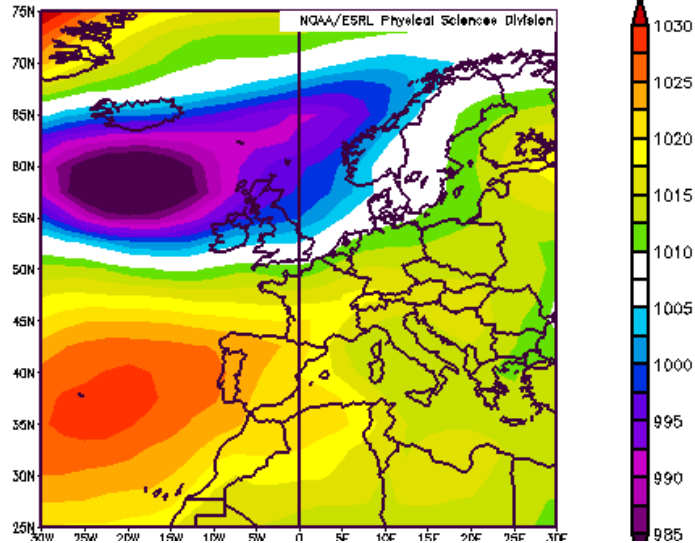
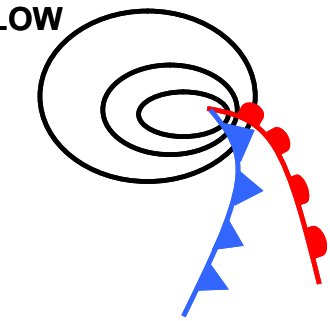
A climatic phenomenon in the North Atlantic Ocean related to fluctuations in the difference of atmospheric pressure between the Icelandic low pressure and Azores high, controlling the strength and direction of westerly winds and storm tracks across the north

NAO index (NAOi) quantifies



NAO index and meteorology

Winter 2007 NAOi +1.37

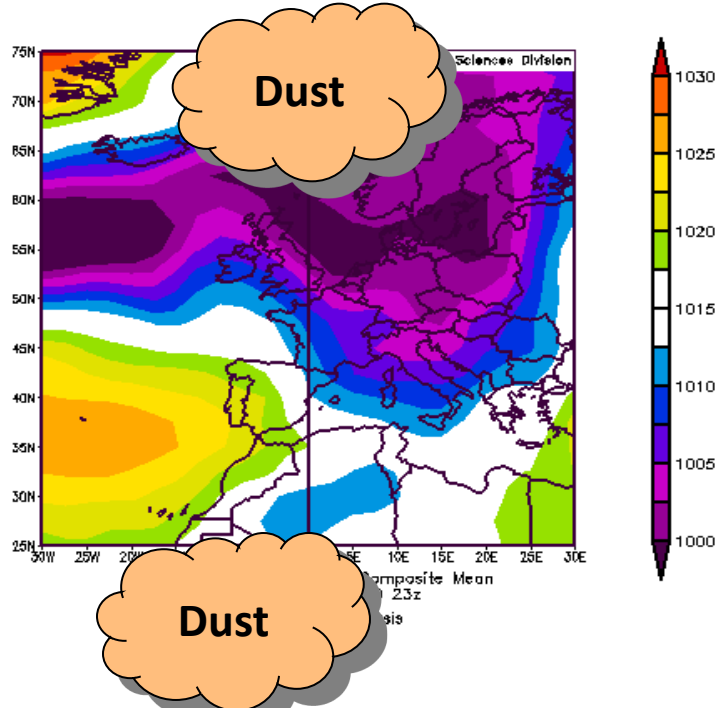
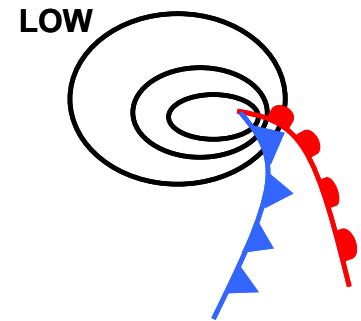


NAO +

Wetter, windier weather across Northern Europe

Warm, dry weather over Southern Europe and Mediterranean

Winter 2009 NAOi -2.54



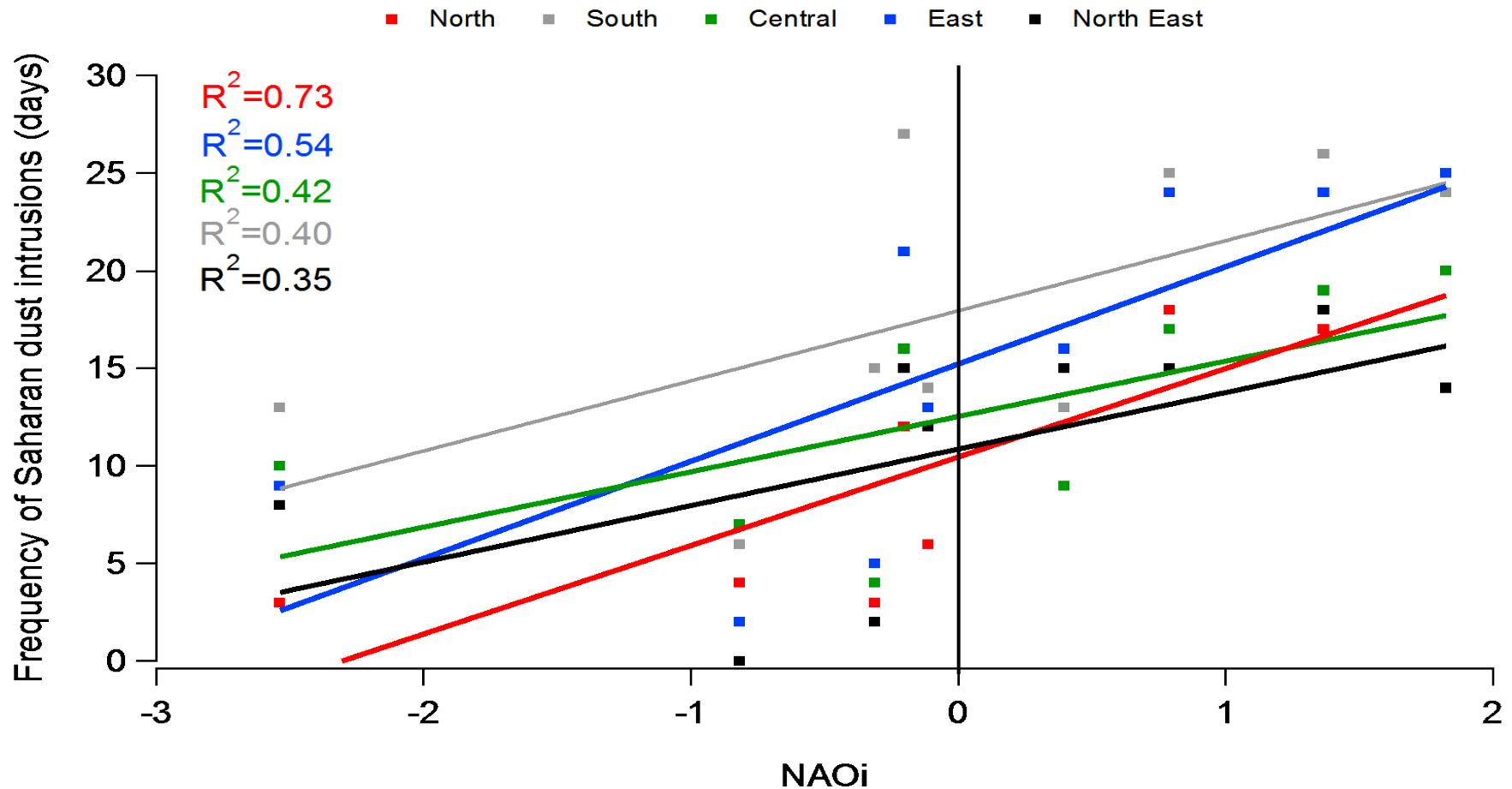
NAO -

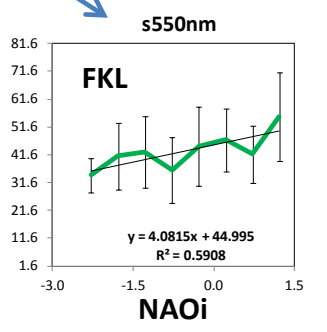
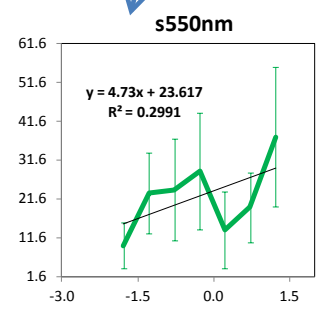
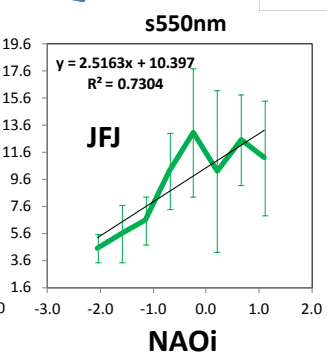
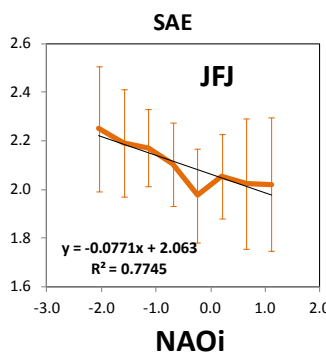
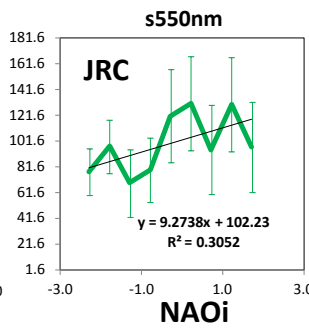
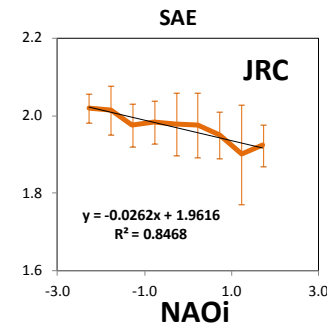
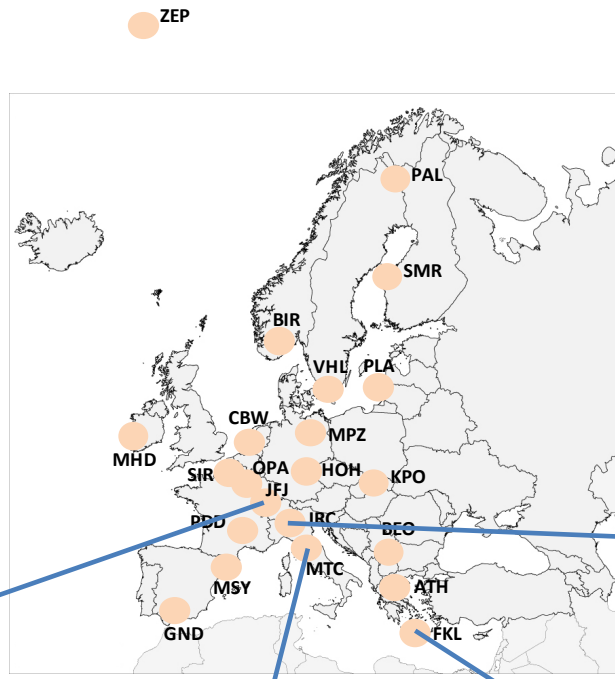
Cold, dry weather across Northern Europe

Atlantic storm track towards Mediterranean and Iberian Peninsula, bringing higher precipitation

NAO index and Saharan dust outbreaks

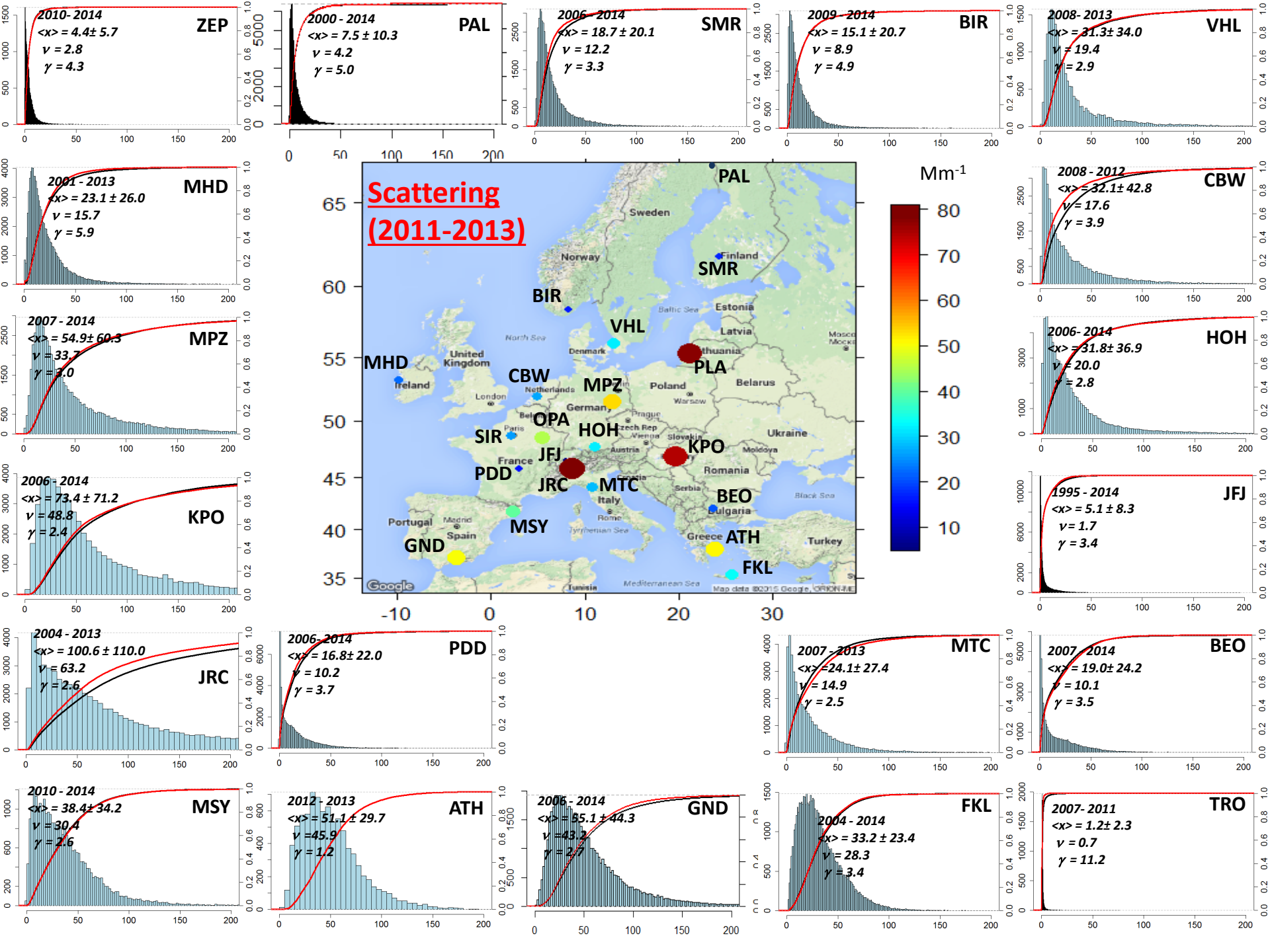
- NAO affects frequency of Saharan dust intrusions across Spain
- Correlation improves with proximity to Atlantic Ocean
- If NAO extremely positive or negative, effects felt across the Peninsula





● TRO

DATA DISTRIBUTION



Frequency counts distributions and cumulative frequency distributions for **scattering** at all stations are reported. Frequency counts are presented considering all data available at each station, whereas the cumulative frequency distributions are presented for both the whole periods at each station and for the “common” period 2011 – 2013. The number of bins at each station was determined based on **Freedman–Diaconis rule**:

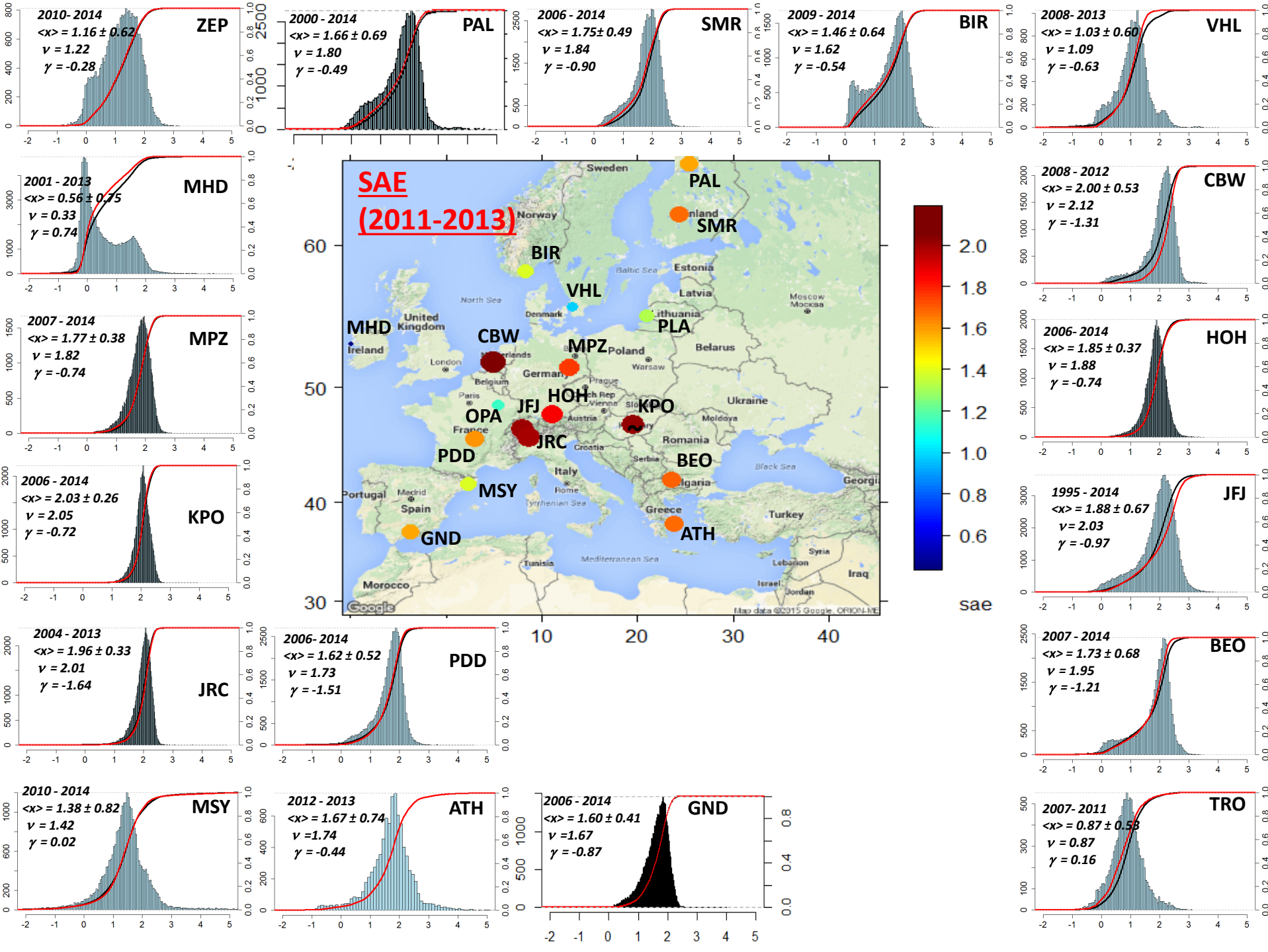
$$BinSize = 2IQR(x)n^{-1/3}$$

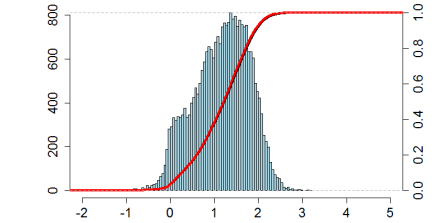
where *IQR* is the interquartile range of the data and *n* is the number of observations in the sample *x*.

Mean (+/- SD), median and skewness are provided for both the whole period and the “common” period (2011 – 2013).

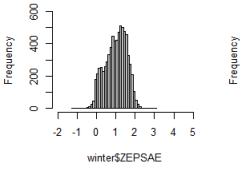
Skewness were calculated based on hourly means at all stations (withouth excludings outliers, thus all hourly data were considered in skewness calculation).

The “common” period (2011 – 2013) was selected in order to make stations comparable. Points in the map represent the mean scattering at each station during 2011 – 2013.

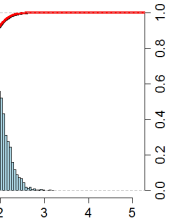




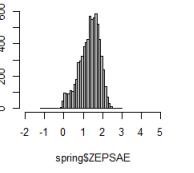
Histogram of winter\$ZEPSAE



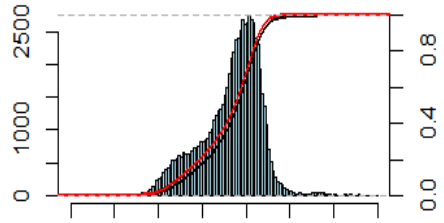
winter\$ZEPSAE



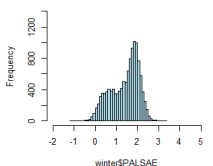
Histogram of spring\$ZEPSAE



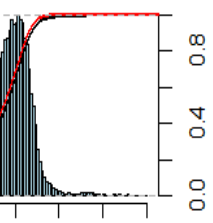
spring\$ZEPSAE



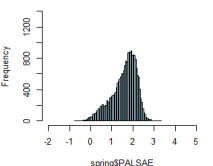
Histogram of winter\$PALSAE



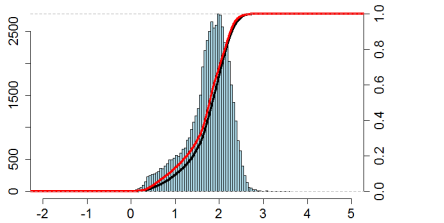
winter\$PALSAE



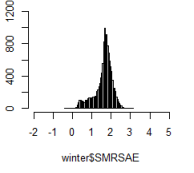
Histogram of spring\$PALSAE



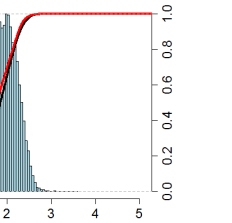
spring\$PALSAE



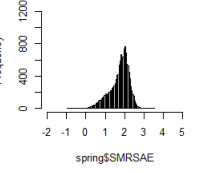
Histogram of winter\$SMRSAE



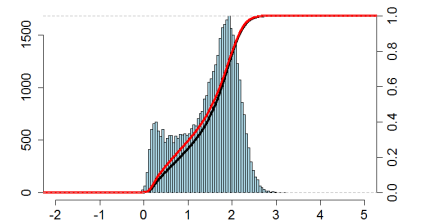
winter\$SMRSAE



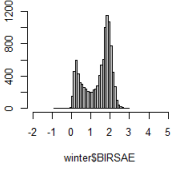
Histogram of spring\$SMRSAE



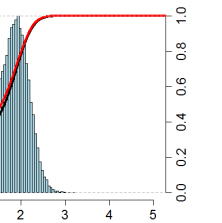
spring\$SMRSAE



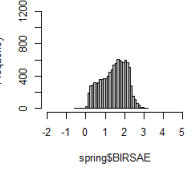
Histogram of winter\$BIRSAE



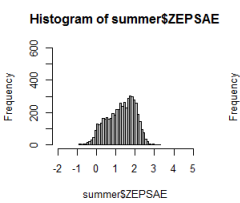
winter\$BIRSAE



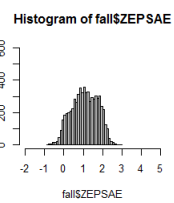
Histogram of spring\$BIRSAE



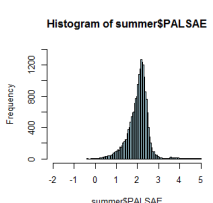
spring\$BIRSAE



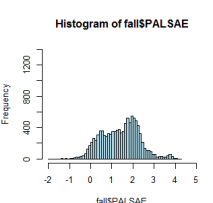
summer\$ZEPSAE



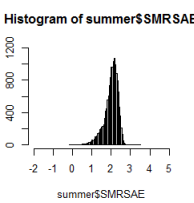
fall\$ZEPSAE



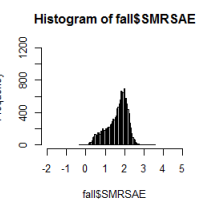
summer\$PALSAE



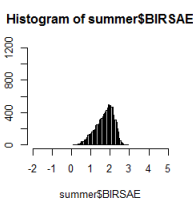
fall\$PALSAE



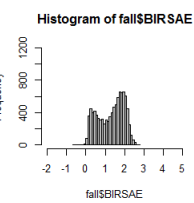
summer\$SMRSAE



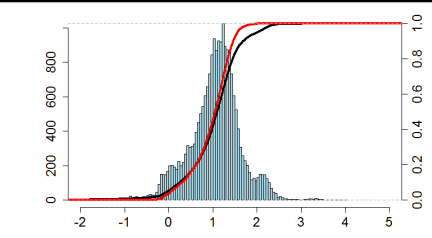
fall\$SMRSAE



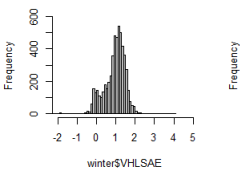
summer\$BIRSAE



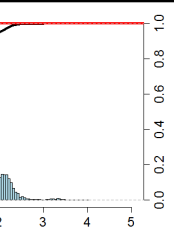
fall\$BIRSAE



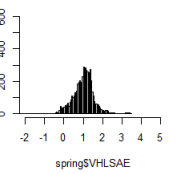
Histogram of winter\$VHLSAE



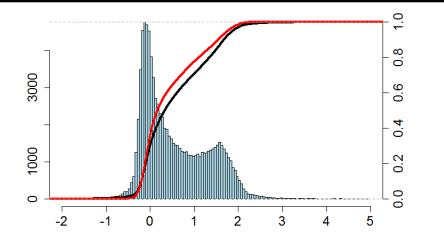
winter\$VHLSAE



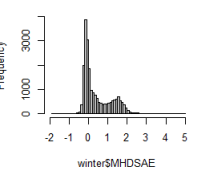
Histogram of spring\$VHLSAE



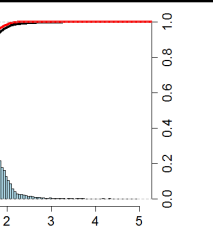
spring\$VHLSAE



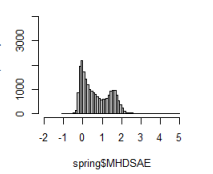
Histogram of winter\$MHDSAE



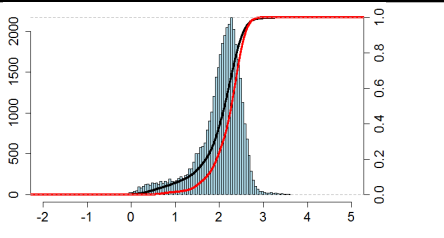
winter\$MHDSAE



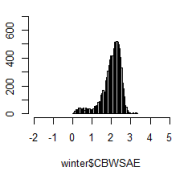
Histogram of spring\$MHDSAE



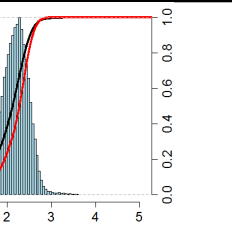
spring\$MHDSAE



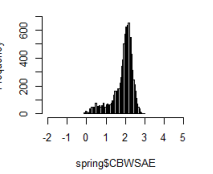
Histogram of winter\$CBWSAE



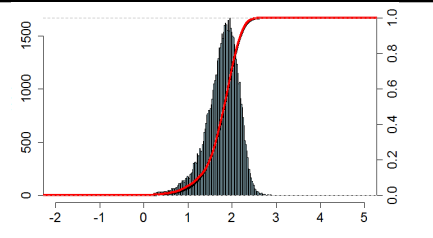
winter\$CBWSAE



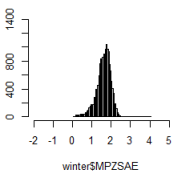
Histogram of spring\$CBWSAE



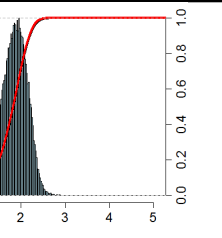
spring\$CBWSAE



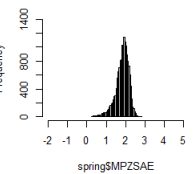
Histogram of winter\$MPZSAE



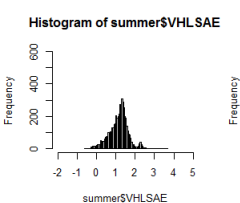
winter\$MPZSAE



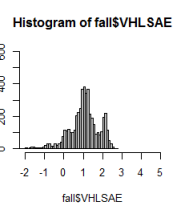
Histogram of spring\$MPZSAE



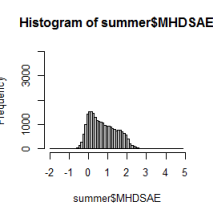
spring\$MPZSAE



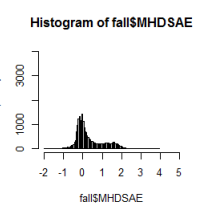
summer\$VHLSAE



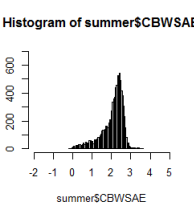
fall\$VHLSAE



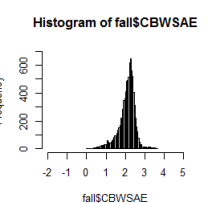
summer\$MHDSAE



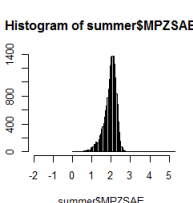
fall\$MHDSAE



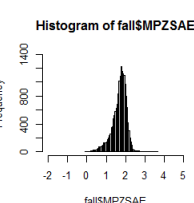
summer\$CBWSAE



fall\$CBWSAE



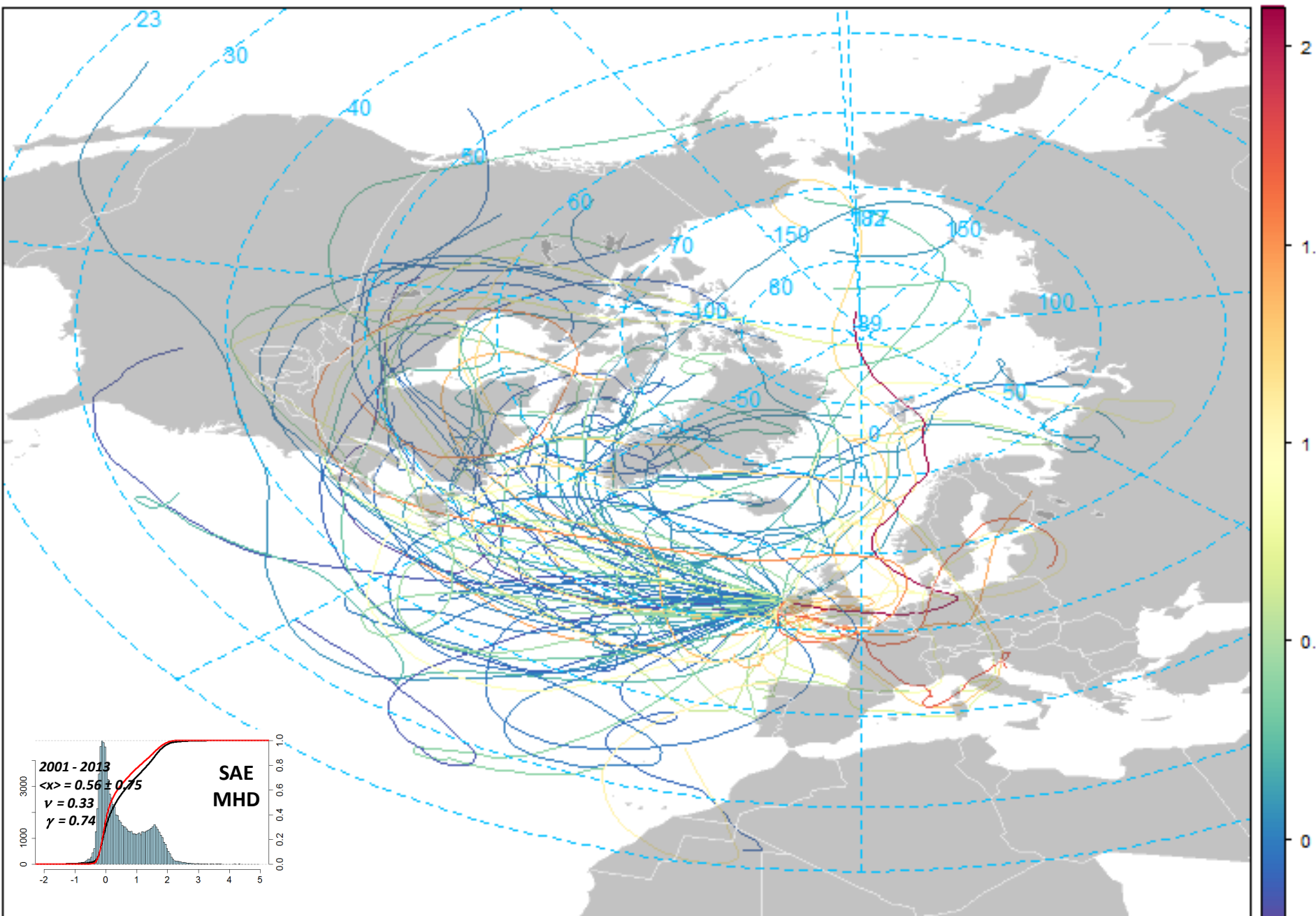
summer\$MPZSAE



fall\$MPZSAE

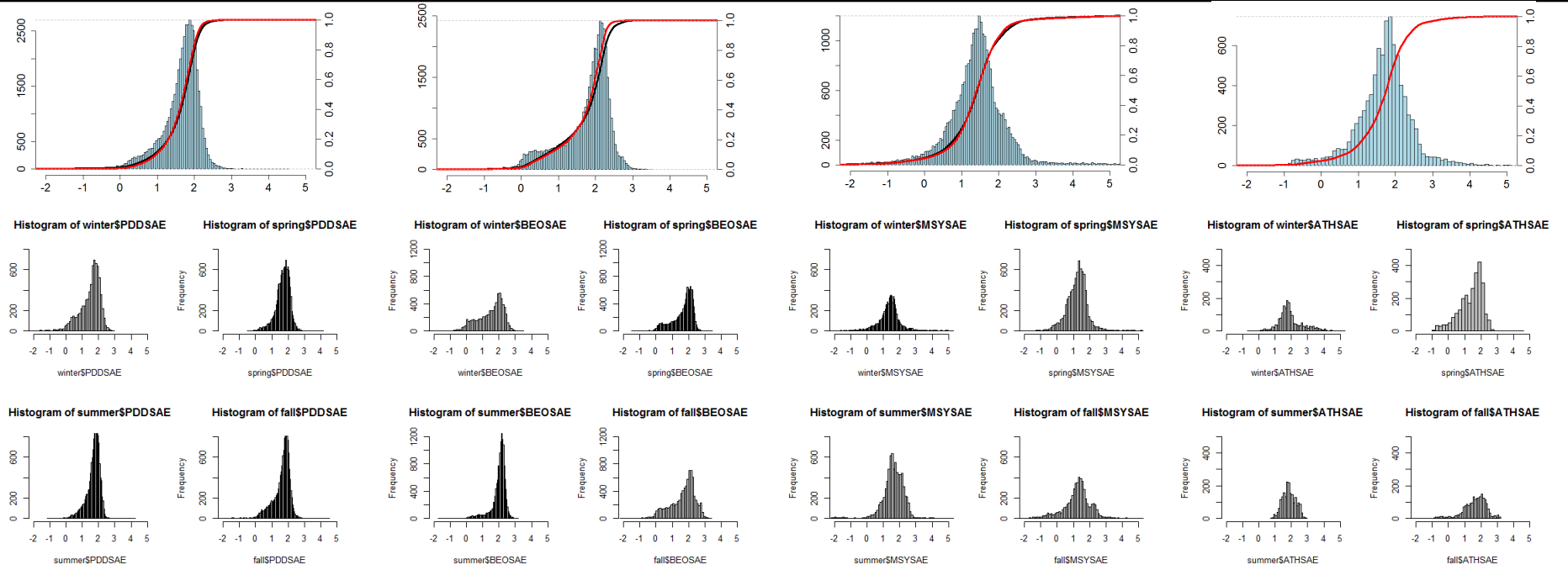
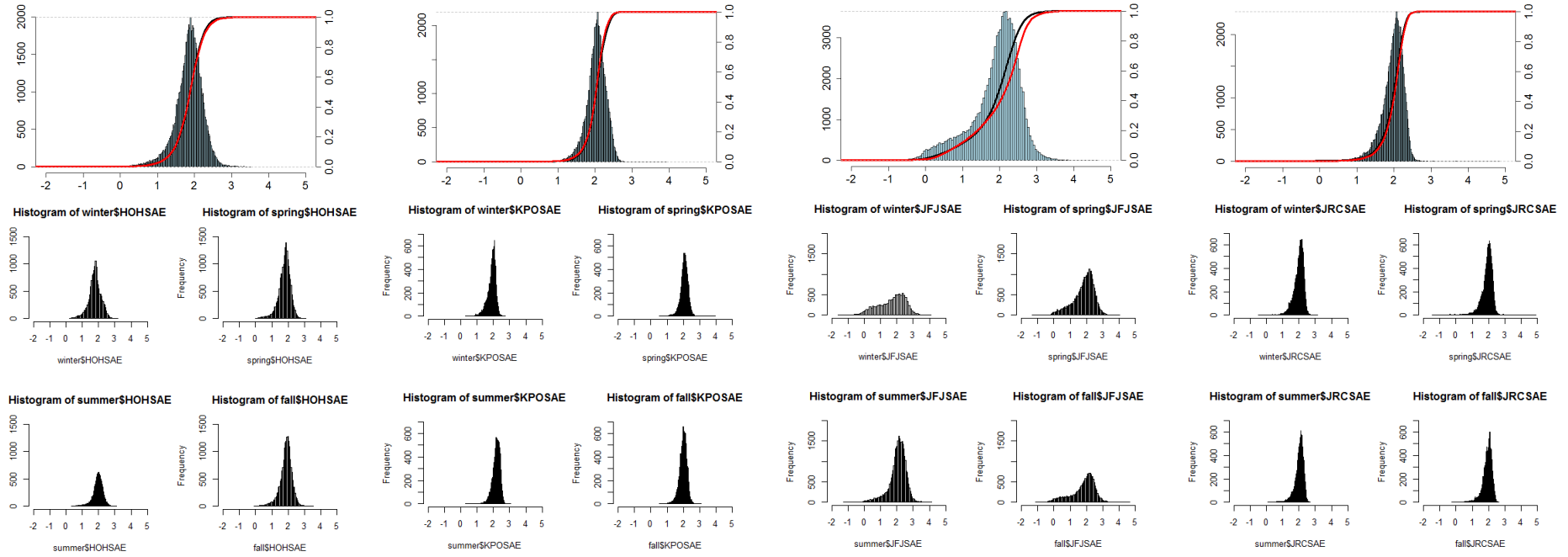
BACKTRAJECTORY ANALYSIS

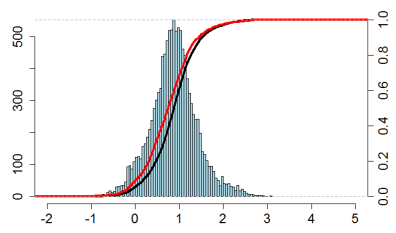
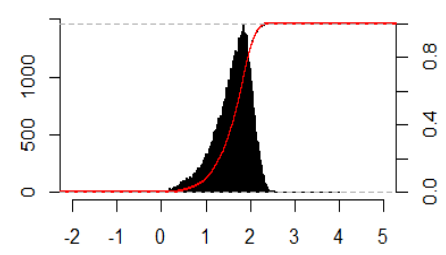
KSAE



That's All for the Moment

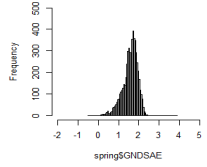
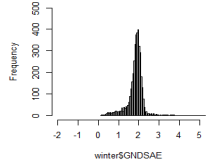
Many thanks !





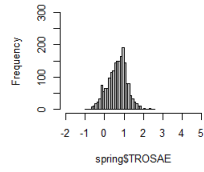
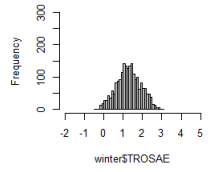
Histogram of winter\$GNDSAE

Histogram of spring\$GNDSAE



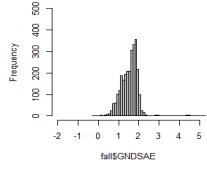
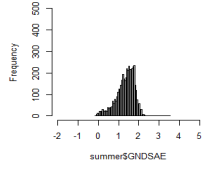
Histogram of winter\$TROSAE

Histogram of spring\$TROSAE



Histogram of summer\$GNDSAE

Histogram of fall\$GNDSAE



Histogram of summer\$TROSAE

Histogram of fall\$TROSAE

