RMIB contribution to AER-WP4.2
“Evaluation of aerosol radiative properties and associated radiative fluxes”

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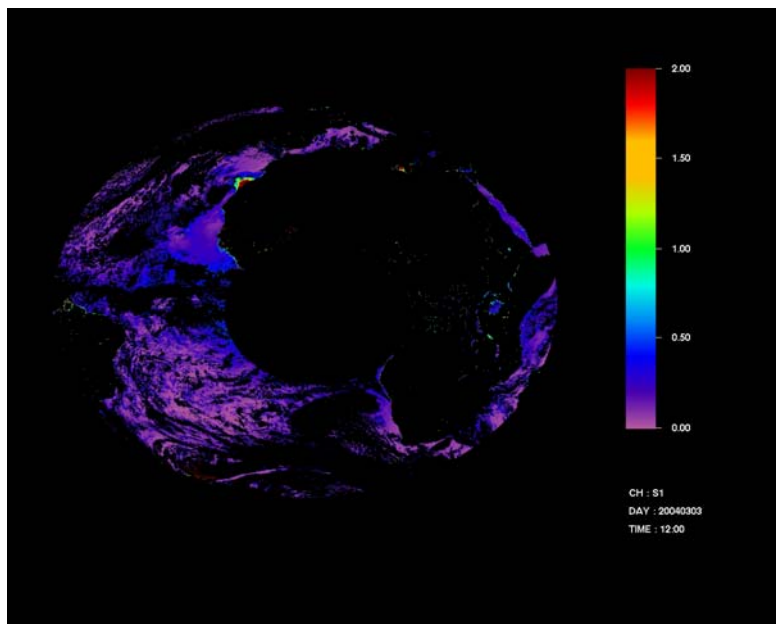


# UV-B AOD retrieved from Brewer spectrophotometers

Data of 9 stations available:

| Station | Coordinates | | time available | aerosol type |
|---|---|---|---|---|
| Norrkoeping (S) | 59 N | 16 E | 02/96 – 03/05 | rural (coast) |
| Brussels (B, 2 instr.) | 50 N | 4 E | 01/84 – present | urban |
| Arosa (CH) | 47 N | 10 E | 05/97 – 12/04 | rural (mount.) |
| Seoul (S-Kor) | 38 N | 127 E | 01/99 – 12/05 | urban (coast) |
| Hong Kong | 22 N | 114 E | 01/95 – 12/04 | urban (coast) |
| Petaling Jaya (MLY) | 3 N | 102 E | 10/92 – 12/03 | urban (coast) |
| Resolute Bay (CAN) | 75 N | 95 W | 05/87 – 10/04 | polar (coast) |
| Toronto (CAN) | 44 N | 80 W | 09/84 – 10/04 | urban (cont.) |
| Belgrano II (Antarctica) | 78 S | 35 W | 02/92 – 12/05 | polar (coast) |

# UV-B AOD retrieved from Brewer spectrophotometers

AOD @ 306.3 / 310.1 / 313.5 / 316.7 / 320.1 nm

for AOD retrieval direct sun measurements necessary
- too cloudy → no data
- time resolution varying

for data quality + assurance:
- raw data files necessary (not in international data bases)
- each station needs to be contacted separately
- careful quality assessment necessary
  (calibration method, estimation of extraterrestrial constant, error budget)

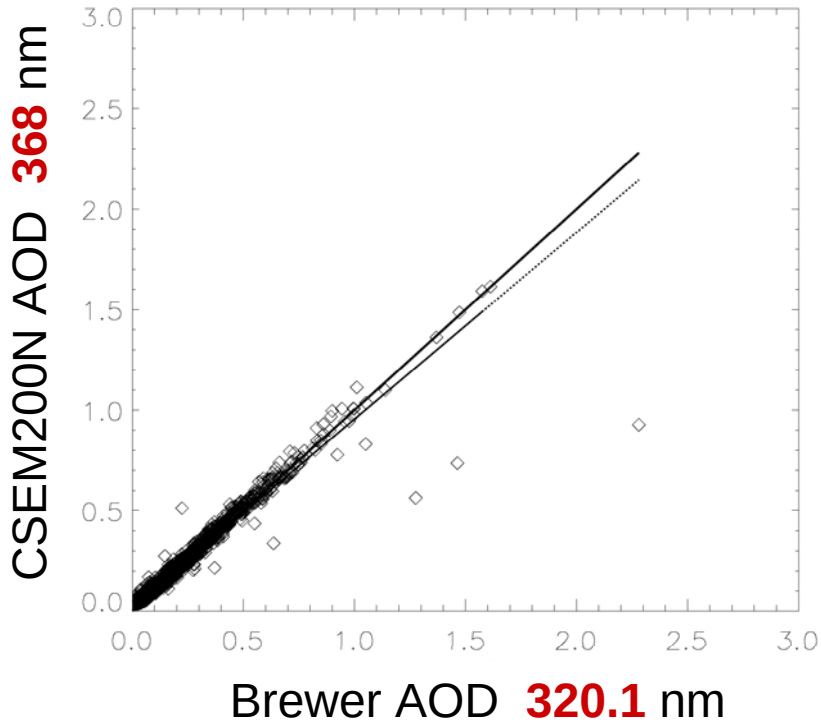
increasing confidence in the Brewer–AOD values:
- comparison with sun-photometers where available
- inter-comparison of Brewer single- and double-monochromators
- more information about the aerosol measured at the stations

# UV-B AOD retrieved from Brewer spectrophotometers

## comparison with sun-photometers:

example for **Norrkoeping**
for all data 2004:
$r^2 = 0.97$
$y = 0.93 * x + 0.03$

**Uccle**: a CIMEL sun-photometer will be operational this year
**Arosa**: comparison with a sun-photometer at Davos




## Inter-comparisons single- and double Brewer monochromators:

**Uccle** single- vs. double-monochromator: $r^2 = 0.98$ $y = 1.02 * x + 0.06$

**Arosa** 2 single- vs. 1 double-monochromator:
$r^2 = 0.94$ to 0.99 slope:0.98 intercept: –0.04 to +0.03

**Future work:**

Preparation of UV-B AOD data set
- quality assurance
- gathering information about the aerosol measured at the stations,
  e.g. for estimation of SSA, Ångstrom-Exponent
  (Uccle: campaign in 2006 for determination of aerosol composition)
- preparing data set for upload on AeroCom data base

Evaluation studies with simulations from the test model runs of ECMWF

First look into comparisons with test simulation (sea salt and dust) for Uccle:
UV-B AOD from the Brewer distinctly (~10fold) higher;
careful data examination necessary

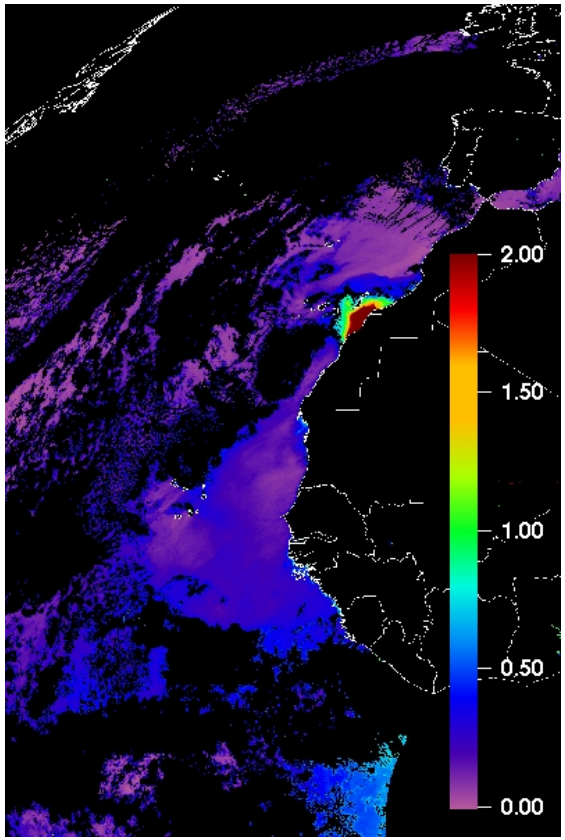
# AOD retrieved from satellite data (SEVIRI on MSG-1)

- aerosol index over ocean + land
  (clear sky with aerosol, cloudy, pristine atmosphere)
- AOD only over ocean
  @ 0.6 / 0.8 / 1.6 μm
  SEVIRI field of view / data at SZA > 60º excluded
- resolution: 3x3 km / 15 min

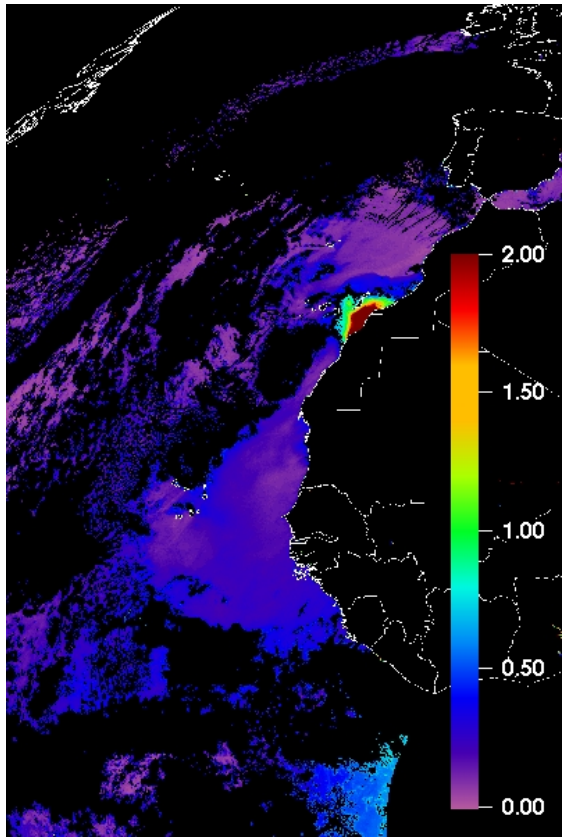
- Procedure:
  cloud screening (including cirrus and contrail detection)
  dust detection and recovering from cloud screening
  land mask filter
  AOD algorithm (3rd generation NOAA/NESDISD aerosol algorithm for AVHRR/3; Ignatov&Stowe, 2002, JAS)

# AOD retrieved from satellite data (SEVIRI on MSG-1)

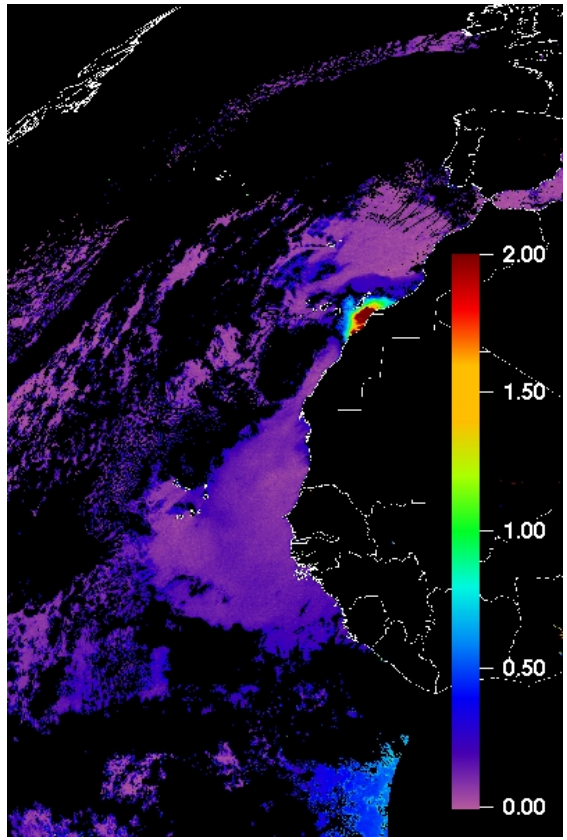
examples for 03.03.2004 12:00




**0.6 μm**




**0.8 μm**

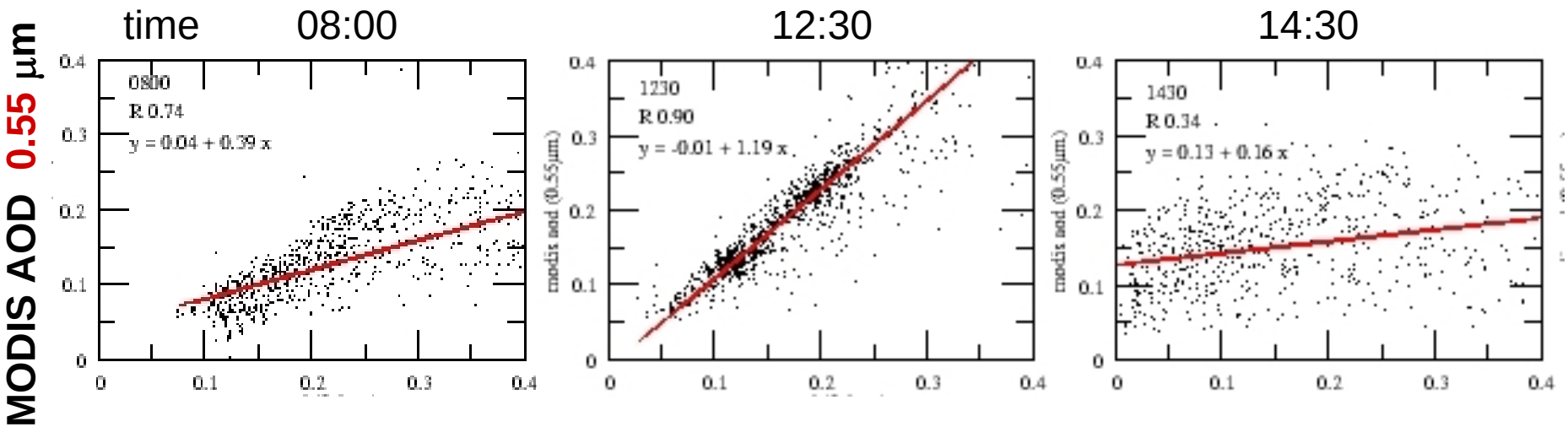



**1.6 μm**

dust: values too high at the moment, sea salt: values seem to be reasonable

# AOD retrieved from satellite data (SEVIRI on MSG-1)

## Comparison with MODIS AOD for 03.03.2004

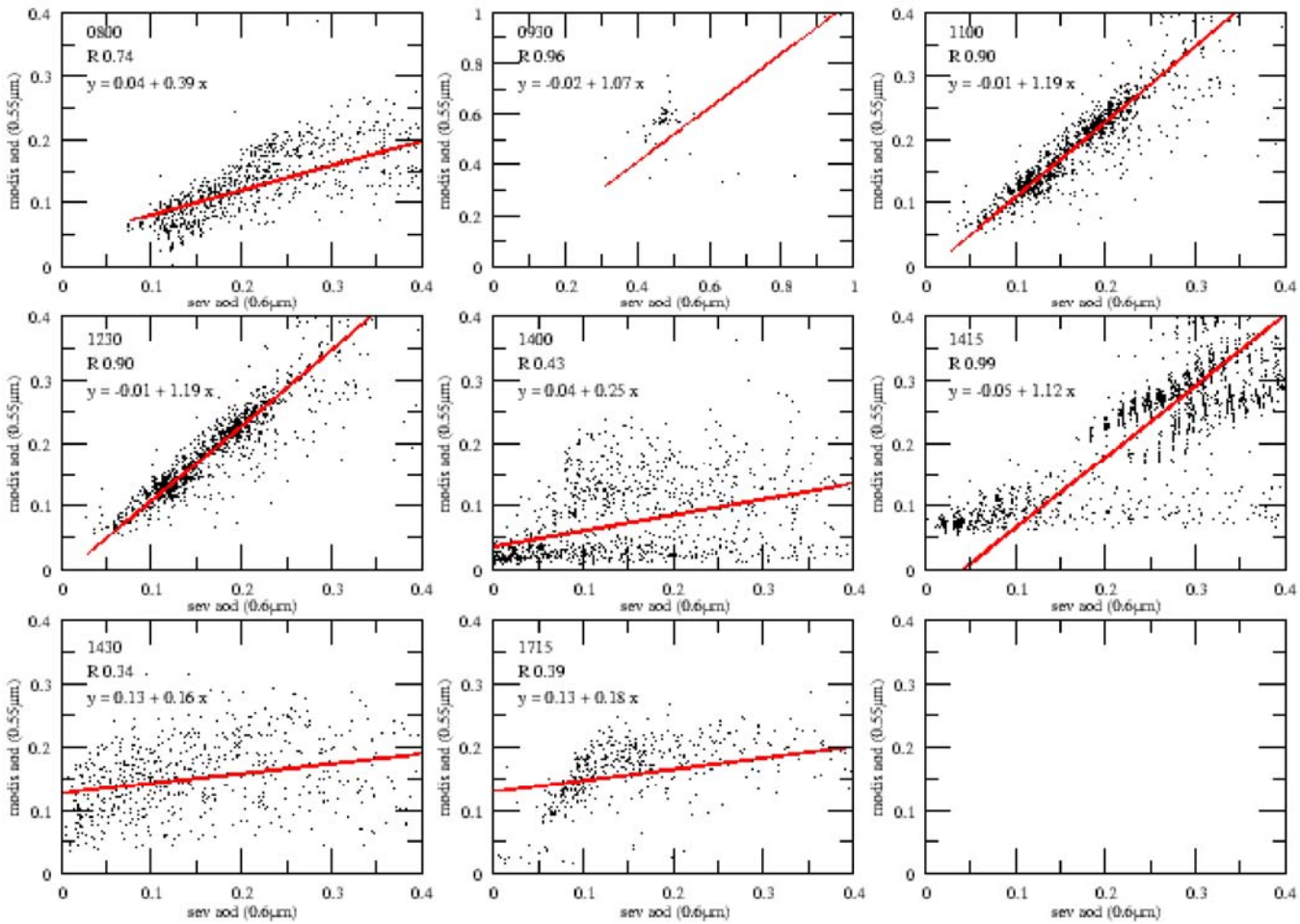



Future work:

- reprocessing of SEVIRI data back to mid-2003
- evaluation studies with simulations from test model runs of ECMWF
- from GERB instrument on MSG-1, TOA radiative fluxes will be retrieved and combined with SEVIRI AOD to get an estimate for the aerosol radiative forcing

# AOD retrieved from satellite data (SEVIRI on MSG-1)

## Comparison with MODIS AOD for 03.03.2004




**MODIS AOD 0.55 µm**

**SEVIRI AOD 0.6 µm**