

Aerosol from SCIAMACHY

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Outline:

Products and Validation

Problems in Aerosol Remote Sensing, using SCIAMACHY

Attempts to overcome problems

Conclusions

Products and Validation

SCIAMACHY Aerosol products:

Nadir:

Absorbing Aerosol Index:
Regular L2 aerosol product

Absorbing Aerosol Index:
KNMI off-line product (M. de Graaf)

Aerosol optical thickness (AOT):
IUP off-line product (W. v. H.-H.)

LIMB:

Vertical extinction profile

Validation activities:

Nadir:

Ground-based AOD measurements by:
AERONET, KNMI, DWD, IUP: data for clear sky conditions available on a daily basis.

LIMB:

Lidar backscatter profiles at ESRANGE, (Uni. Bonn, Fricke, EARLINET)

M55, Falcon aircraft campaigns (ERS Florence, DLR)

Problems in Aerosol Remote Sensing, using SCIAMACHY

Aerosol remote sensing relies very sensitive on an accurate determination of TOA reflectance

$$\rho_{TOA}(\lambda) = \frac{\pi \cdot L(\lambda, z_S, a_S)}{E_0(\lambda) \cdot \cos z_0}$$

$$\rho_{Aer}(\lambda) = \rho_{TOA}(\lambda) - \rho_{Ray}(\lambda) - \rho_{Surf}(\lambda)$$

SCIAMACHY TOA reflectance until now doesn't fit the requirements for an aerosol remote sensing:

TOA reflectance is significantly too low for this purpose, e.g. present radiance calibration underestimates the TOA reflectance significantly.

Bias from E – W side of the scan, caused by the polarization correction.

→ Both aerosol products (AAI, AOT) suffer from this insufficient radiometric calibration. (AAI ~ 8, AOT < 0)

Attempts to overcome problems

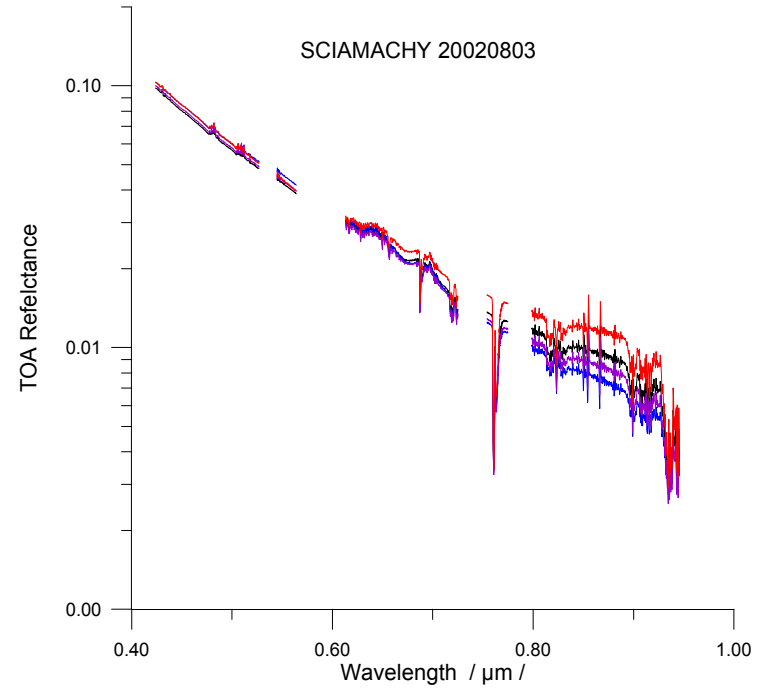
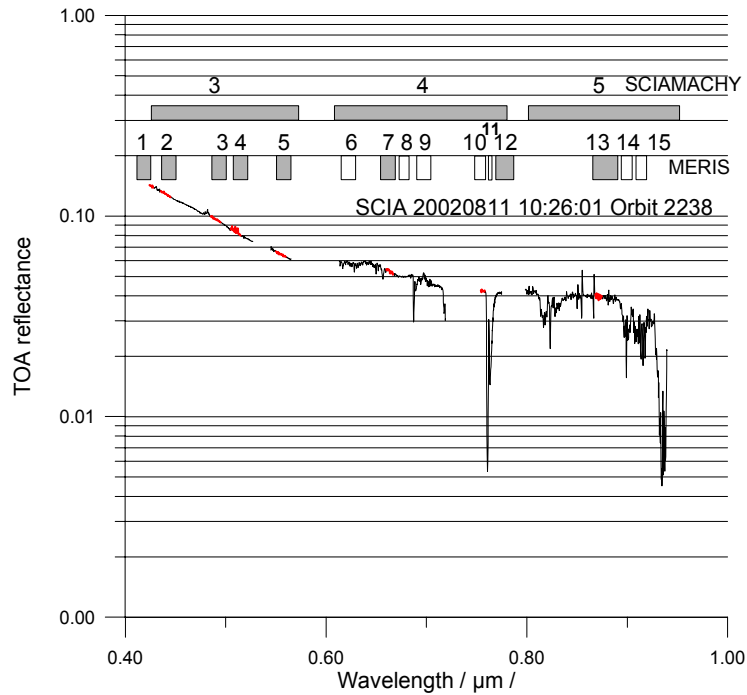
Determination of 'correction factors'

Comparisons with RTM (DAK - KNMI)

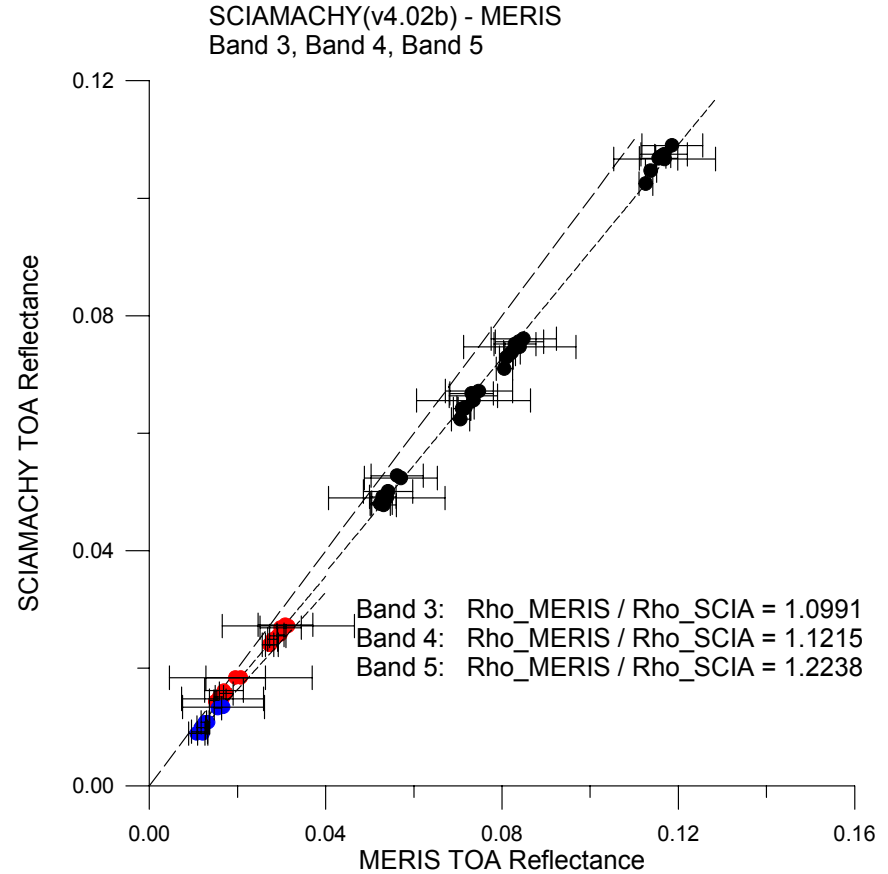
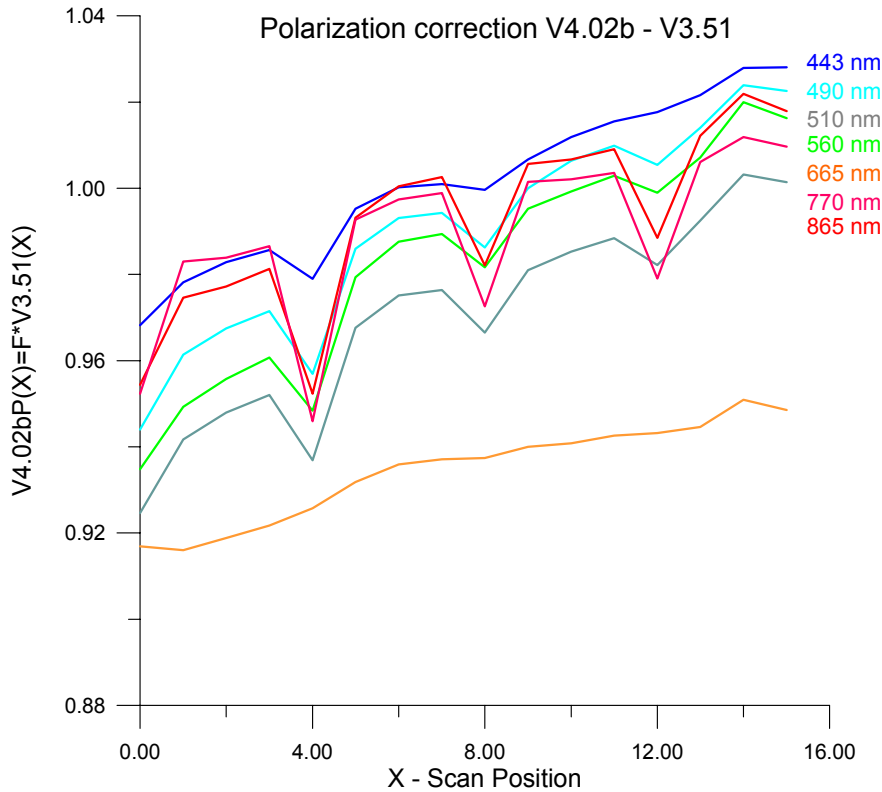
Comparisons with other satellite observations (GOME, MERIS - KNMI, IUP)

Recalculation of the radiometric key data (IUP)

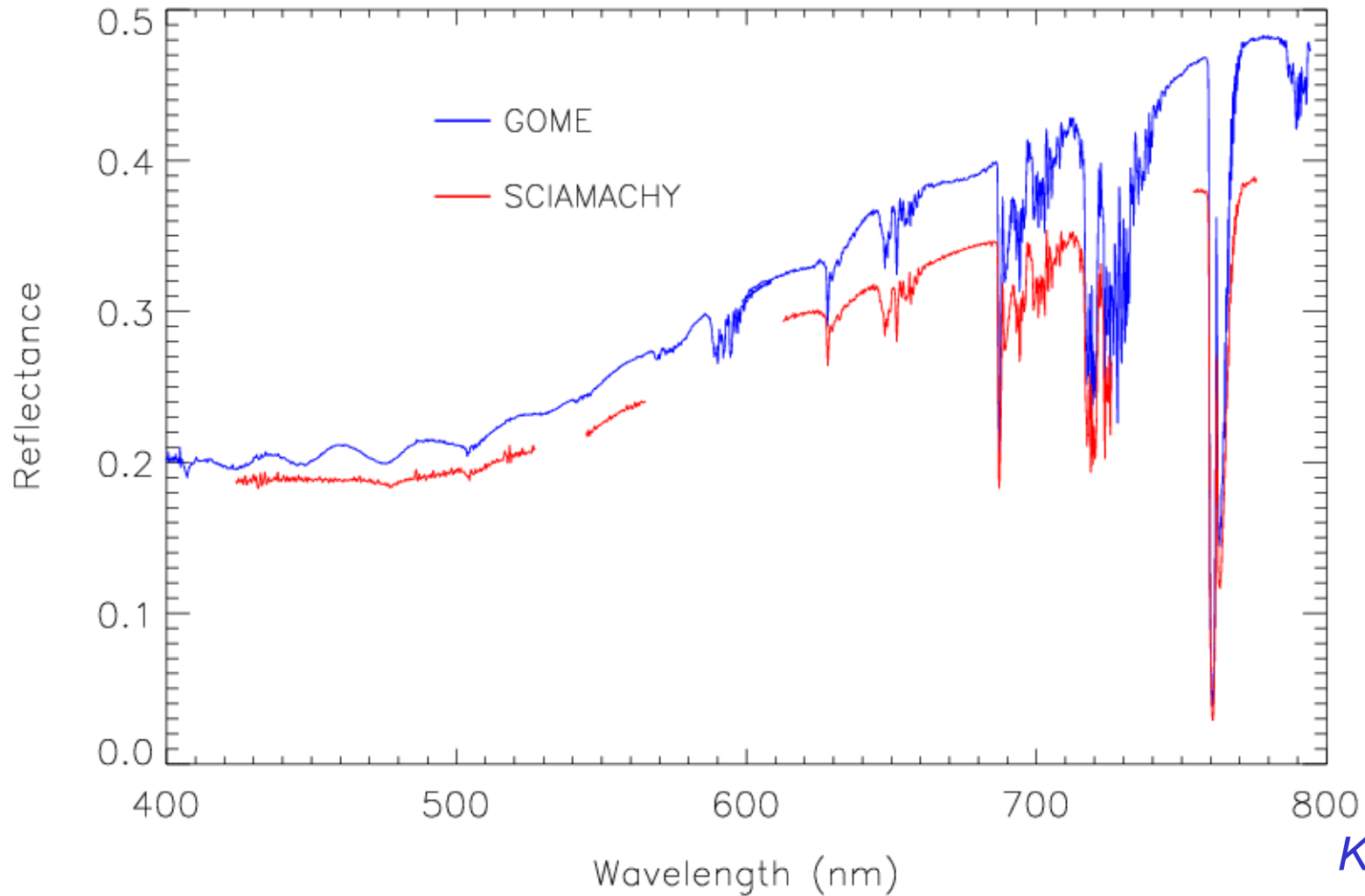
SCIAMACHY – MERIS Data



SCIAMACHY - MERIS

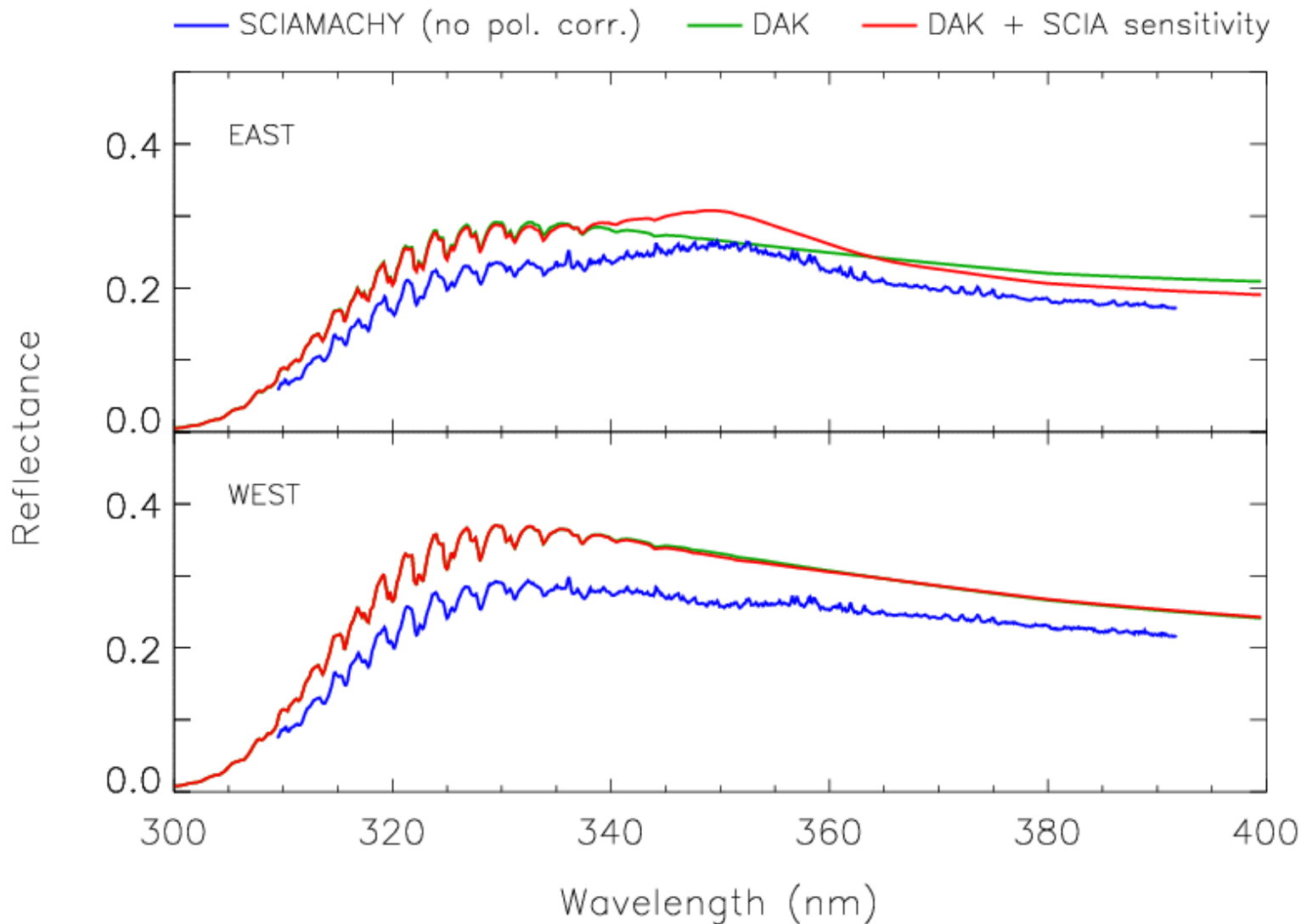


Result for cloudfree Sahara state



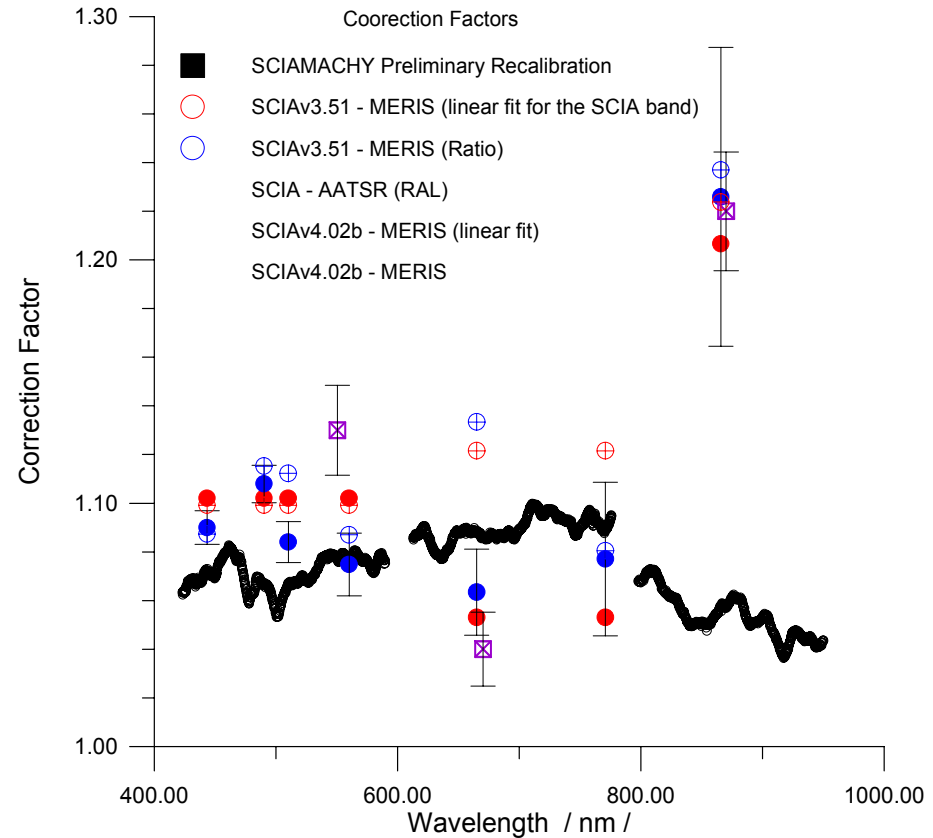
KNMI

Comparison between reflectance reported by SCIAMACHY and a polarised radiative transfer code (DAK)

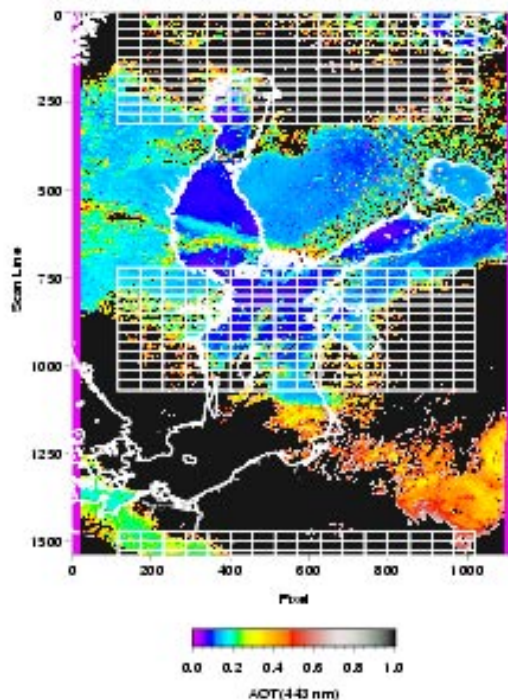
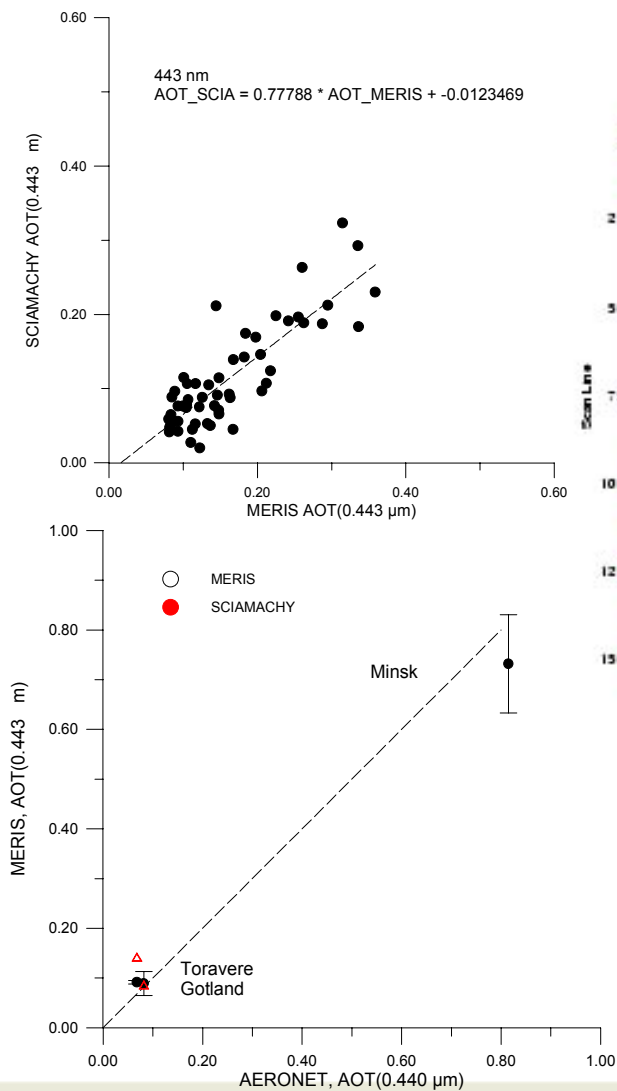


Comparison of Correction Factors

Correction factors to the TOA reflectance obtained with L1 data from V4.02b

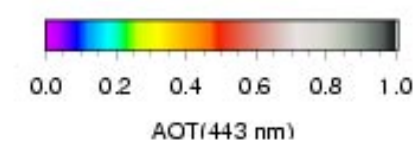
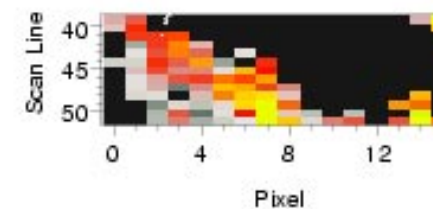
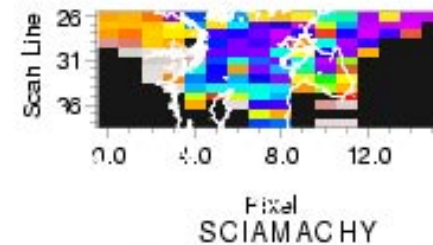
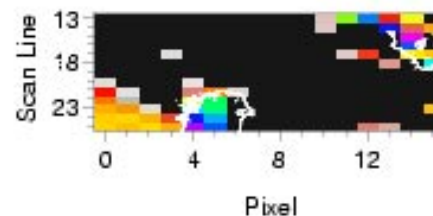


AOT Retrieval



MERIS

Correction factors applied,
 BAER approach used,
 AOT for central part of
 scene comparable



Conclusions

SCIAMACHY instrument is sensitive enough for an aerosol remote sensing
The present L1 product is not sufficient for this task because of insufficient radiometric calibration
Regular and off-line aerosol products require either correction factors or new radiometric key data.