

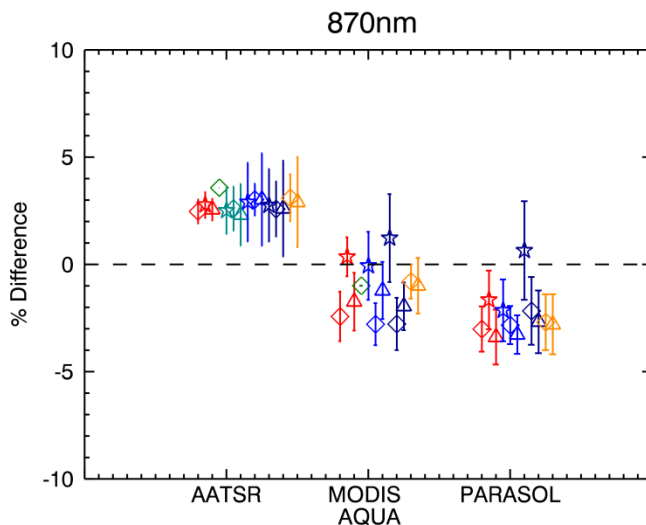
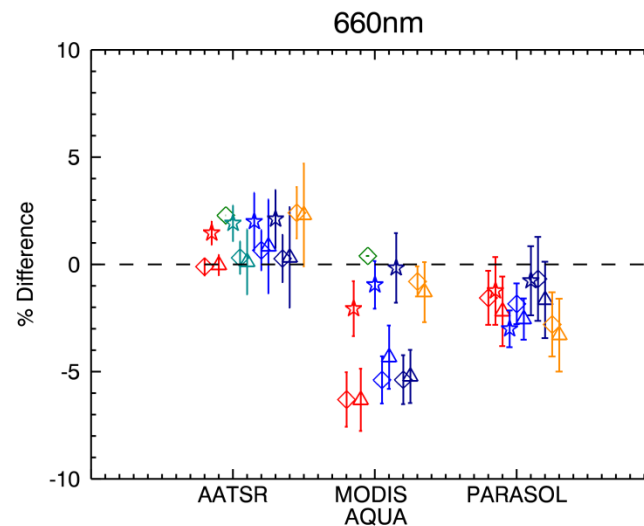
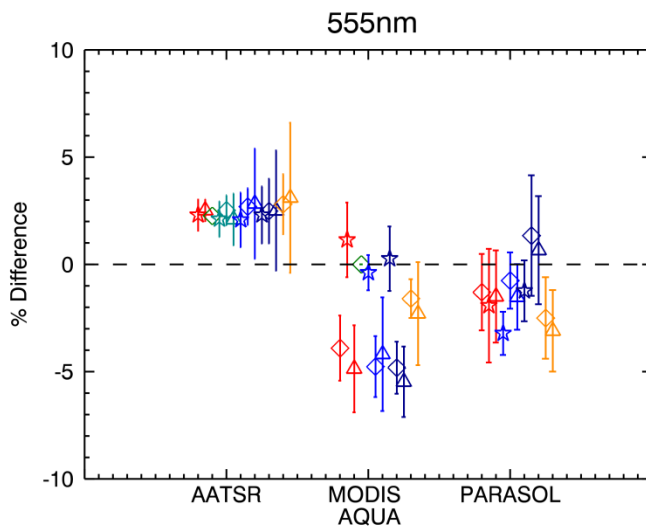
Use of Spectrometer Data over Libya-4 site

Dr Dave Smith



WG-4 Intercomparison summary

As measured

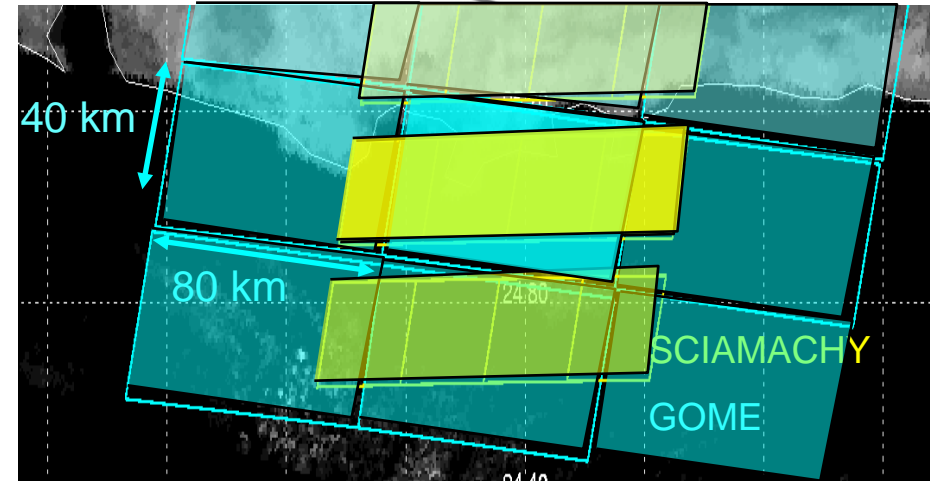
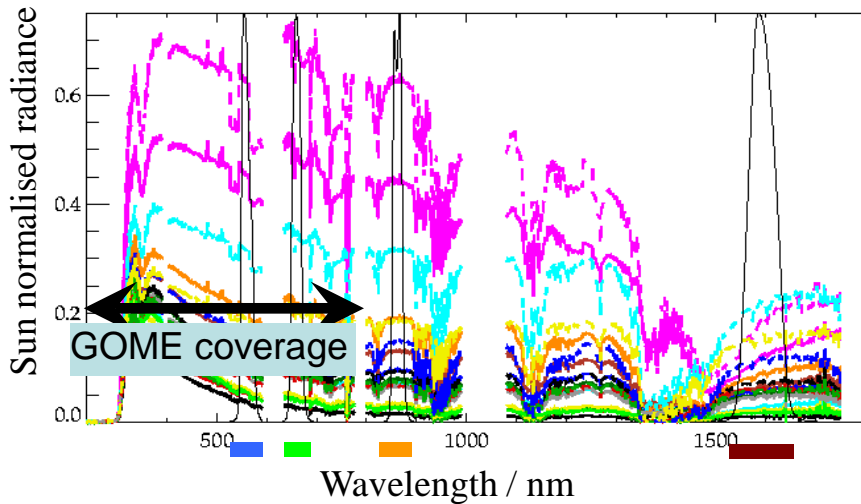


- Nadir BRF (RAL)
- BRF Model (RAL)
- DIMITRI (ESA/ARGANS,ACRI)
- Simulation (VITO)
- MUSCLE (CNES)
- Direct Match (RAL)
- ◇ LIBYA-4
- △ NIGER-2
- ☆ DOME-C

How to account for spectral Variations

- Even after accounting for atmosphere – we still need to address spectral variations of site BRF
- Use MERIS profile
 - OK as a rough approximation
 - Spectral resolution not fine enough to account for absorption lines
- Use Simulations
 - MODTRAN
 - Corrections to atmosphere only - site spectral variations not specific enough
 - Need spectra for sites
- Use Spectrometer Data
 - GOME-2
 - Nadir View
 - Bands up to 800nm
 - SCIAMACHY
 - Alternate Limb/Nadir view
 - Bands up to 2200nm

Intercomparisons via spectrometers

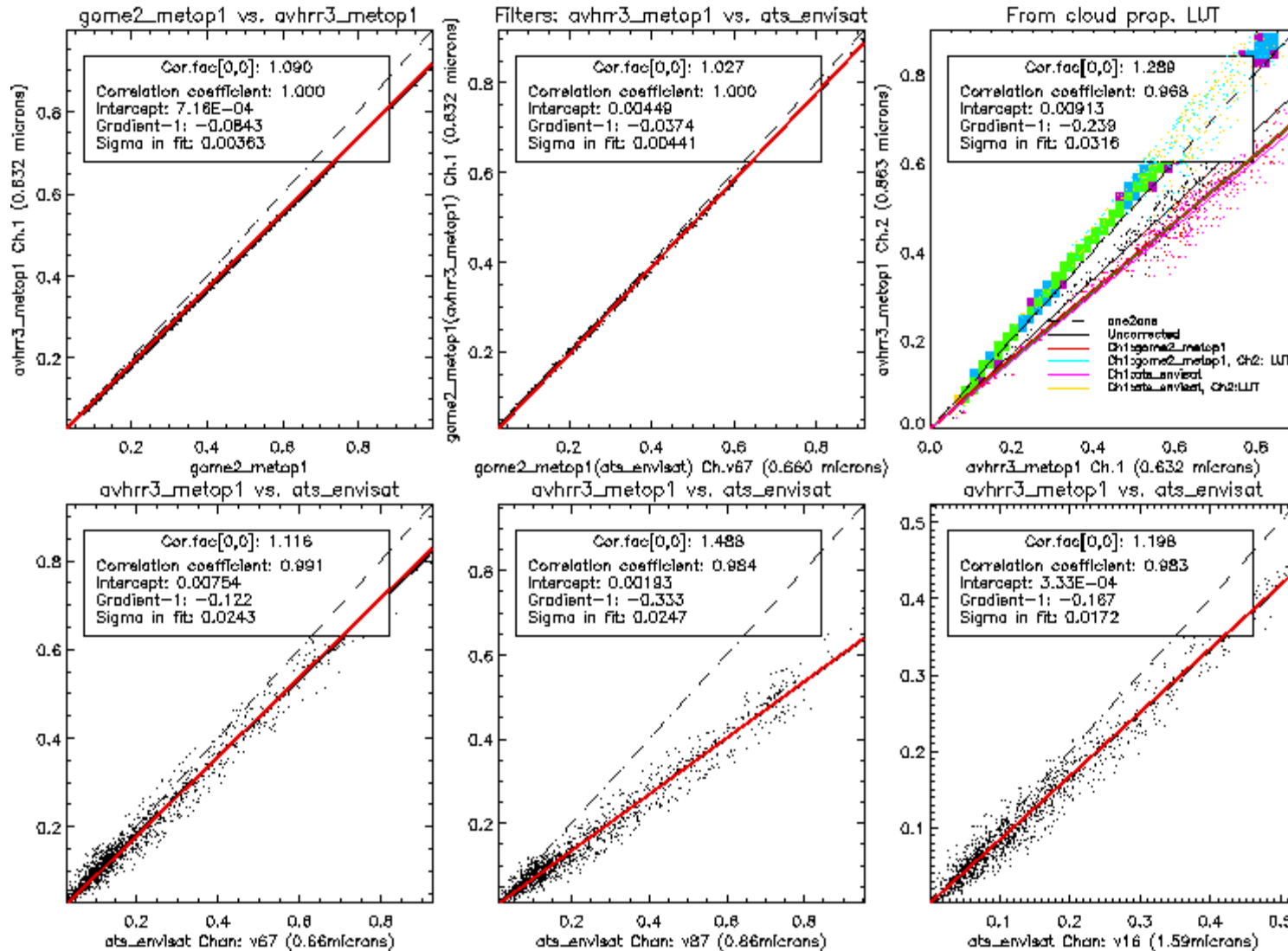


- Inter-comparison requires
 - Spectral averaging of SCIA/GOME
 - Spatial averaging of AATSR/ATSR-2
- GOME & SCIA pixels not same size or coincident, therefore
 - Perform comparison for accurately co-located GOME/ATSR-2
 - Average SCIA to give scene comparable to GOME; compare to properly averaged AATSR
 - Associate nearest GOME/SCIA pixels to allow cross platform comparison; accept “noise” due to scene variation (time difference).

AVHRR/3 vs. AATSR (via GOME-2)

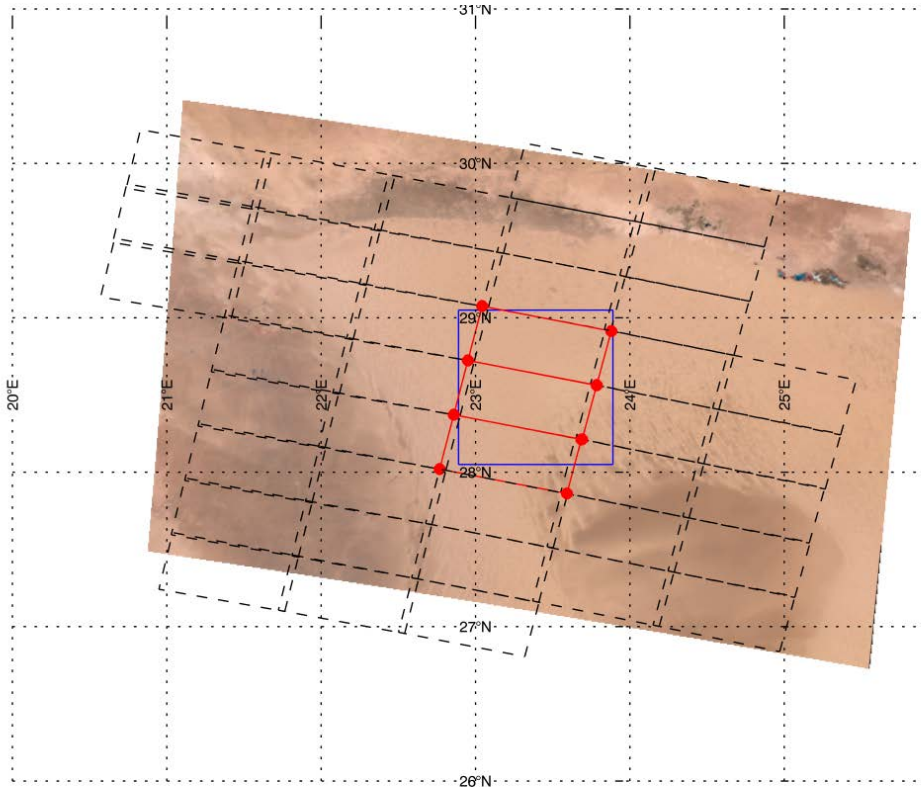
(1 orbit, 30/05/2007)

Scaling factors to correct avhrr3_metop1 based on gome2_metop1 and ats_envisat



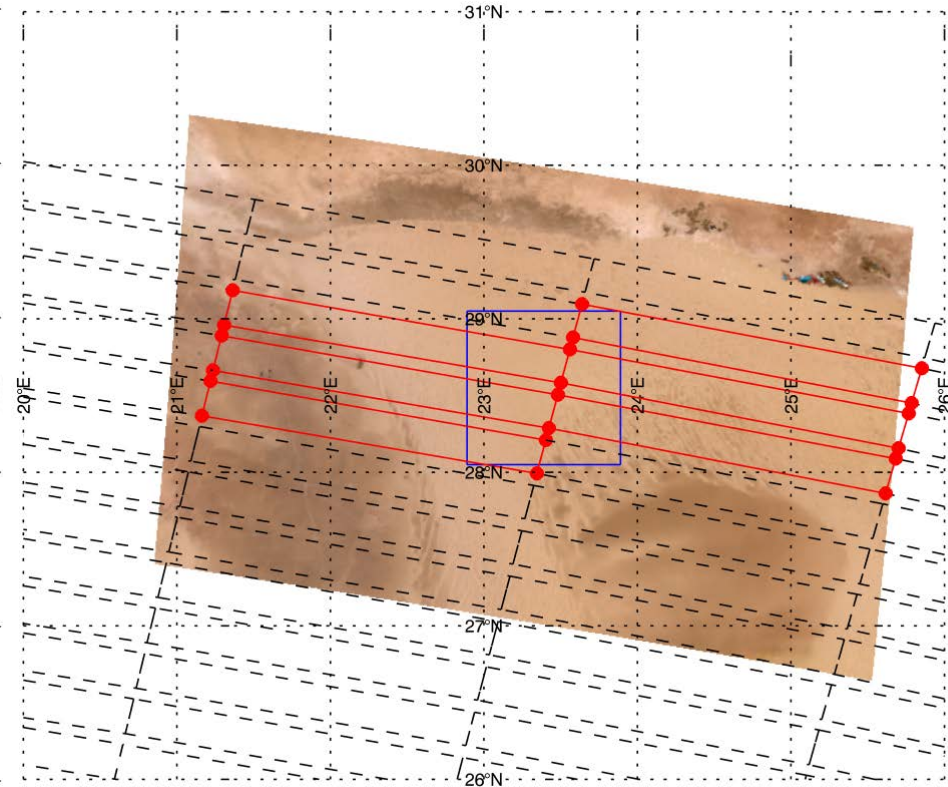
Spectrometers

GOME-2 Over Libya-4



Good temporal coverage
Spatial resolution within Libya-4 site
Spectral range up to 800nm
Co-registered with METOP-AVHRR

SCIA Over Libya-4



Poor temporal coverage (for Nadir)
Spatial resolution larger than site
Spectral range up to 2000nm
Co-Registered with AATSR/MERIS

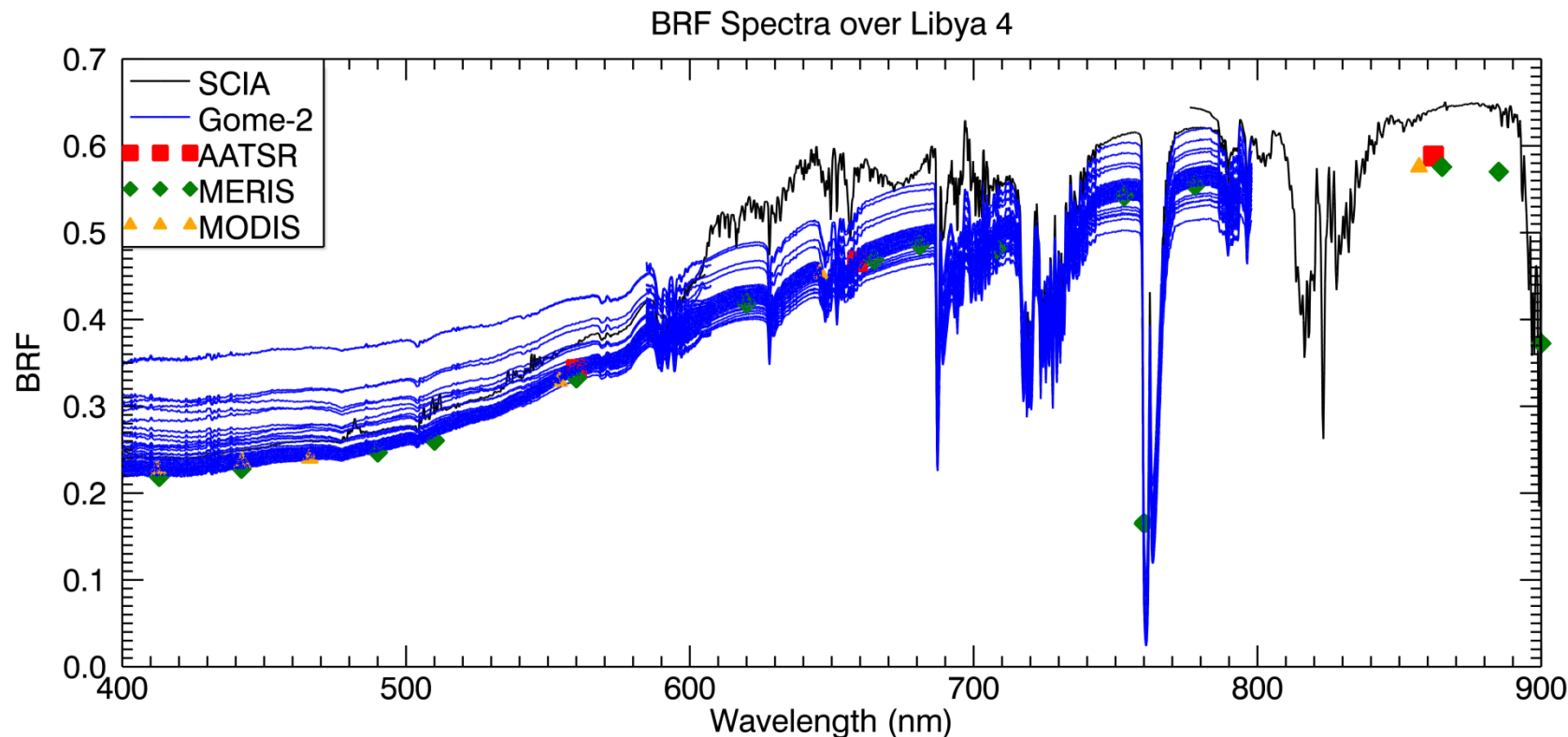
GOME-2 Extractions over Libya-4



- METOP GOME-2 orbital L1 products from EUMETSAT
 - Jan-2007 to present (up to 2025 expected)
 - At Issue 4.0 on BADC
 - Latest version Issue 5.3 – to be ingested
- Extractions performed for channels 3 (400-600nm) and 4 (600-800nm) pixels within $\pm 2^\circ$ Lon, $\pm 1.5^\circ$ Lat of site centre.
 - No spectral or spatial averaging – data are at native resolution
 - Spectral sampling (0.11-0.22nm) and resolution (0.24-0.53nm) dependent on wavelength
 - Channels 1 (240-315nm) and 2 (310-403nm) not extracted for this analysis
- ERS-2 GOME-1 Data are also available for 1996-2005
 - Data quality?

Site Spectral Variations

Comparison of SCIA, GOME-2, AATSR, MERIS and MODIS-A measured BRF over Libya-4

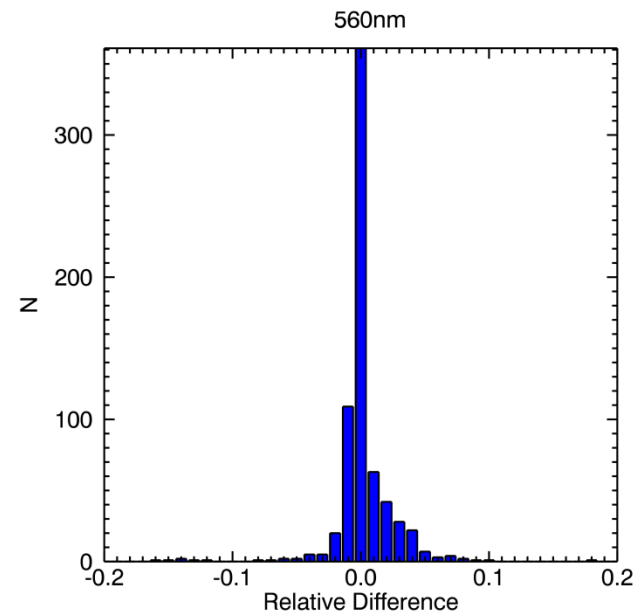
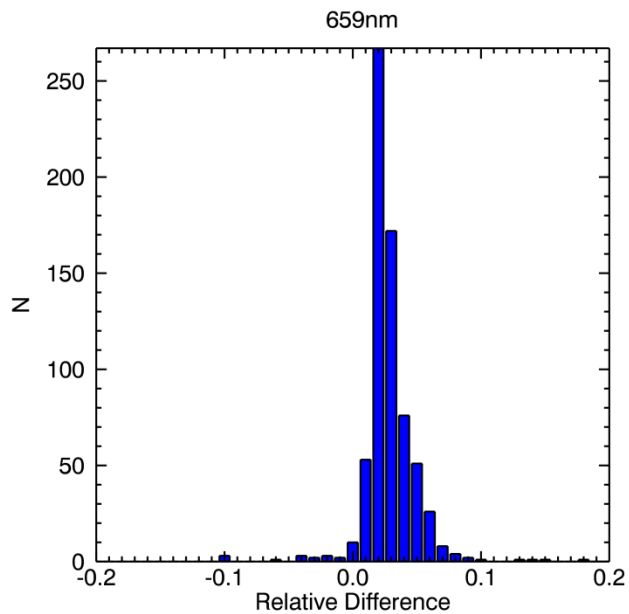


GOME-2 shown for full year (2007)
All data are assumed to be cloud free

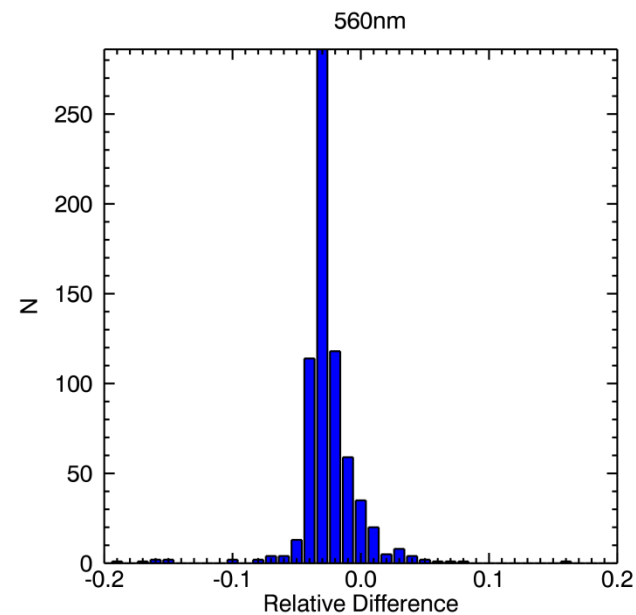
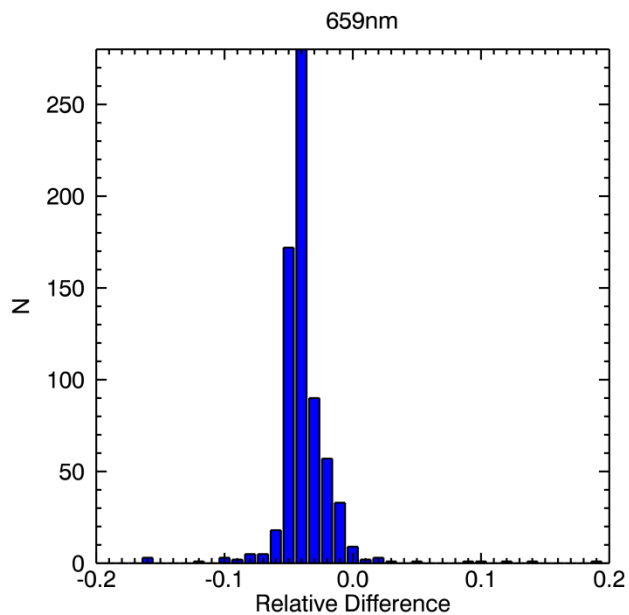
Systematic bias estimates using GOME-2



MERIS vs.
AATSR

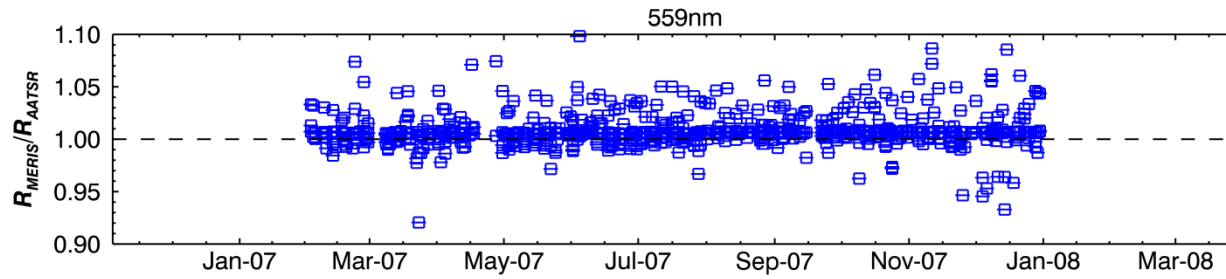
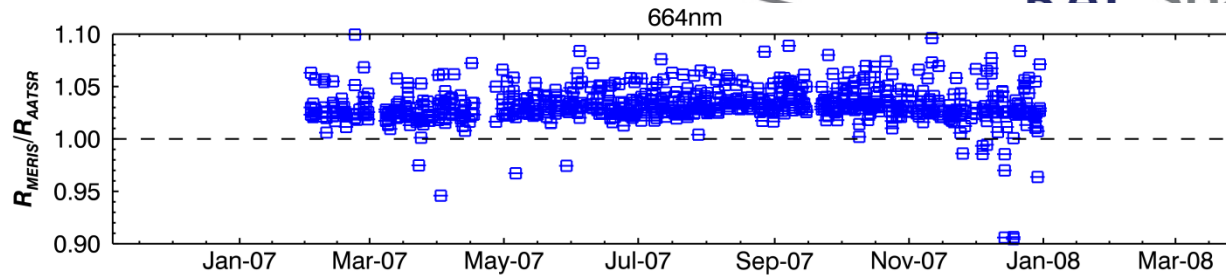


MODIS vs.
AATSR

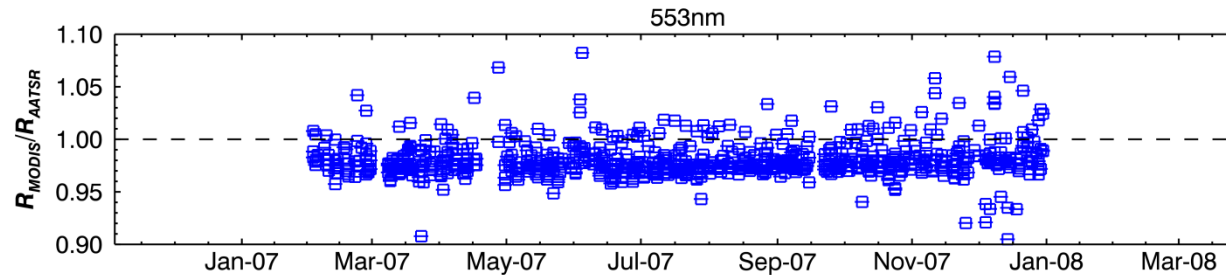
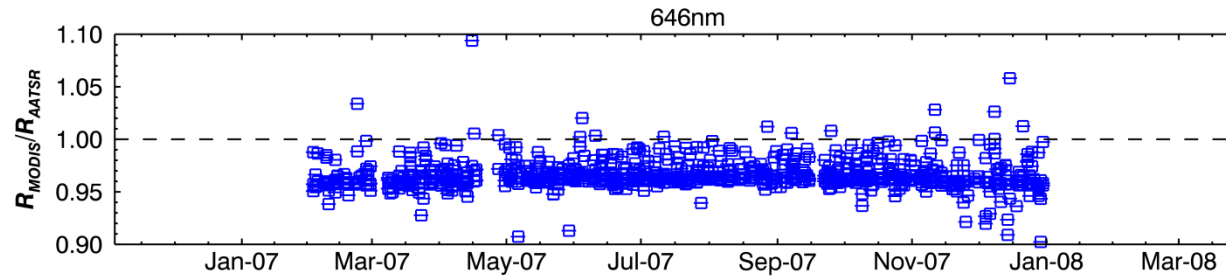


Systematic bias estimates using GOME-2

MERIS vs.
AATSR

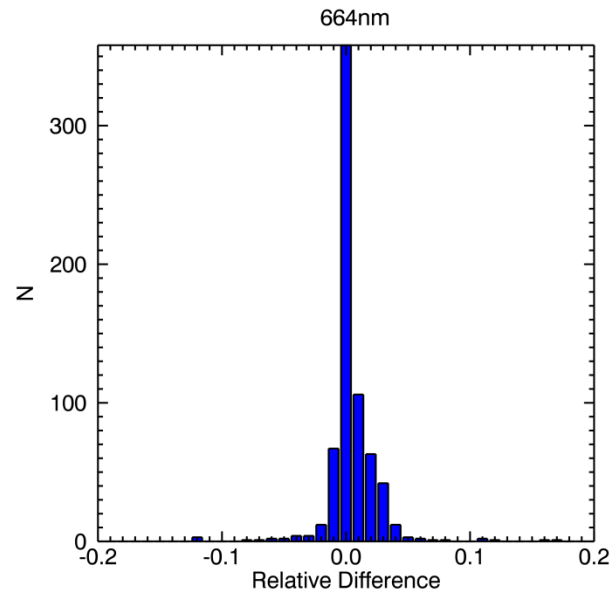
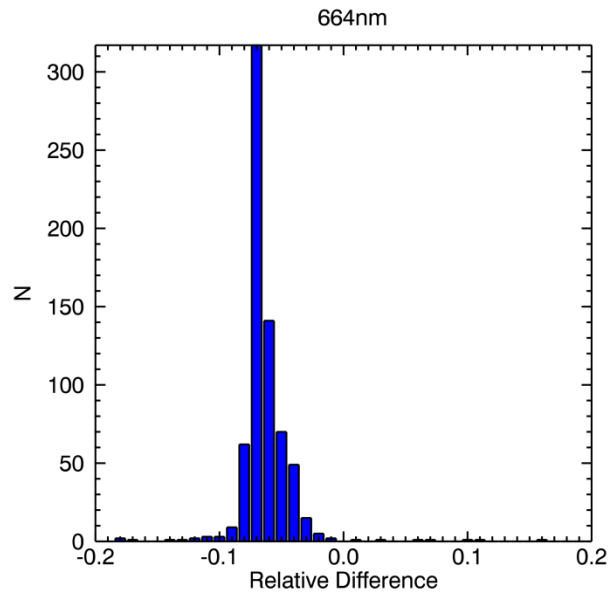
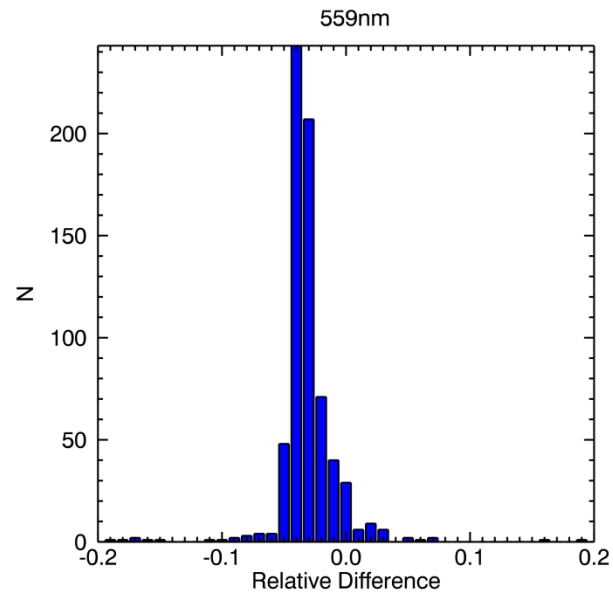
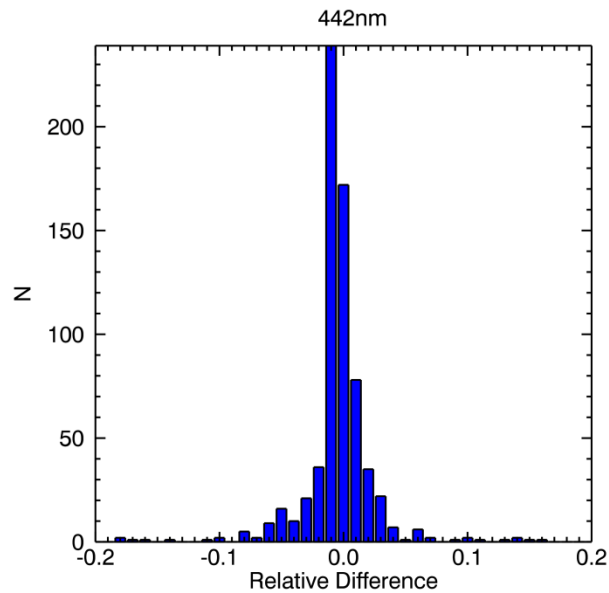


MODIS vs.
AATSR



Systematic bias estimates using GOME-2

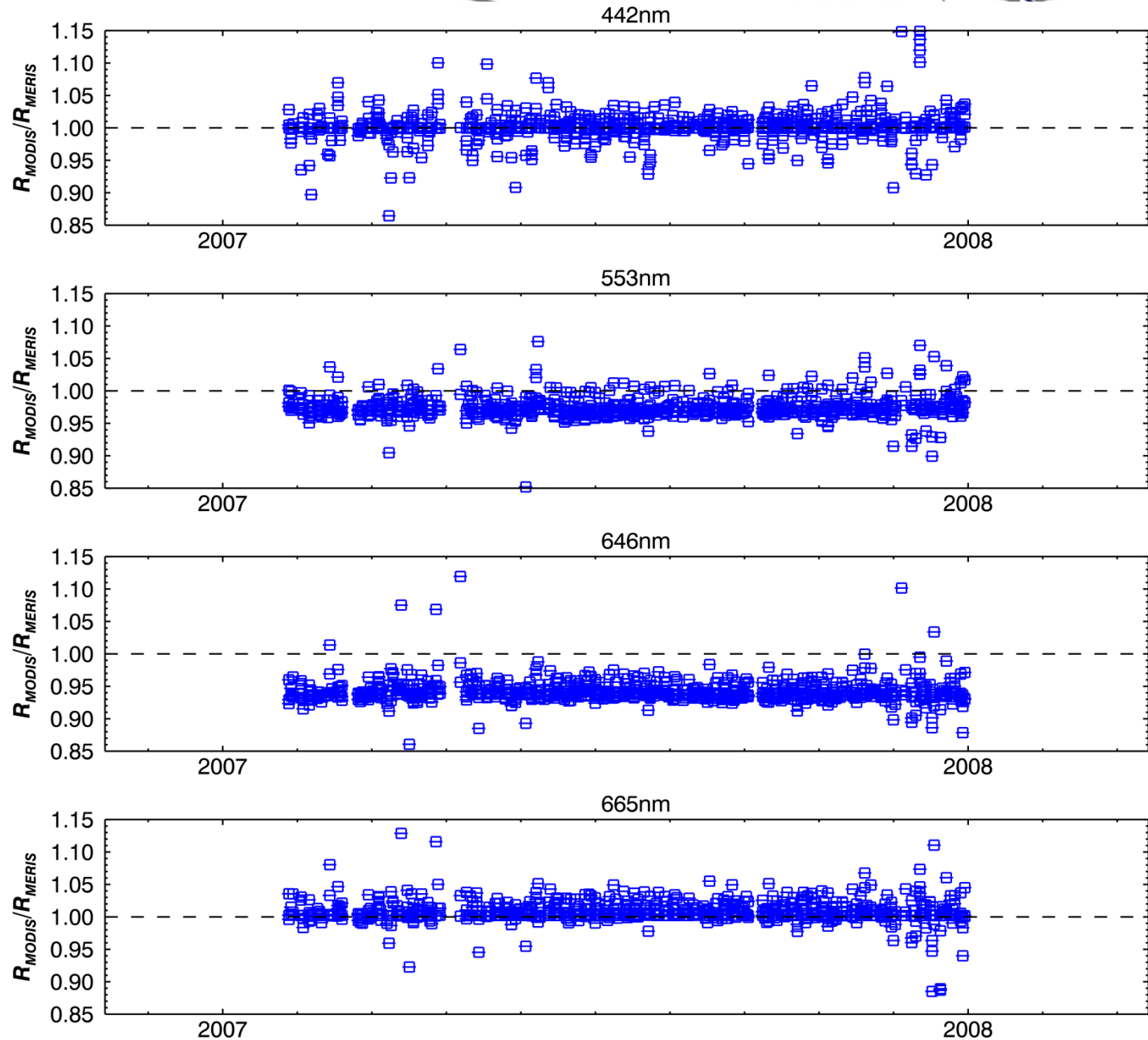
**MODIS
vs. MERIS**



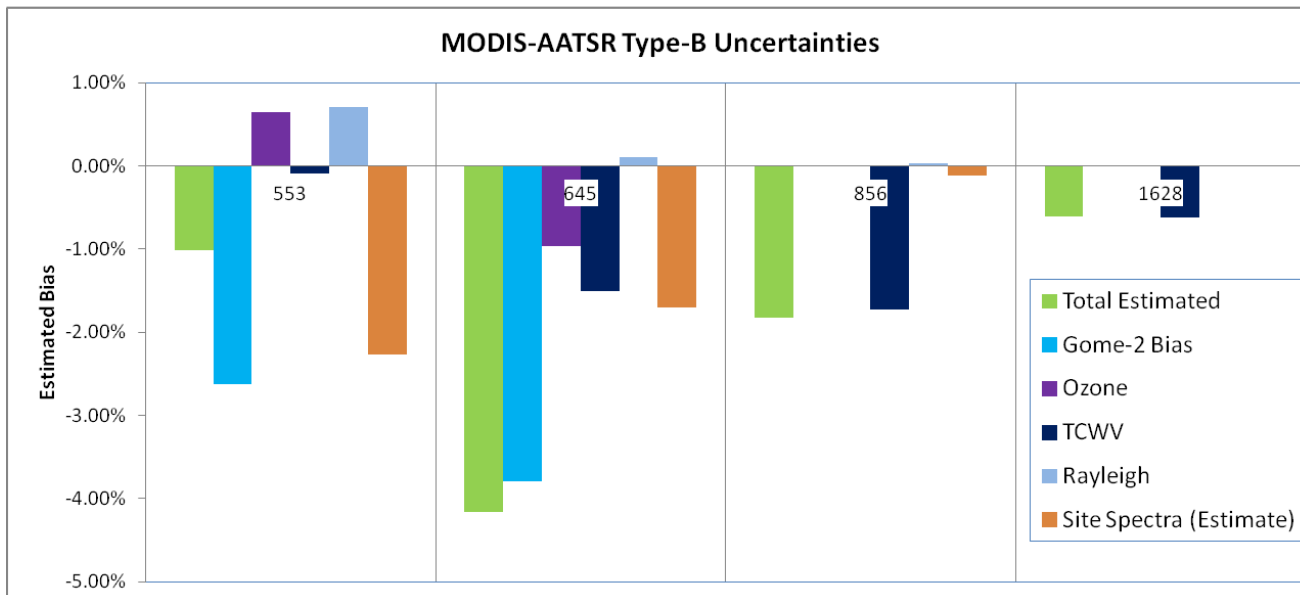
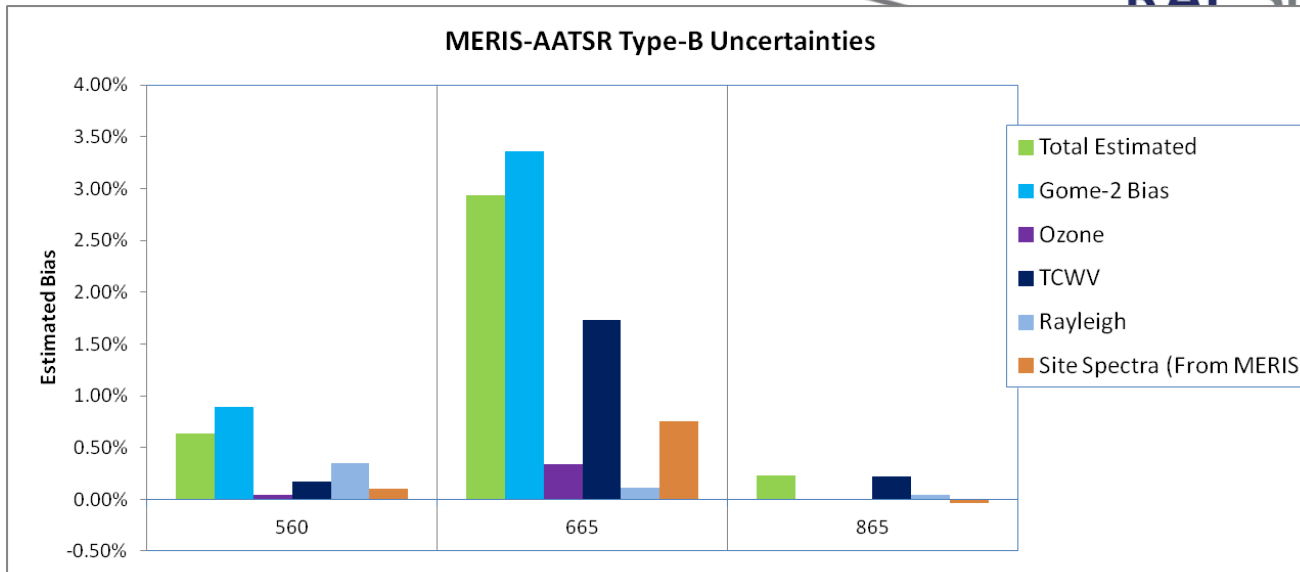
Systematic bias estimates using GOME-2



**MODIS vs.
MERIS**



Systematic Errors



Intercomparison summary

Adjusted for estimated spectral errors

