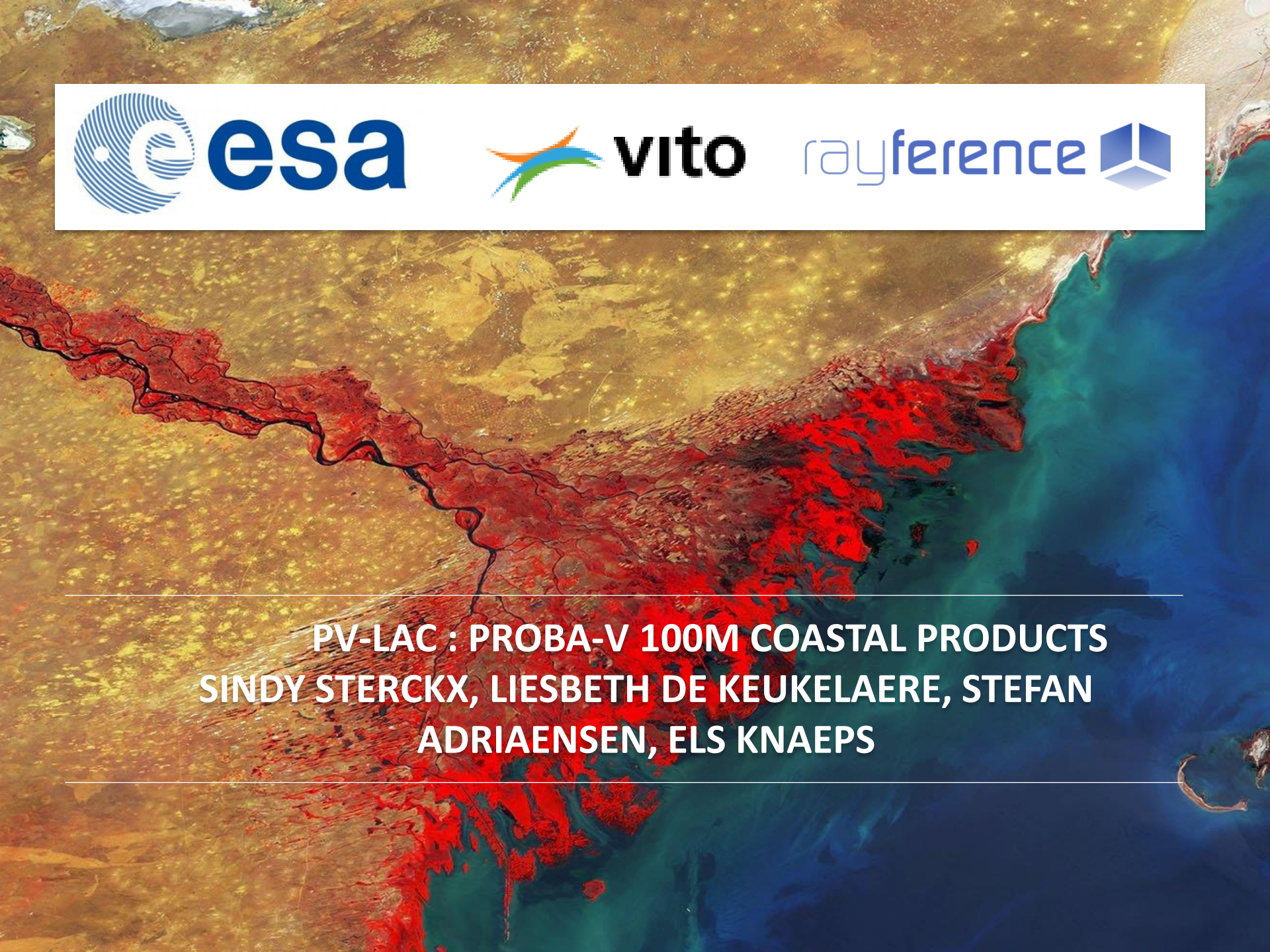


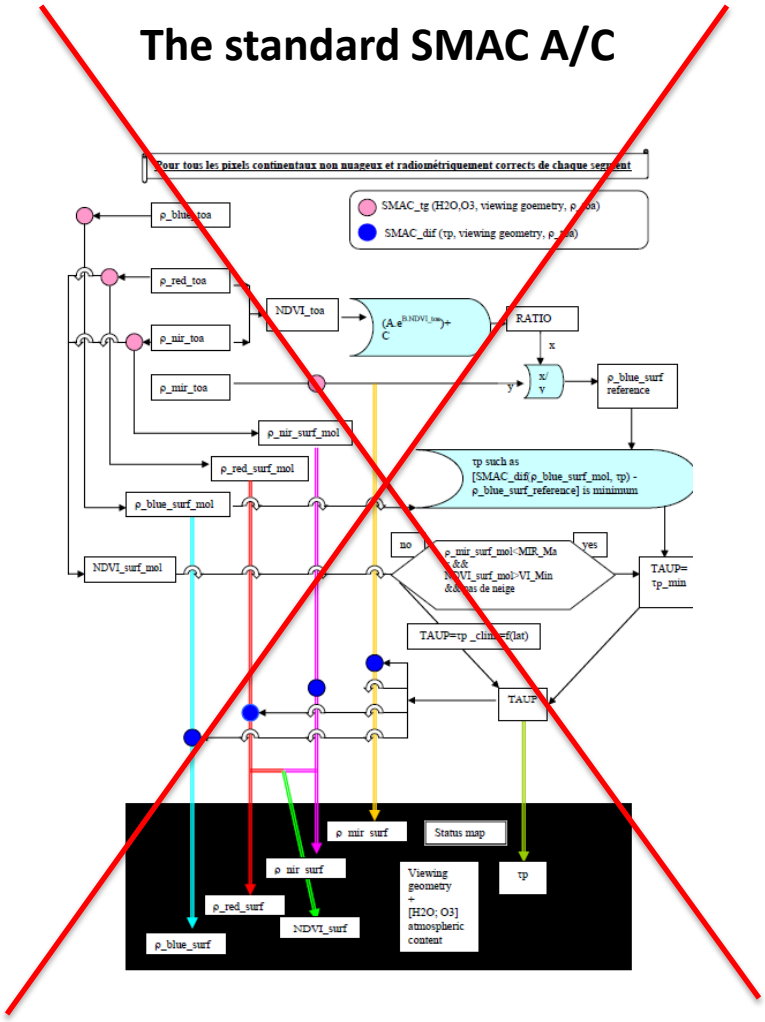
PV-LAC : PROBA-V 100M COASTAL PRODUCTS

SINDY STERCKX, LIESBETH DE KEUKELAERE, STEFAN ADRIAENSEN, ELS KNAEPS

PRIMARY VALIDATION SITE : SOUTHERN NORTH SEA

ATMOSPHERIC CORRECTION (A/C)

The standard SMAC A/C



ATMOSPHERIC CORRECTION (A/C)

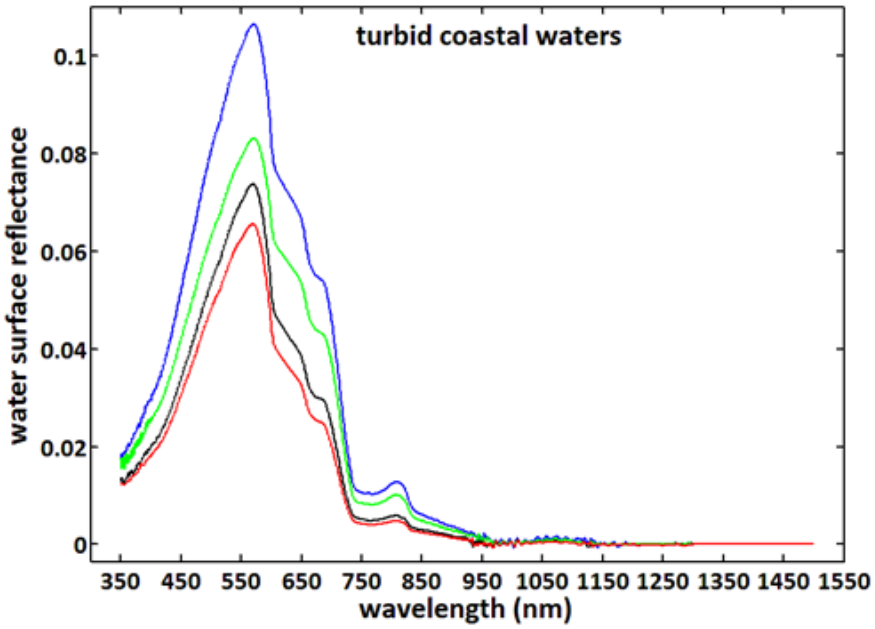
OPERA
Land-based atmospheric correction

- AOT retrieved over land (*Guanter et al. (2008))*, spatially extended over water
- Similar implementation as for S2 and L8
  - In-depth intercomparion within ACIX: (CEOS-WGCV A/C Inter-comparison)
- Will be made available in SNAP for S2 & L8

iCOR
atmospheric image correction for land and water

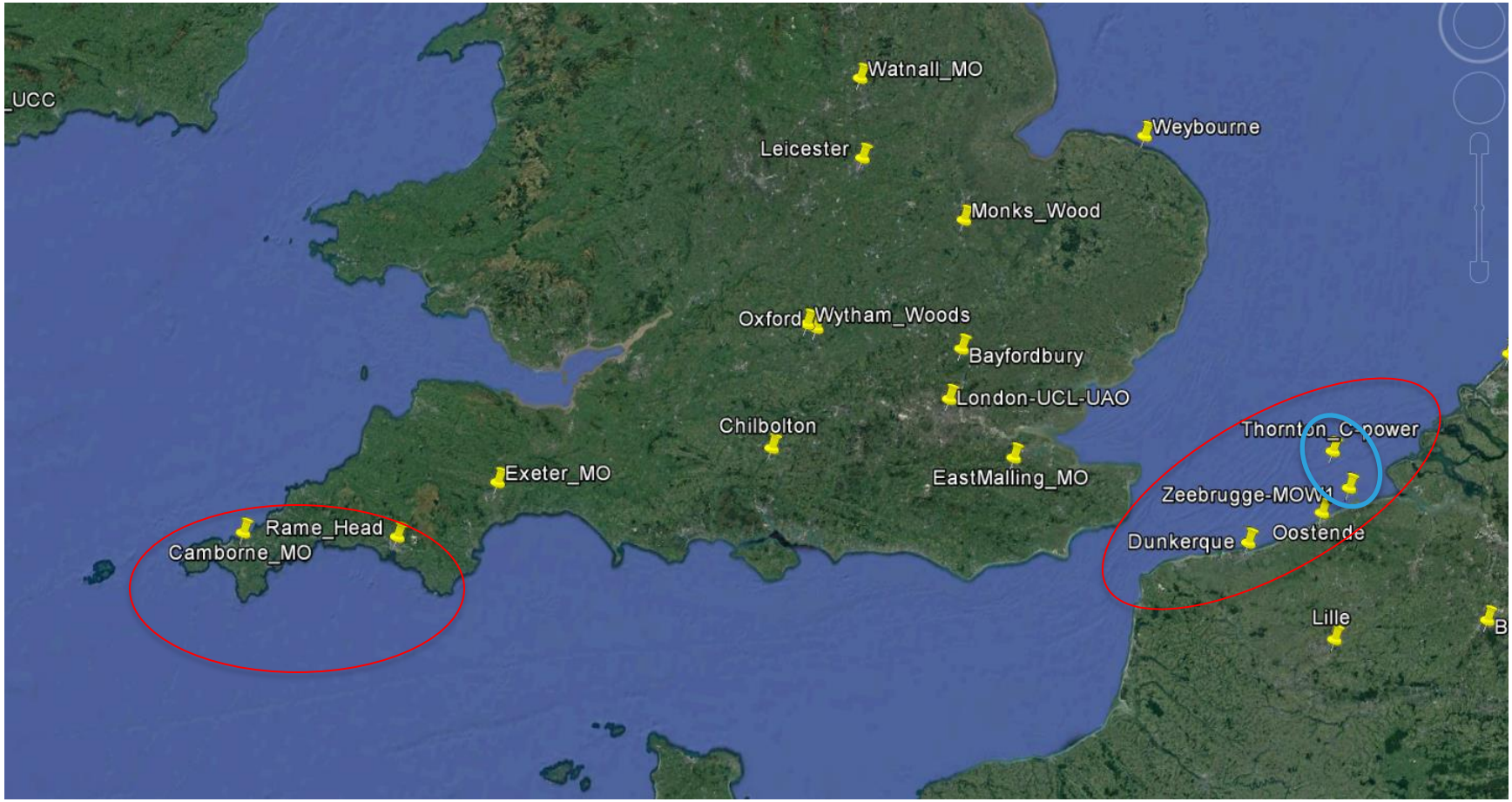
OPERA
SWIR-based atmospheric correction

- AOT retrieved over water

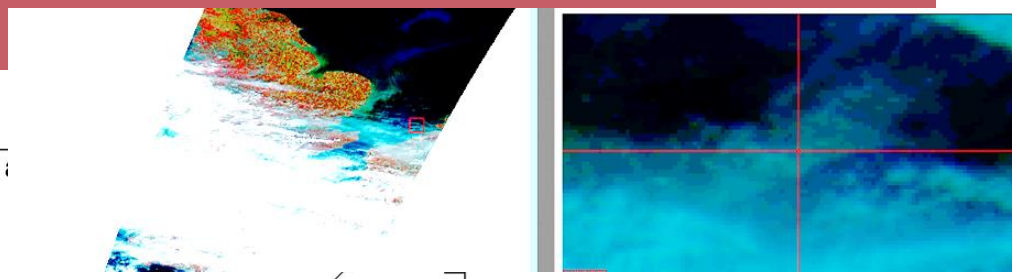


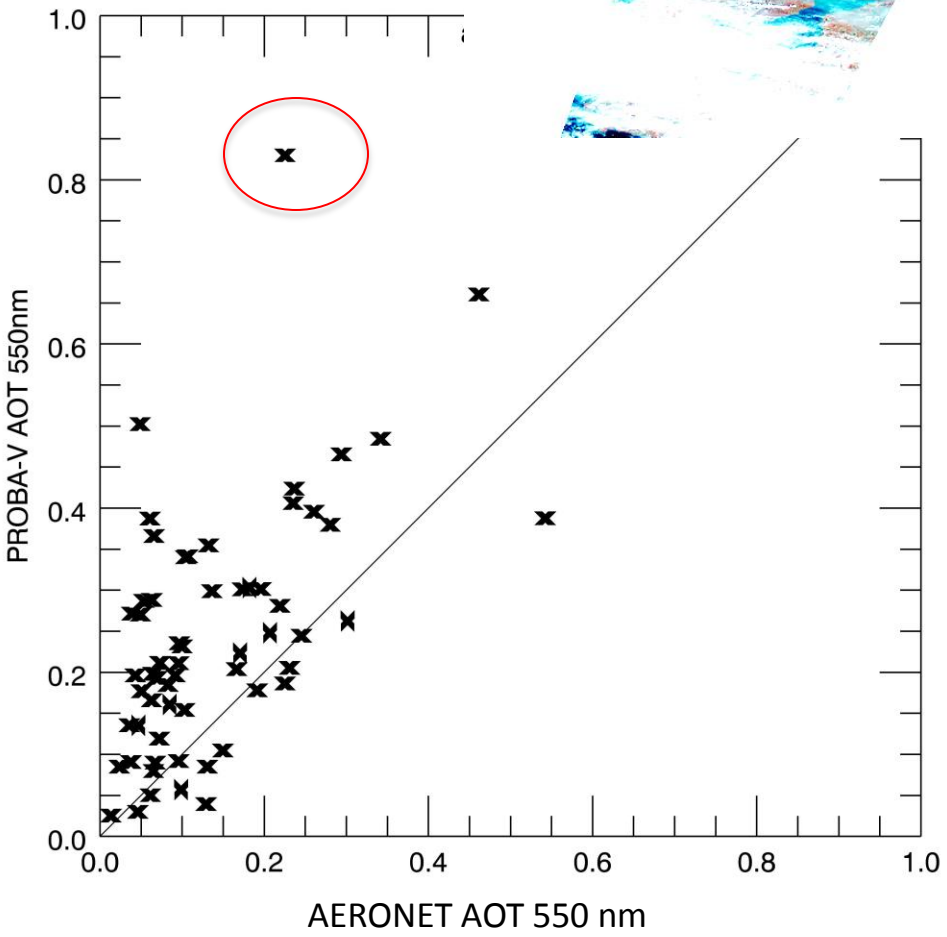
esa vito rayference

VALIDATION AOT RETRIEVAL > COMPARISON AGAINST AERONET



LANDBASED AOT RETRIEVAL





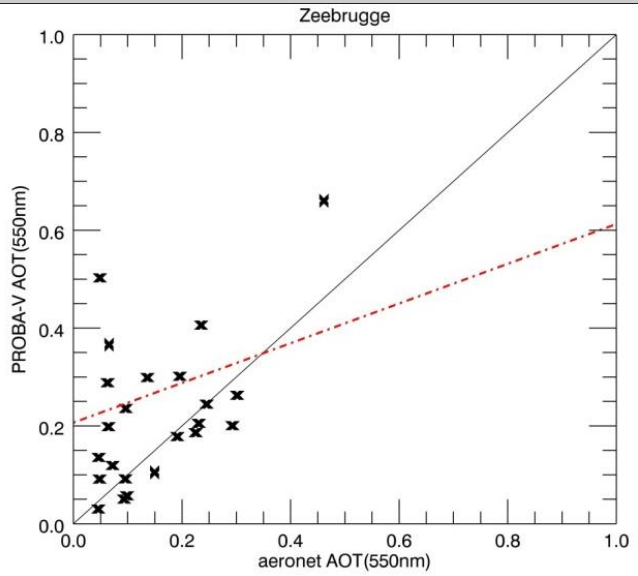
Aeronet-OC sites

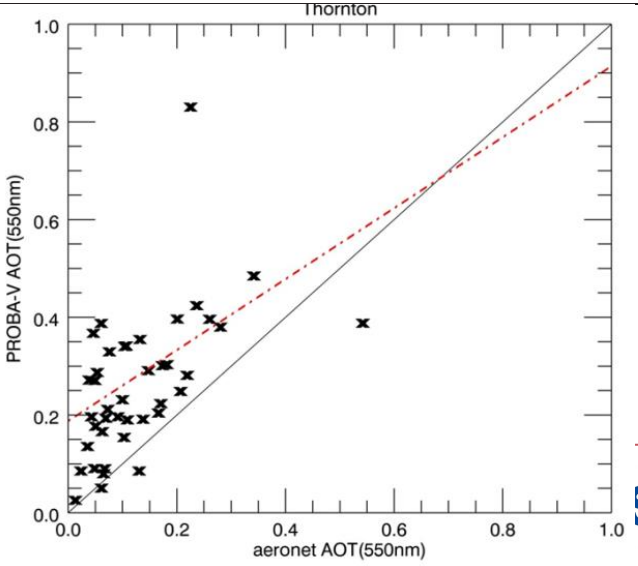
Zeebrugge

Thornton

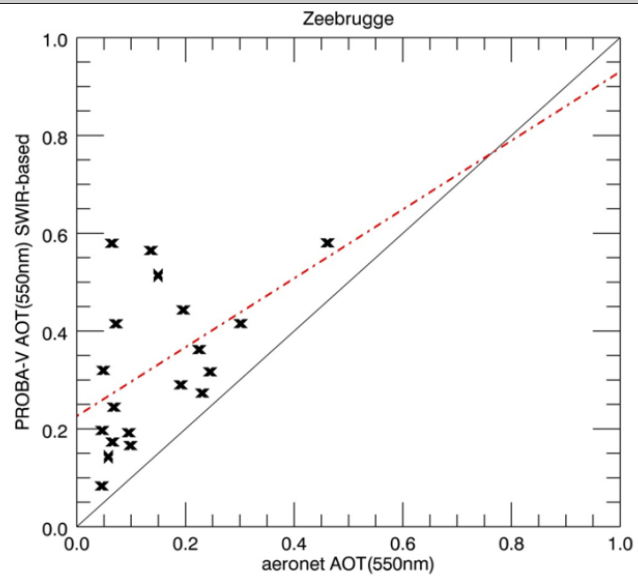
PROBA-V AOT Validation

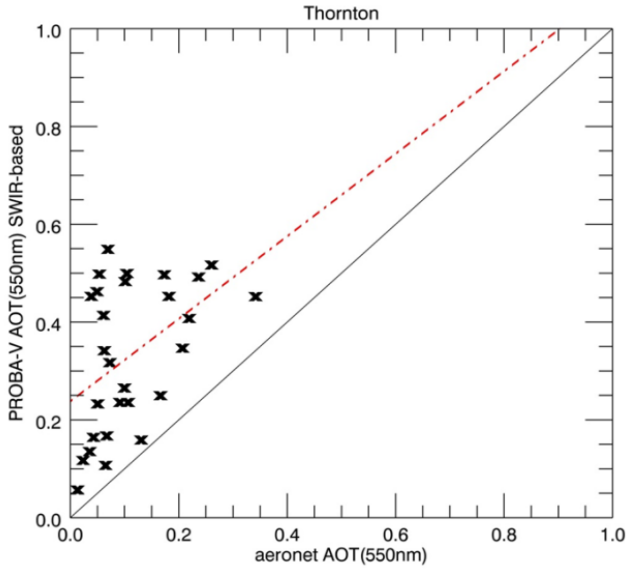
OPERA Land-based



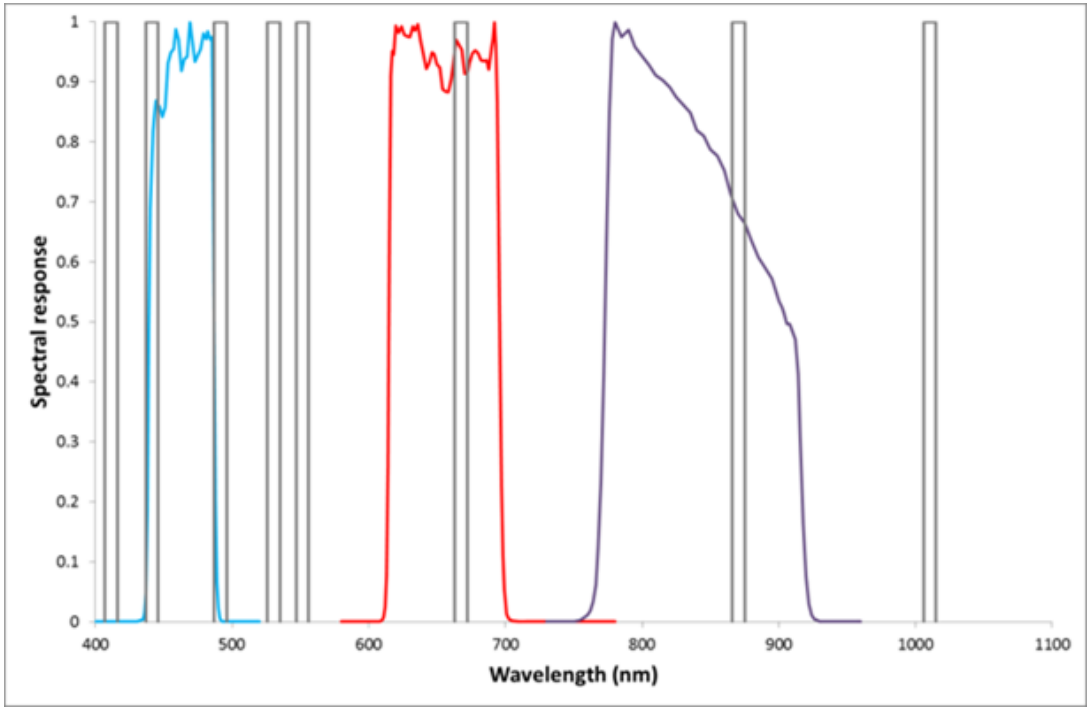


OPERA SWIR based





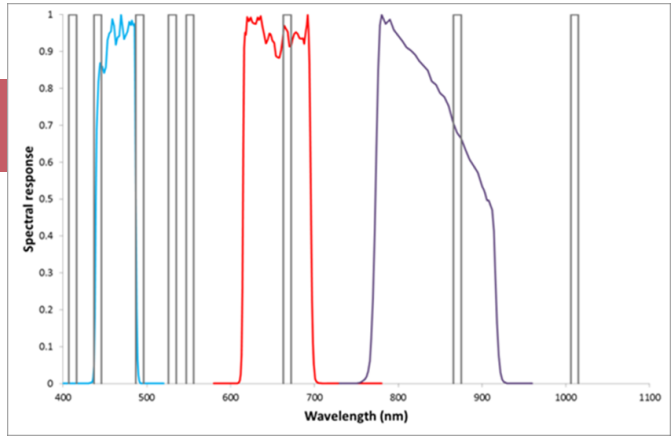
RW VALIDATION USING AERONET-OC STATIONS

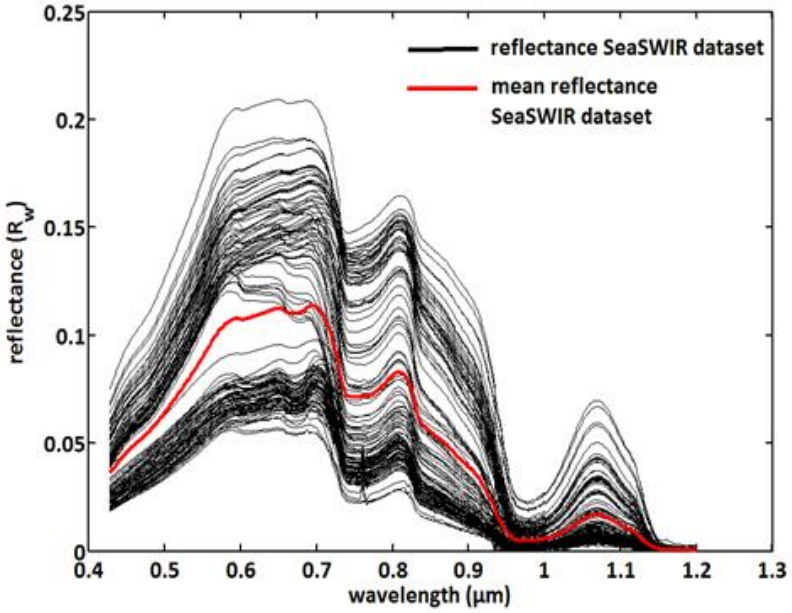


Issue : spectral band difference PROBA-V and AERONET OC

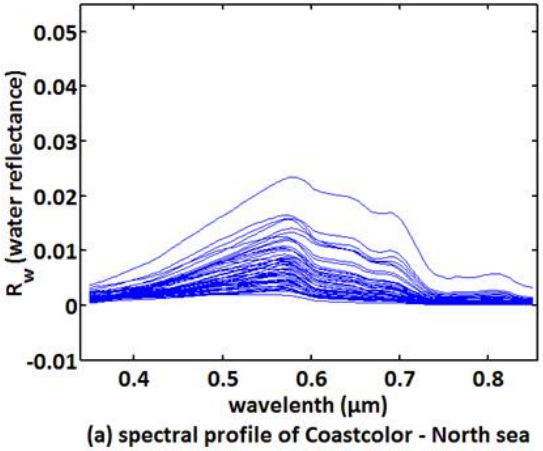
RW VALIDATION USING AERONET-OC STATIONS

Hyperspectral dataset to investigate spectral band difference PROBA-V and AERONET OC





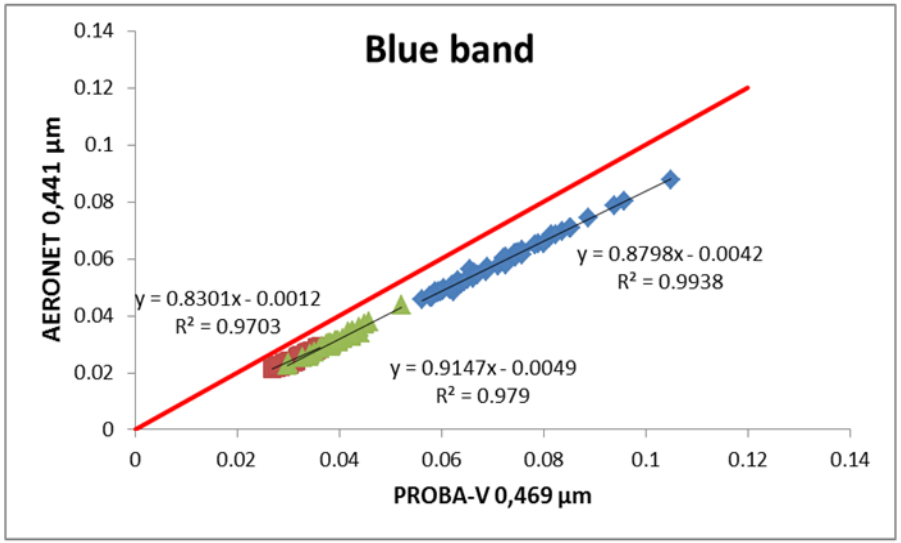
SeaSWIR in-situ

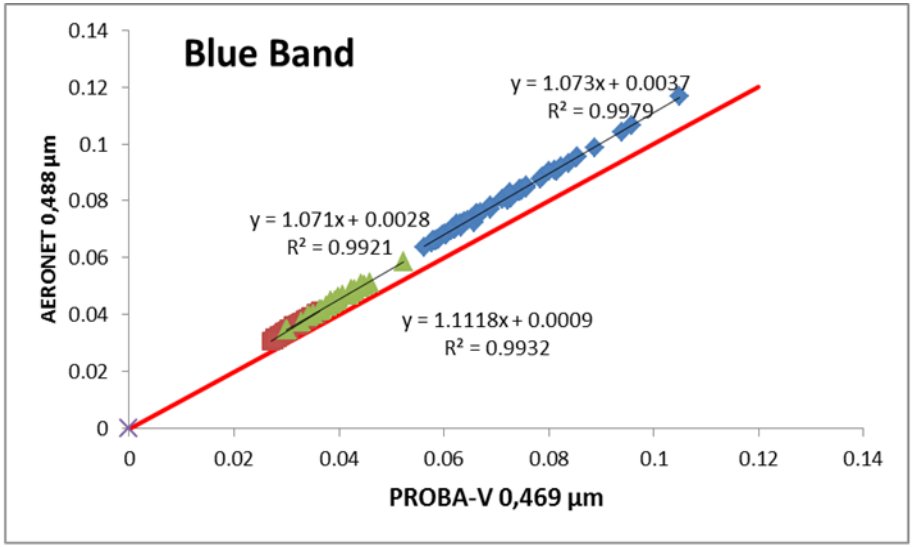


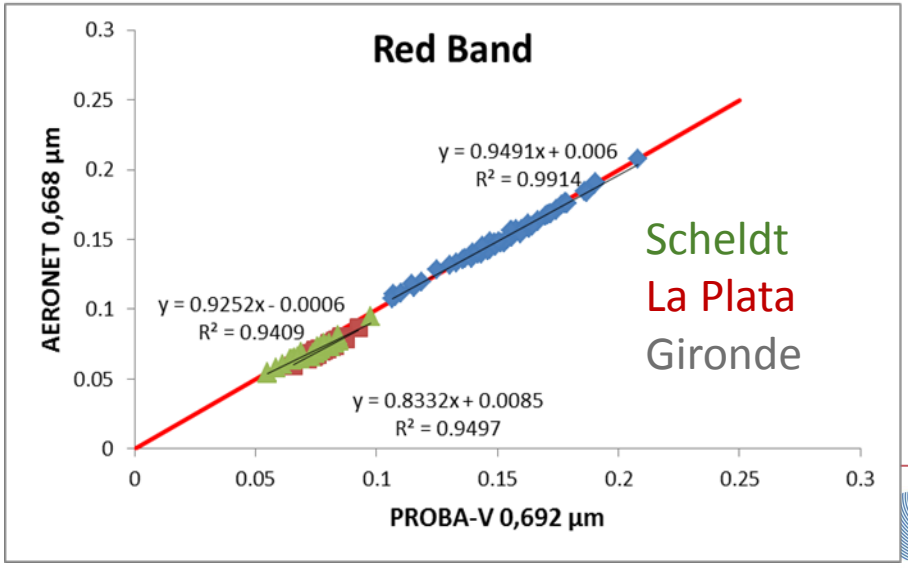
Coastcolour in-situ

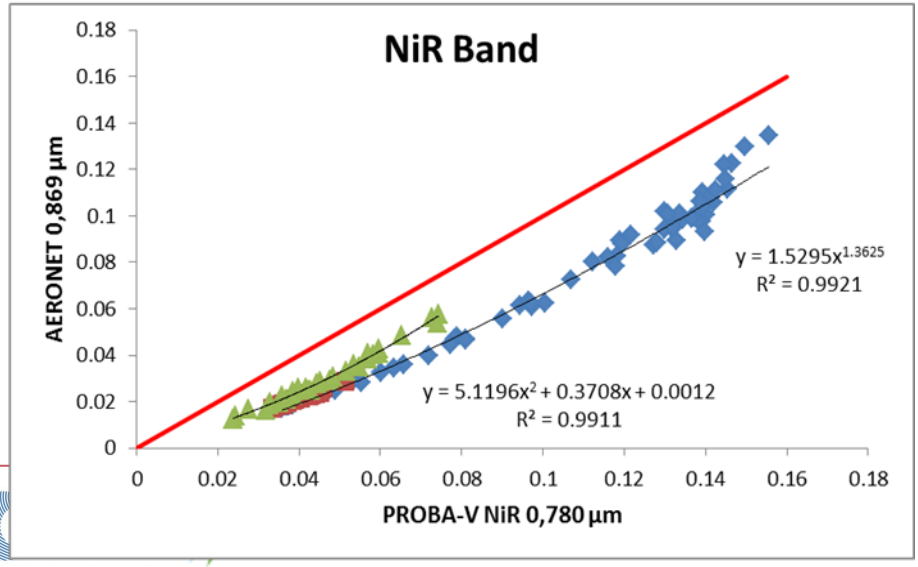
Approach : resample to PROBA-V and Aeronet OC spectral bands to determine spectral shift correction

RW VALIDATION USING AERONET-OC STATIONS

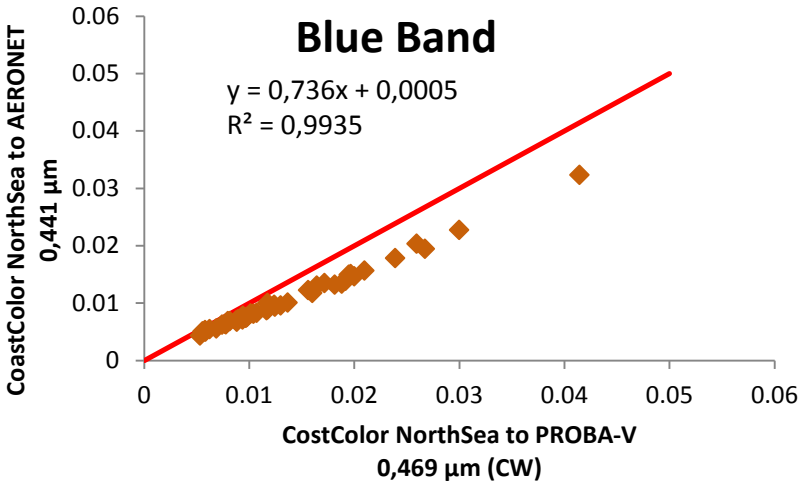


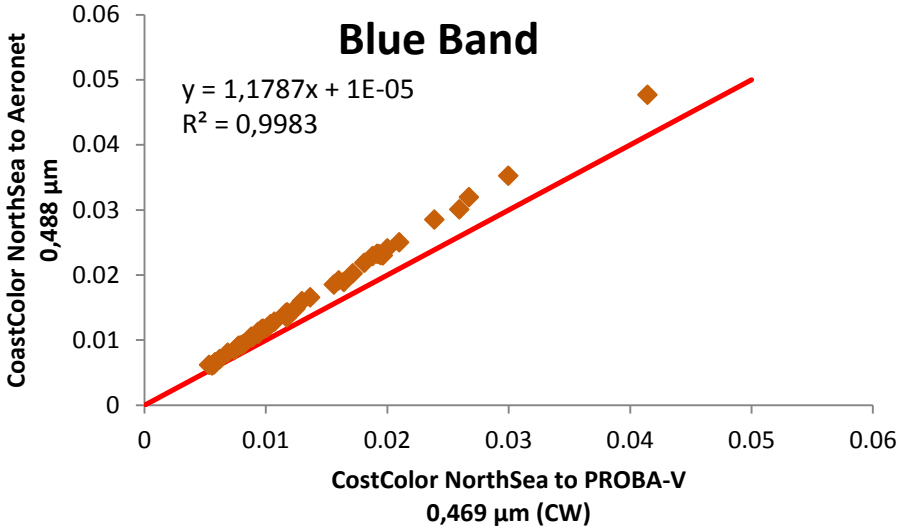


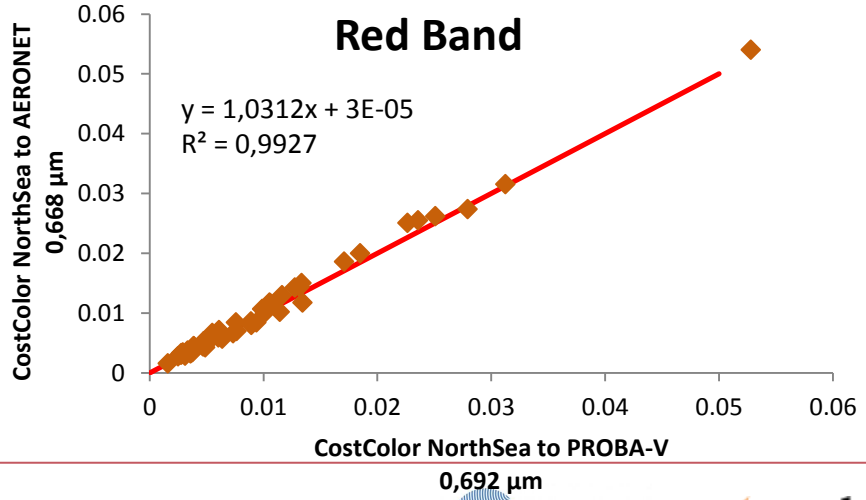




RW VALIDATION USING AERONET-OC STATIONS



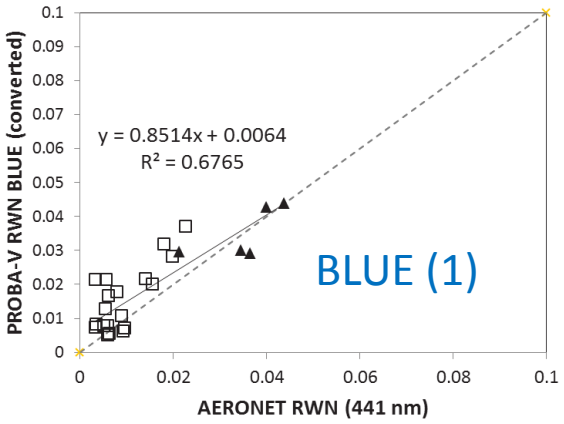


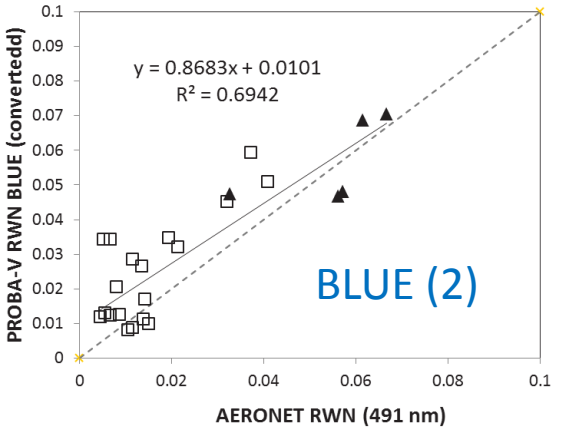


RW VALIDATION USING AERONET-OC STATIONS

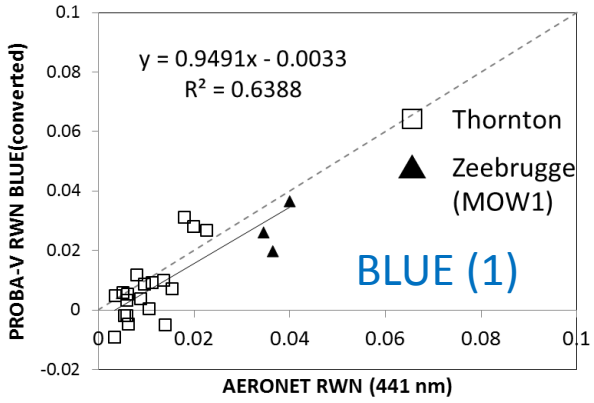
PROBA-V RWN Validation

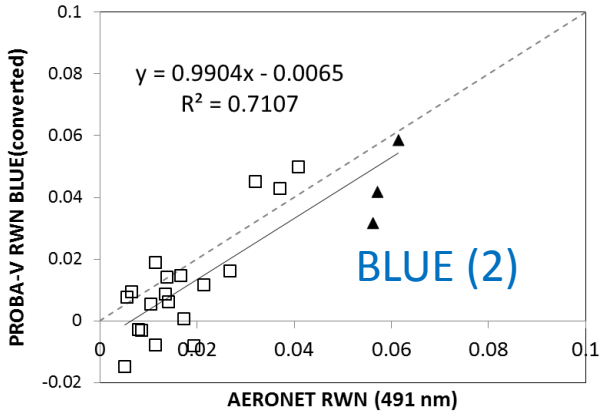
OPERA Land-based

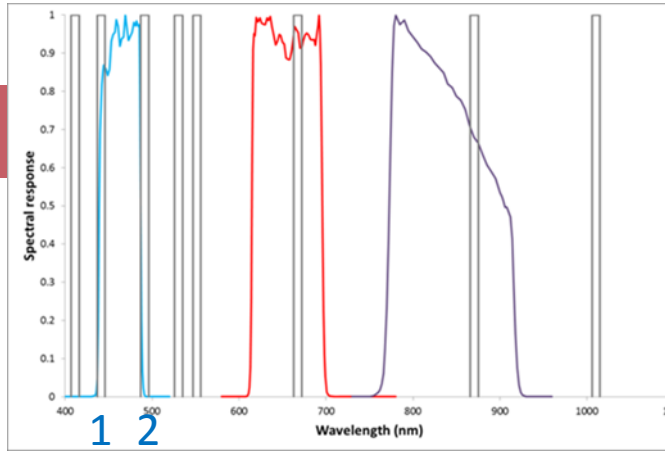




OPERA SWIR based



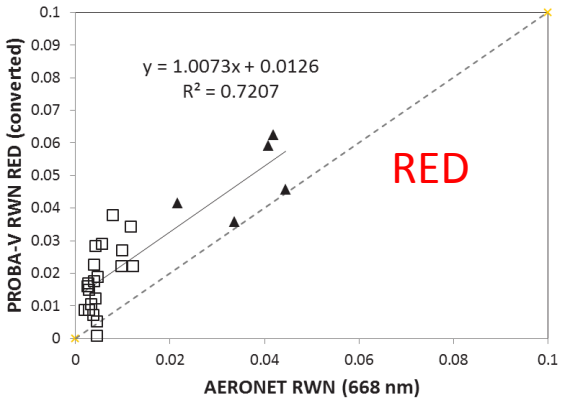


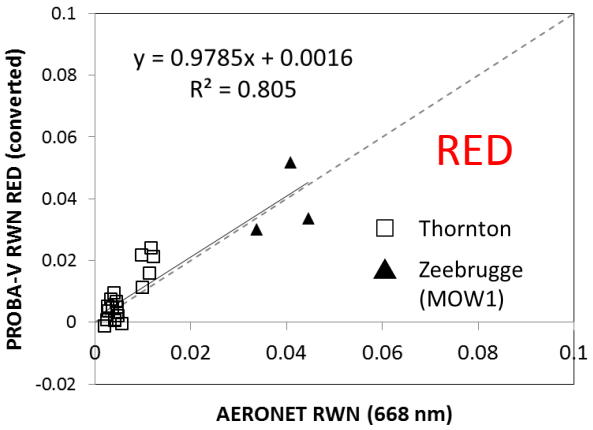


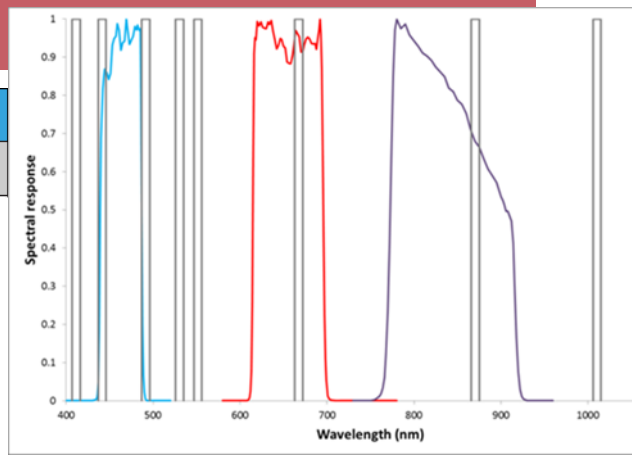
RW VALIDATION USING AERONET-OC STATIONS

PROBA-V RWN Validation

OPERA Land-based	OPERA SWIR based





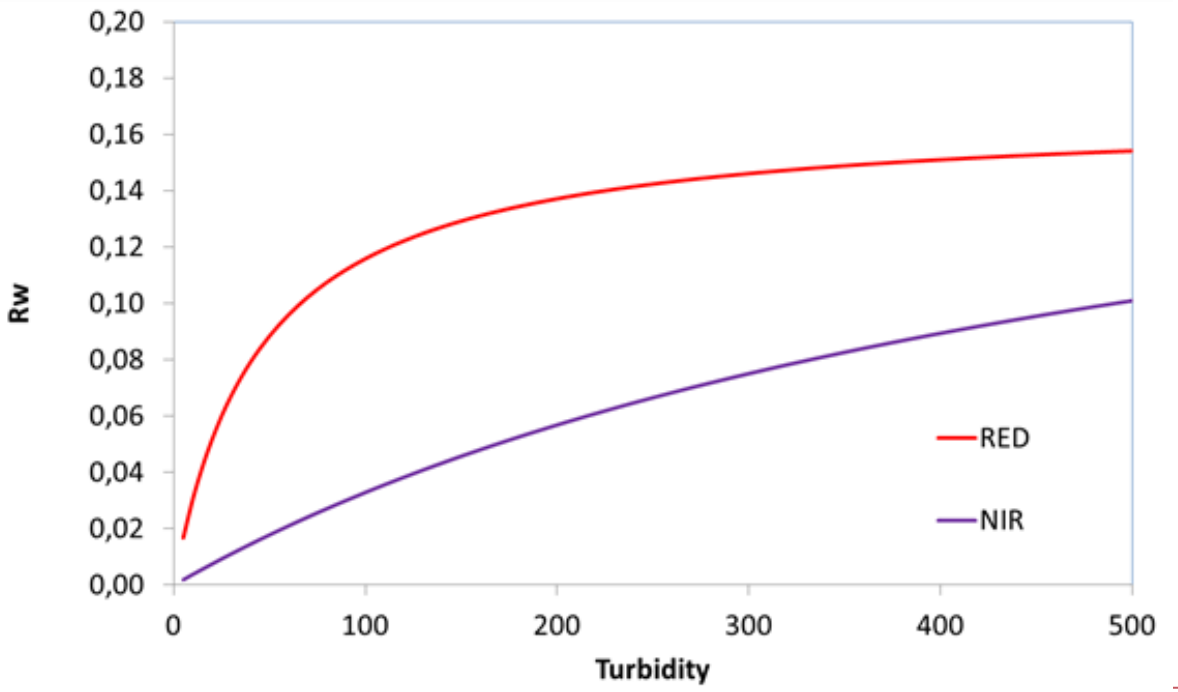


TURBIDITY ALGORITHM

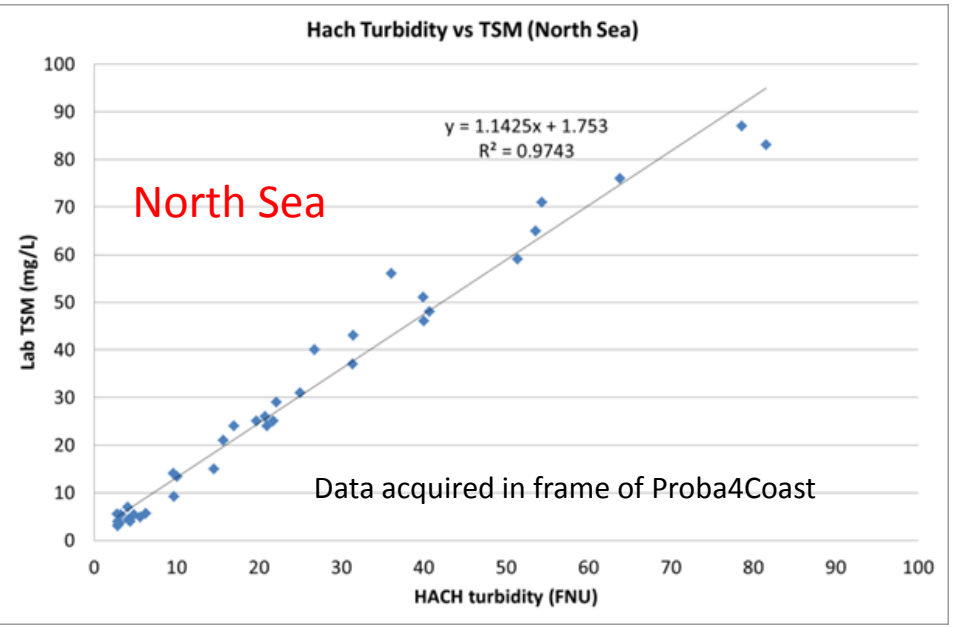
$$T = \frac{A_T^{\rho} \cdot \rho_w(\lambda)}{\left(1 - \frac{\rho_w(\lambda)}{C_T^{\rho}}\right)}$$

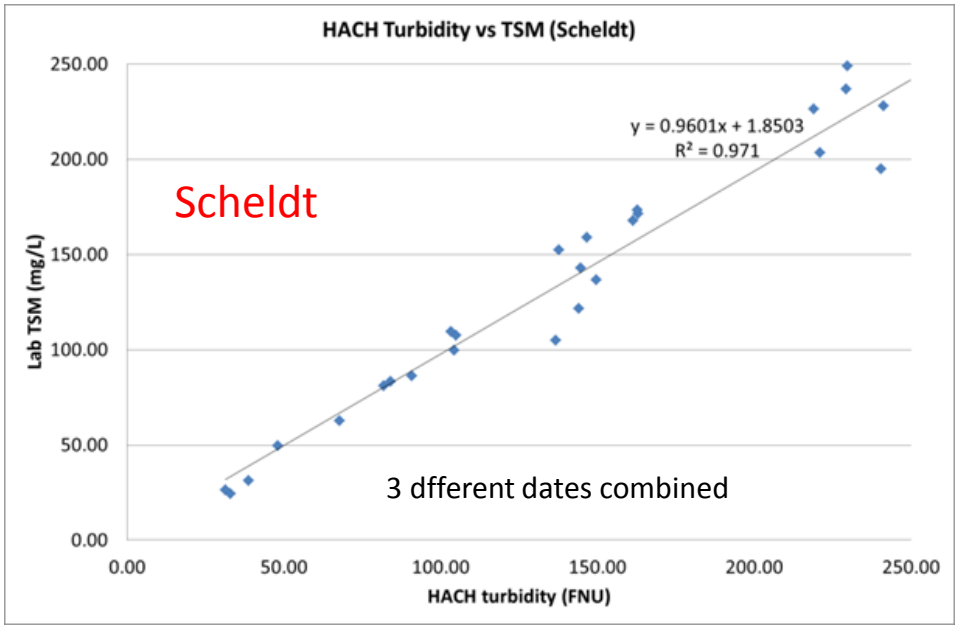
PROBA-V band	A_T^{ρ}	C_T^{ρ}
RED	237.891	0.168
NIR	2535.41	0.209

(Nechad et al., 2009)



LOCAL TURBIDITY-TSM RELATIONSHIPS





Turbidity algorithm should be combined with local T-TSM relationship to get TSM !

CEFAS SMART BUOYS

INTERCOMPARISON TURBIDITY METERS

	HACH VITO 2100Qis 	OBS-3A IMDC	Seabird VLIZ OBS 3+	CEFAS smartbuoy Seapoint turbidity meter
Operating wavelength	860 nm	850 nm/875 nm (depending on the documentation received)	850 ± 5 nm	880 nm
Measurement Method, scattering angle	Side scattering 90 ° Ratio turbidimetric determination using a primary nephelometric light scatter signal (90°) to the transmitted light scatter signal.	OBS sensors detect IR backscattered between 140° and 160°, and where the scattering intensities are nearly constant with the scattering angle	OBS3+ measures turbidity from the relative intensity of light backscattered at angles from 90°to 165°.	records light scattered by suspended particles between 15° to 150°
unit	FNU (operator choice: NTU or FNU)	NTU	NTU	FNU

Used to set-up Turbidity algo

Used to validate Turbidity algo

INTERCOMPARISON TURBIDITY METERS

Despite turbidity instruments being calibrated with standard Formazine suspensions, their response in natural waters might
be different because of their different angular configuration (Roesler
& Boss, 2007)

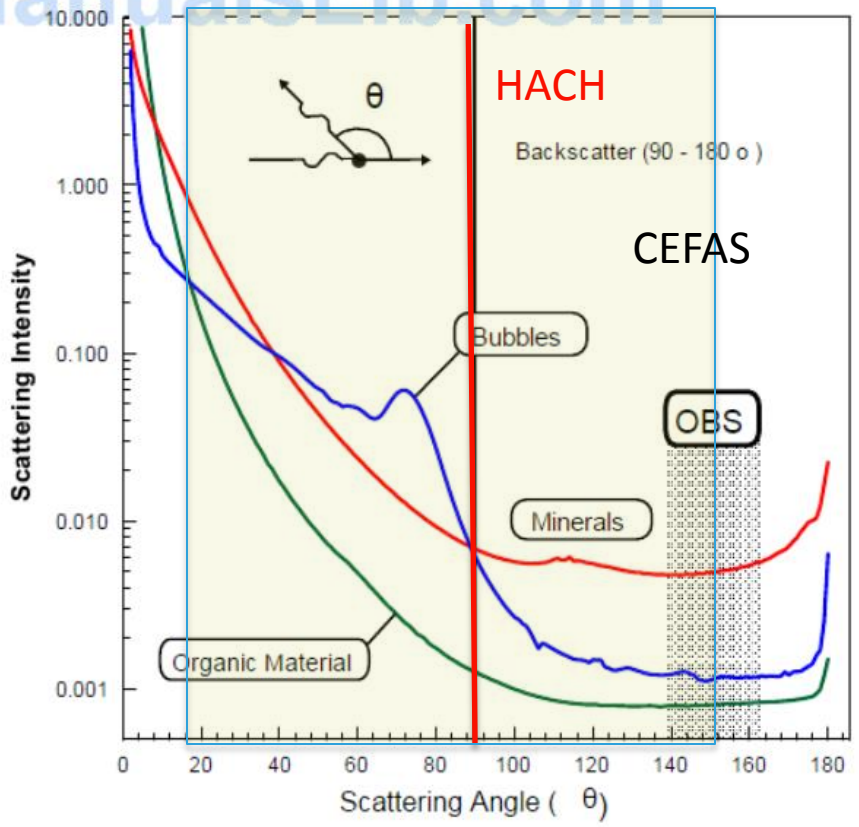
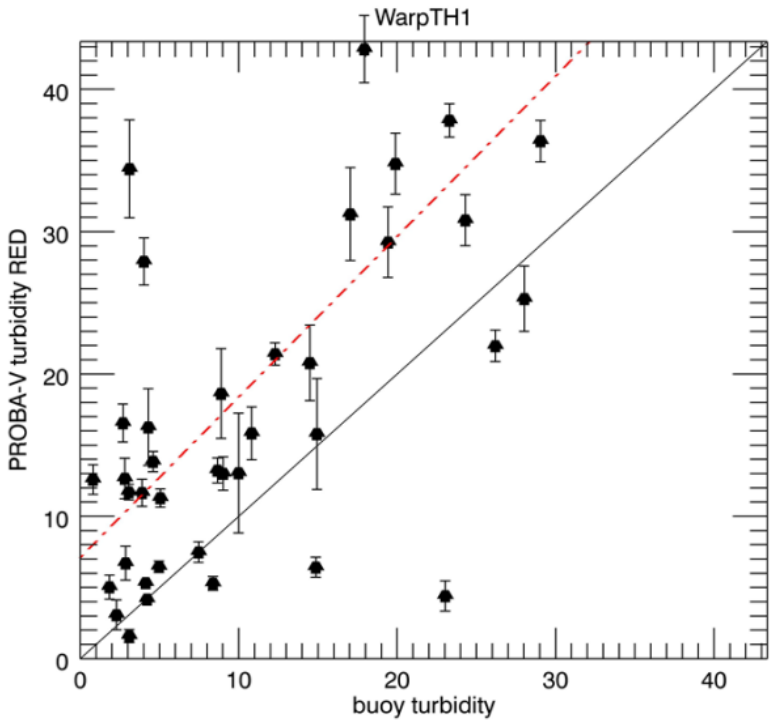


FIGURE 10-5. Scattering intensity vs. angle

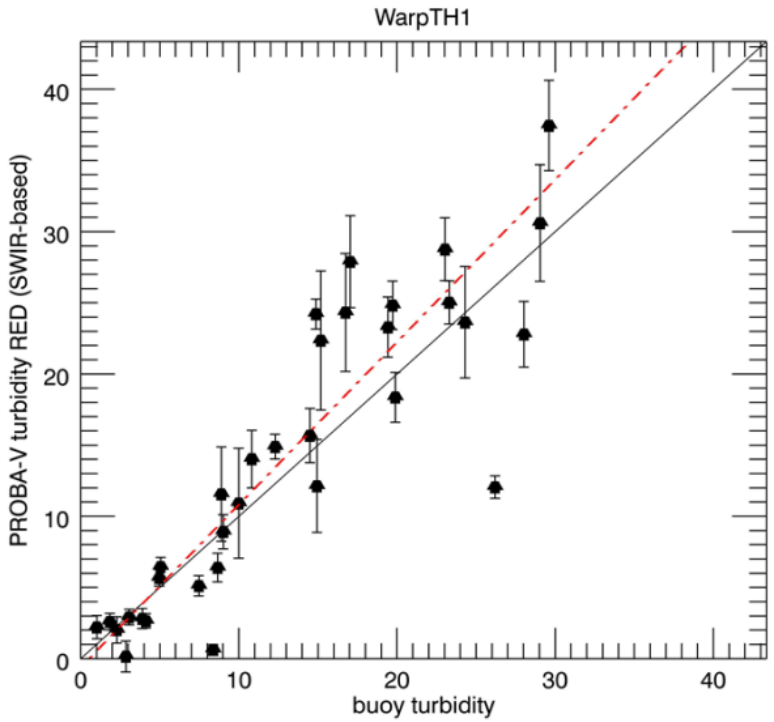
CEFAS SMART BUOYS

WARP TH1

OPERA land-based



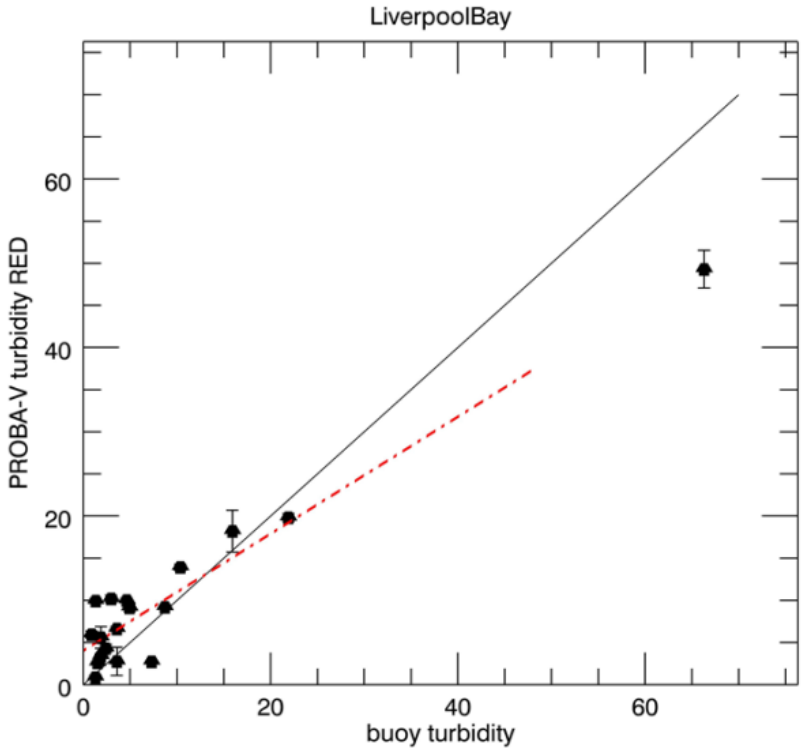
OPERA SWIR-based



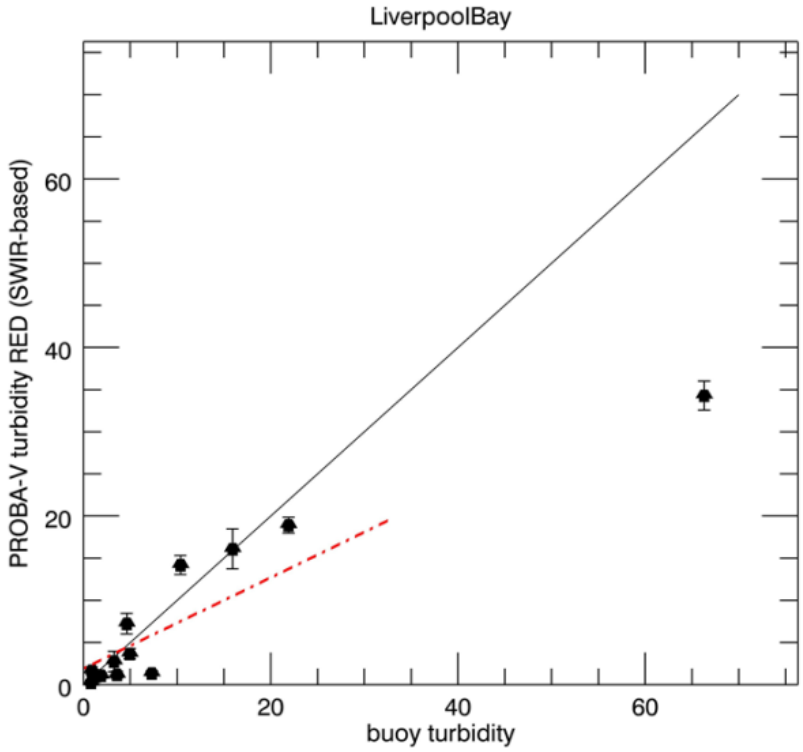
CEFAS SMART BUOYS

LIVERPOOL BAY

OPERA land-based



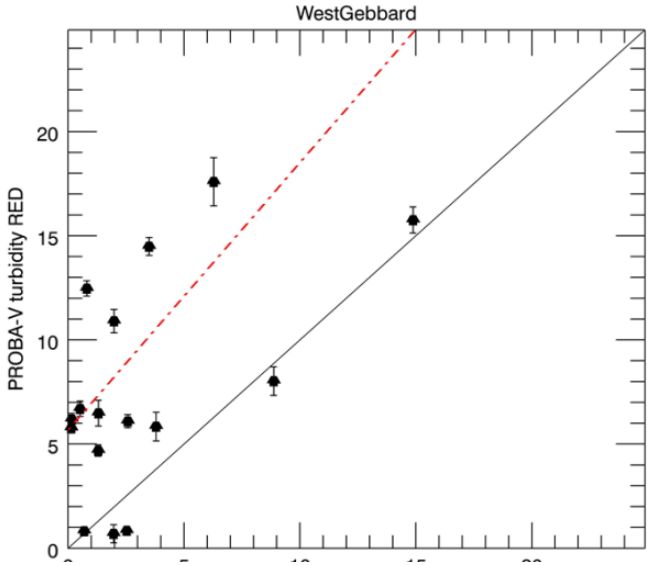
OPERA SWIR-based



CEFAS SMART BUOYS

WEST GABBARD

OPERA land-based



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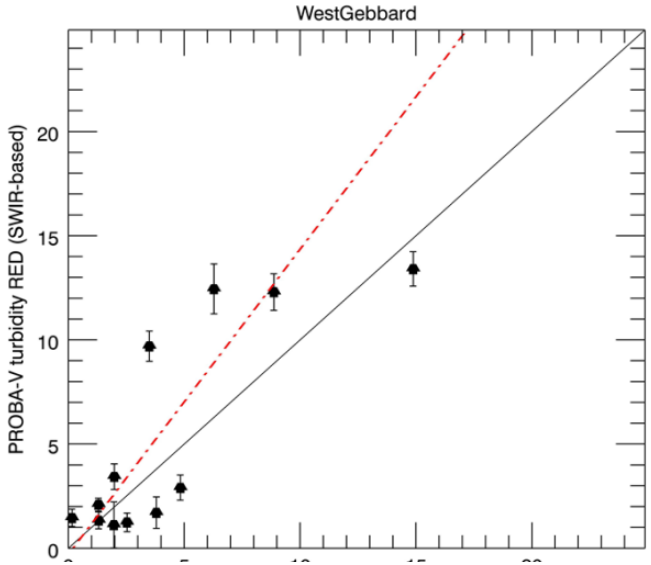
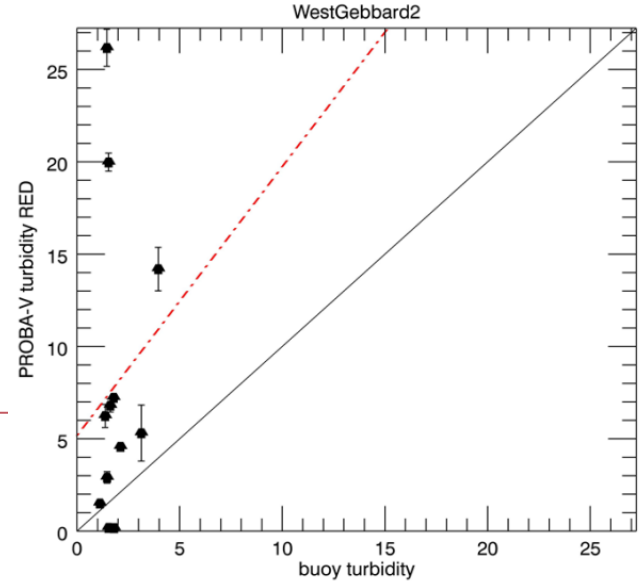
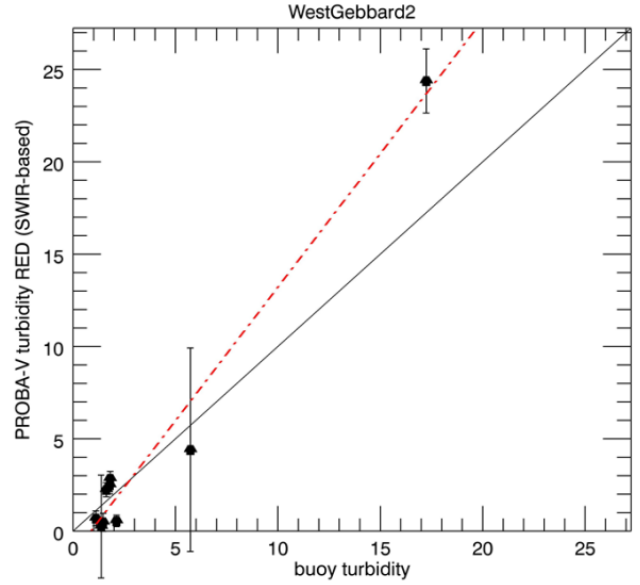


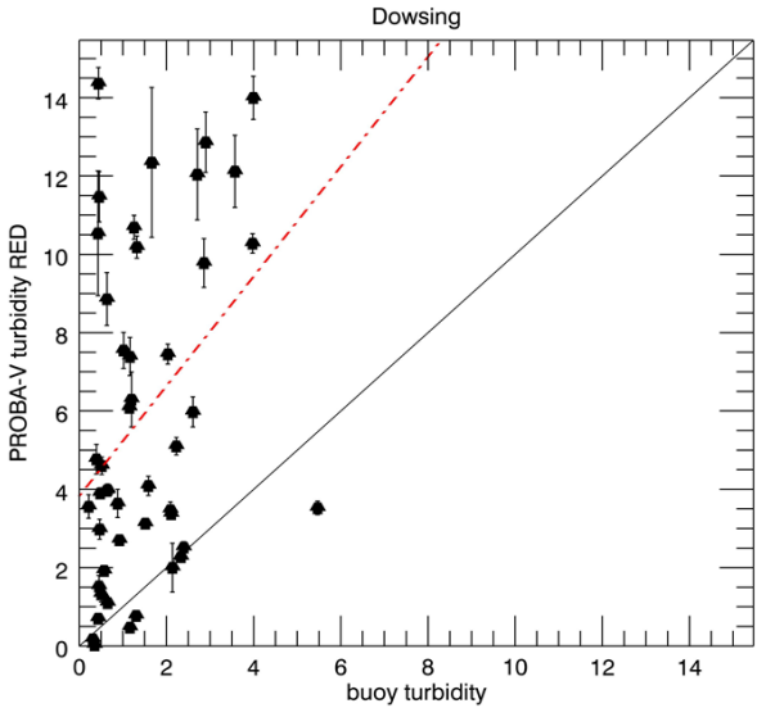




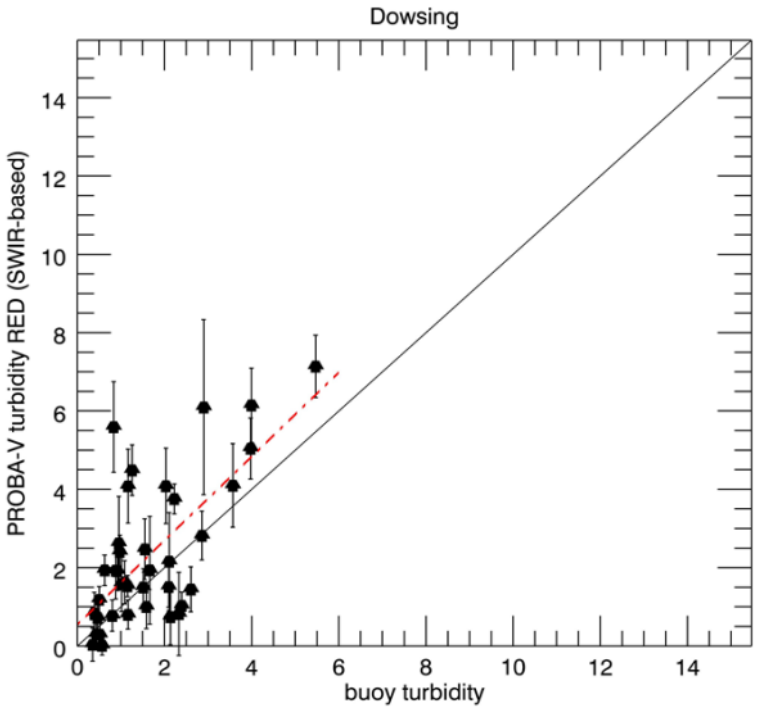
CEFAS SMART BUOYS

DOWSING

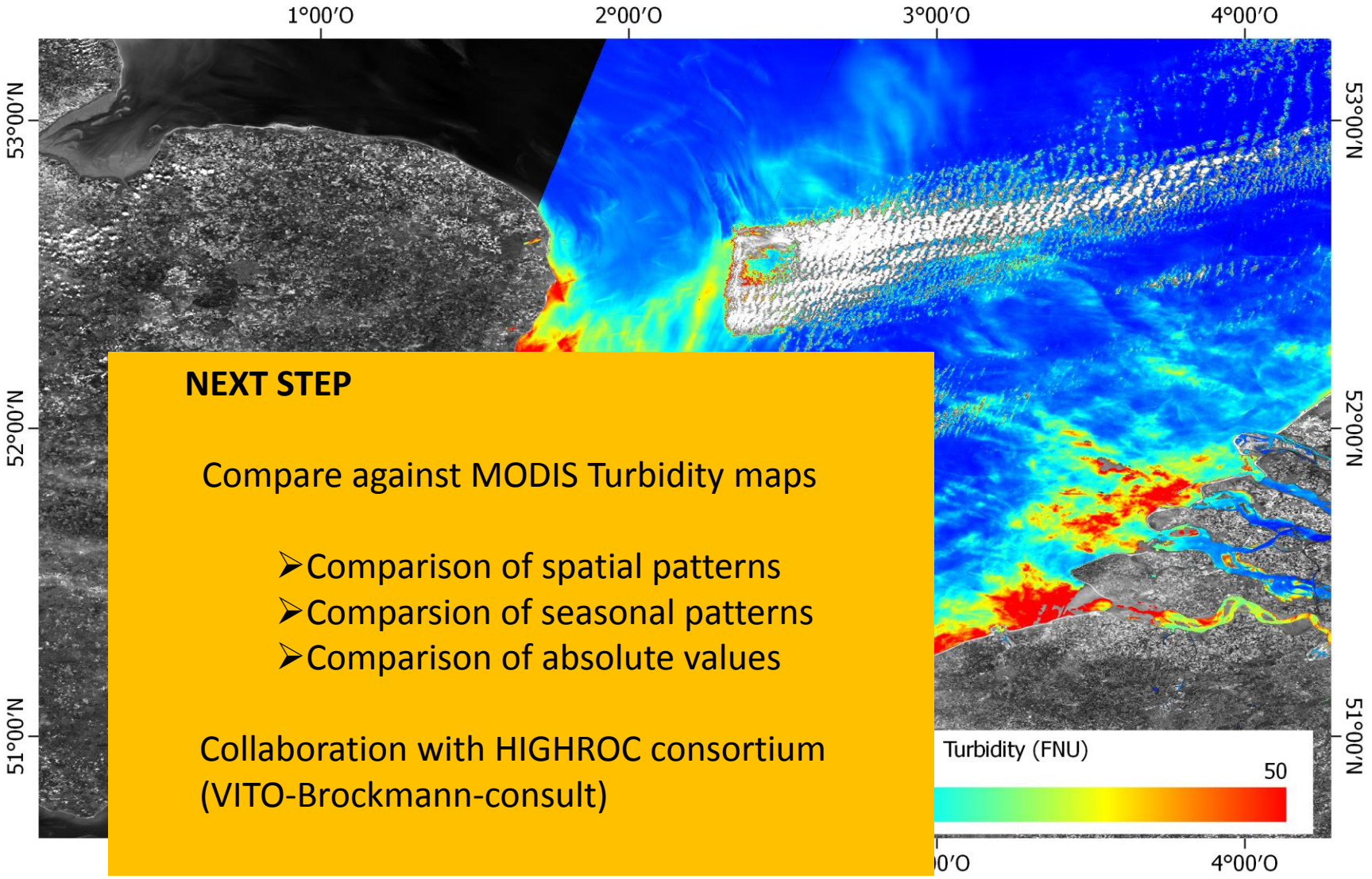
OPERA land-based



OPERA SWIR-based



OPERA LAND-BASED (21/04/2016)



NEXT STEP

Compare against MODIS Turbidity maps

- Comparison of spatial patterns
- Comparsion of seasonal patterns
- Comparison of absolute values

Collaboration with HIGHROC consortium (VITO-Brockmann-consult)

WATER APPLICATIONS NOT CONSIDERED PROBA-V REQUIREMENTS

- MERIS, OLCI : vicarious adjustment before A/C over water
- L8 : Pahlevan gains for water applications (Pahlevan, 2014)

Table 7. Reference radiance levels for PROBA-V (W m^{-2} sr^{-1} μm^{-1}).

	L_1	$L_2 = L_{ref}$	L_3	$L_4 = L_{max}$
Blue	39	111	236	567
Red	10	110	231	446
NIR	4	106	212	296
SWIR	0.6	20	38	58