STAR JPSS 2017
Annual Science Team Meeting

VIIRS Ocean Color Breakout
Wednesday , 16 August 2017

Optical Measurements in Support of JPSS Cal/Val

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Location	Season	Year	Stations	Status	To Menghua	Seabass Format	
Ches. Bay GEOCAPE	July	2012	57	Processed	No	Yes	NASA GEOCAPE
Chesapeake Bay 2012							
VIIRS Launch							
Chesapeake Bay 2012	Dec	2011	2	Processed	Yes	No	First VIIRS validation VIIRS data not saved.
South Florida	Mar	2012	17	Processed	Yes	No	First good validation, lots of matchups.
Oahu, HI	September	2012	21	Processed	Yes	Yes	Many good matchups
Chesapeake Bay 2013	All Year	2013	37	Processed	Yes	No	Many good matchups and Red Tide and Mabel overflight
CUNY Ches. Bay Exp.	Aug	2013	42	Processed	Yes	No	Some matchups, Good closure experiment
GOM GEOCAPE	September	2013	67	Processed	Yes	Yes	Many good matchups in lots of conditions
Chesapeake Bay 2014	All Year	2014	27	Processed	Yes	Yes	Many good matchups and Red Tide and JOEYS
Puerto Rico	May	2014	15	Processed	Yes	Yes	Many good matchups
Hawaii/MOBY	May	2014	12	Processed	Yes	Yes	Good matchups with VIIRS and MOBY
VIIRS Cal/Val	Nov	2014	23	Processed	Yes	in process	Many good matchups
Chesapeake Bay 2015	All Year	2015	7	Processed	Yes	Yes	Many good matchups
Puerto Rico	Mar	2015	15	Processed	Yes	Yes	Many good matchups
East Coast Ocean Acidification	Jun/July	2015	74	Processed	Yes	Yes	Many good matchups
VIIRS Cal/Val	Dec	2015	27	Processed	Yes	Yes	Many good matchups
Chesapeake Bay 2016	All Year	2016	6+	Processed	No	No	Landsat validation
KORUS OC	May/June	2016	35	Processed	Yes	Yes	Many good matchups
West Coast Ocean Acidification	May/June	2016	35	Processed	Yes	Yes	lots of clouds some good matches
Fiji to Australia	Jun/July	2016	24	Processed	Yes	Yes	Several Matchups
CORAL PRISM	Oct	2016	37	Processed	No	Yes	Hurricane Matthew
VIIRS Cal/Val	Oct	2016	12	Processed	Yes	No	Several Matchups
P18 South Pacific	Jan/Feb	2017	45	Processed	No	Yes	includes south pacific gyre low chl H2O
JOEYS	March	2017	12	No	No	No	
Chesapeake Bay 2017	All Year	2017	17	No	No	No	
Total since VIIRS			**603**				

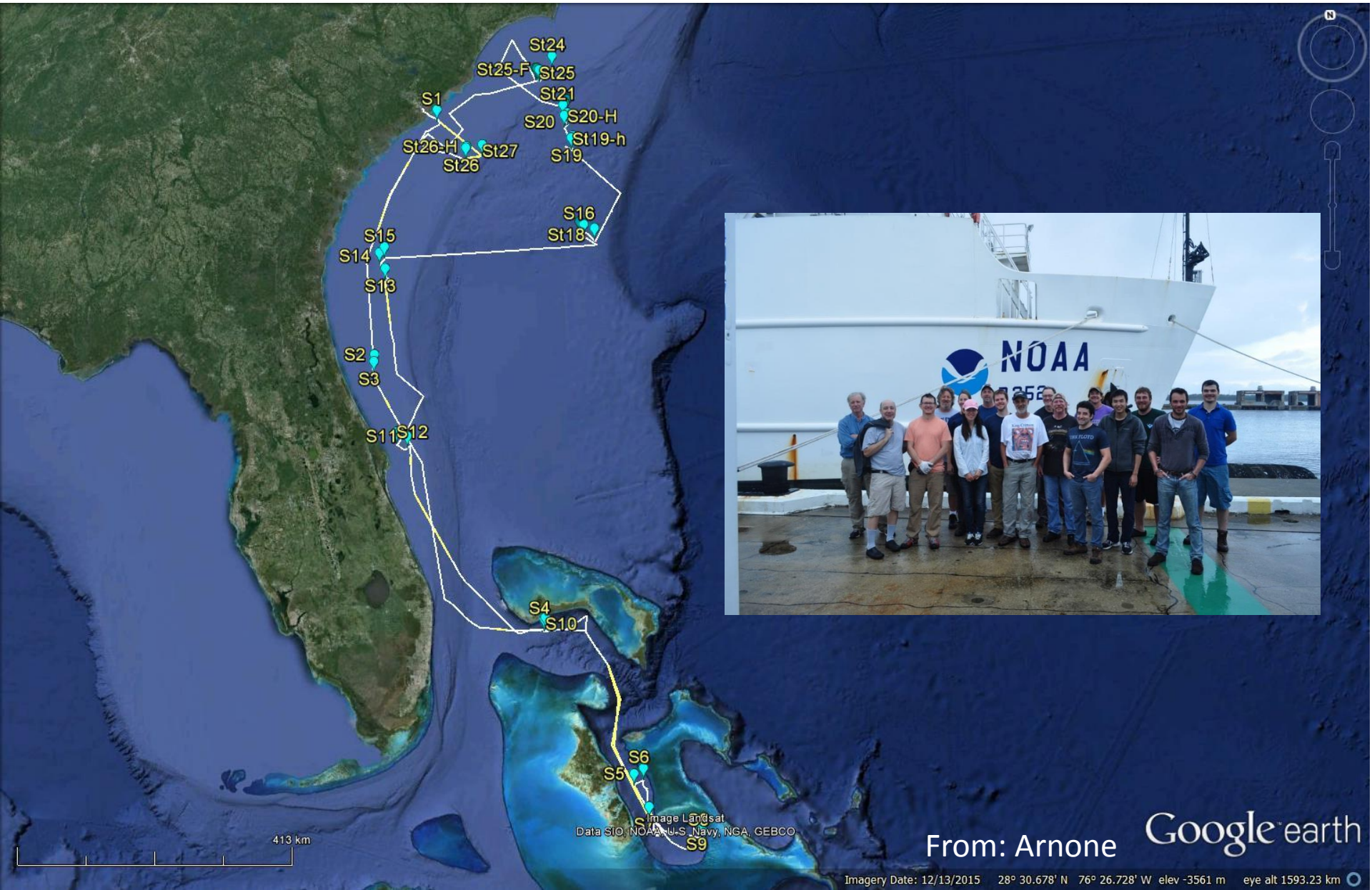
Primary Objectives:

- Provide in situ ocean color data to be used for calibration and validation of the JPSS Cal/Val effort.
- Define uncertainties in validation data collection.
- Outline best protocols to address validation and collection issues.

November 2014 Cal/Val Cruise

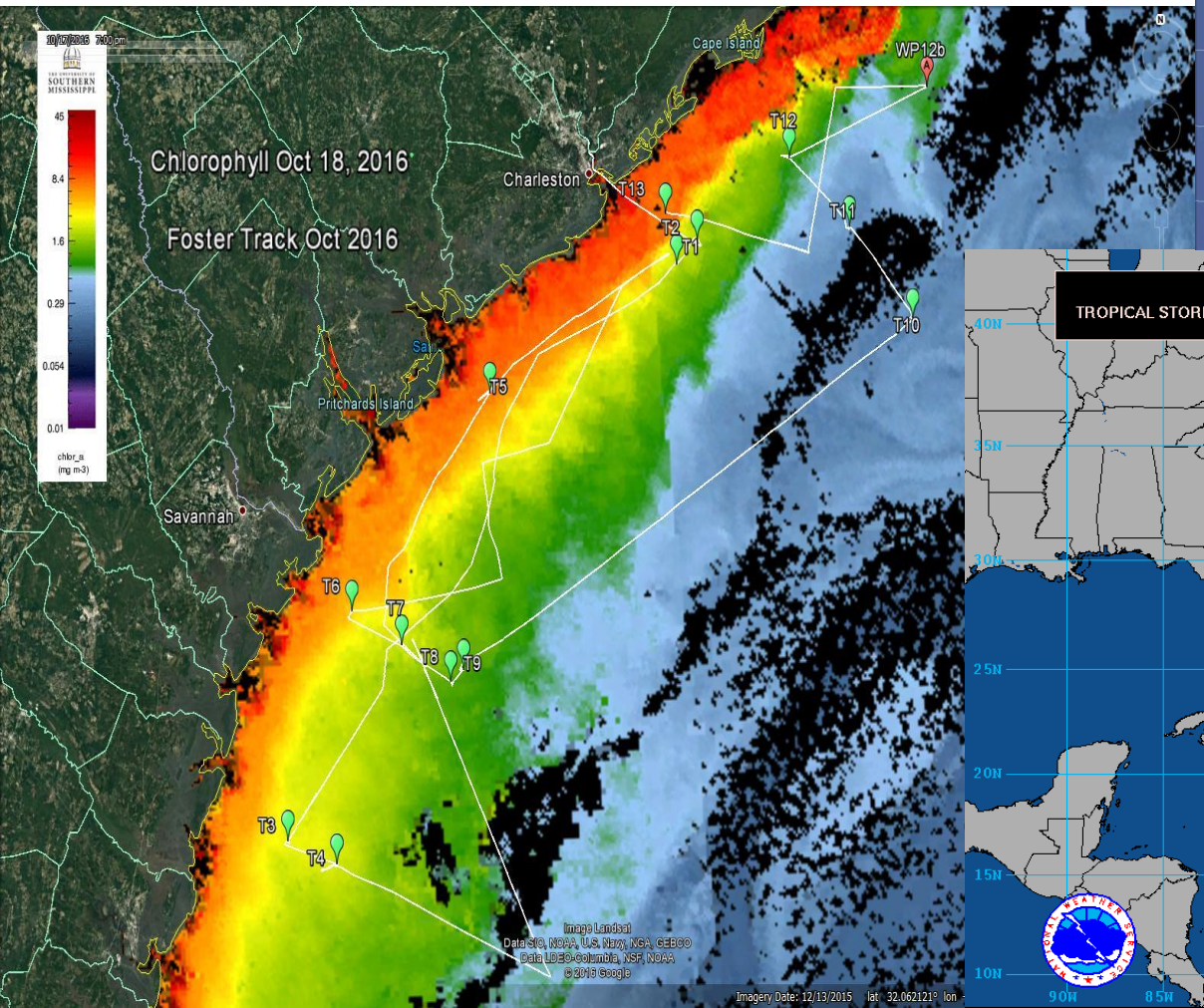


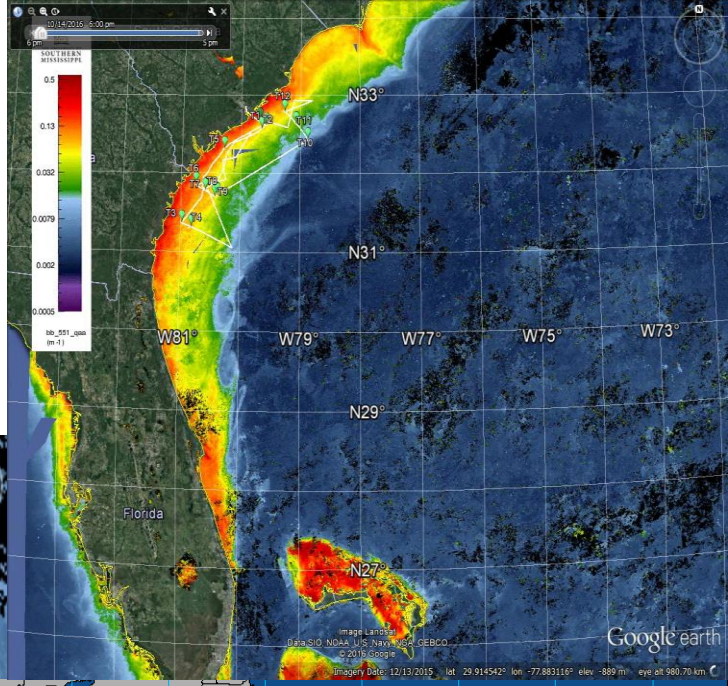
December 2015 Cal/Val Cruise

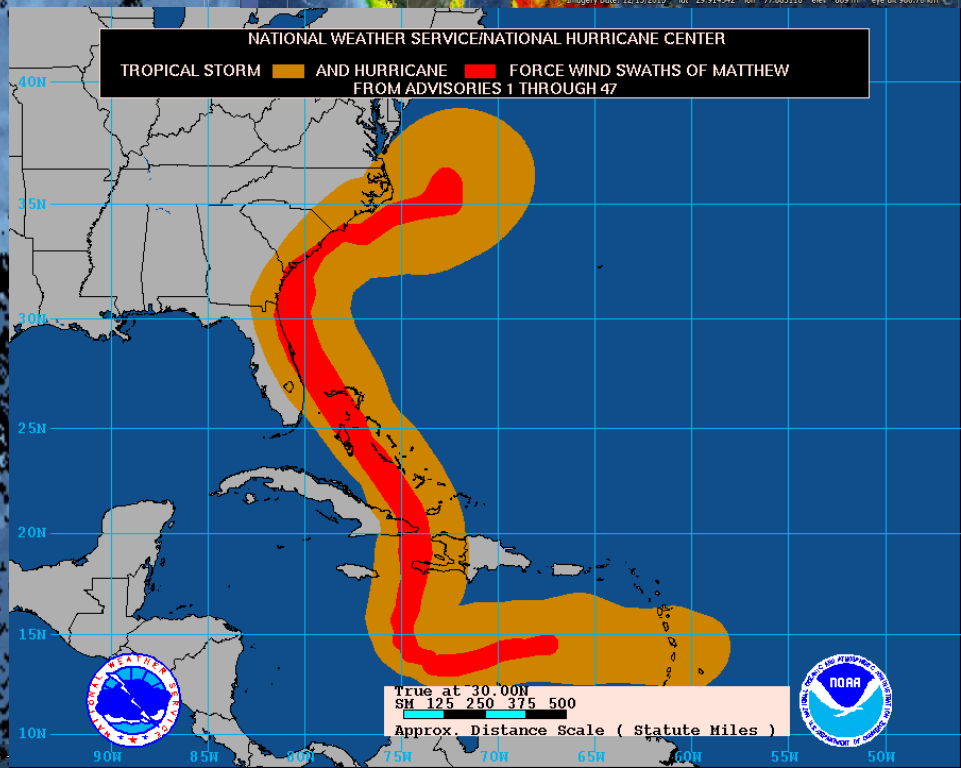


From: Arnone

VIIRS Cal/Val Cruise III (NF-16-08), October 5 to 18, 2016 aboard the NOAA Vessel Nancy Foster

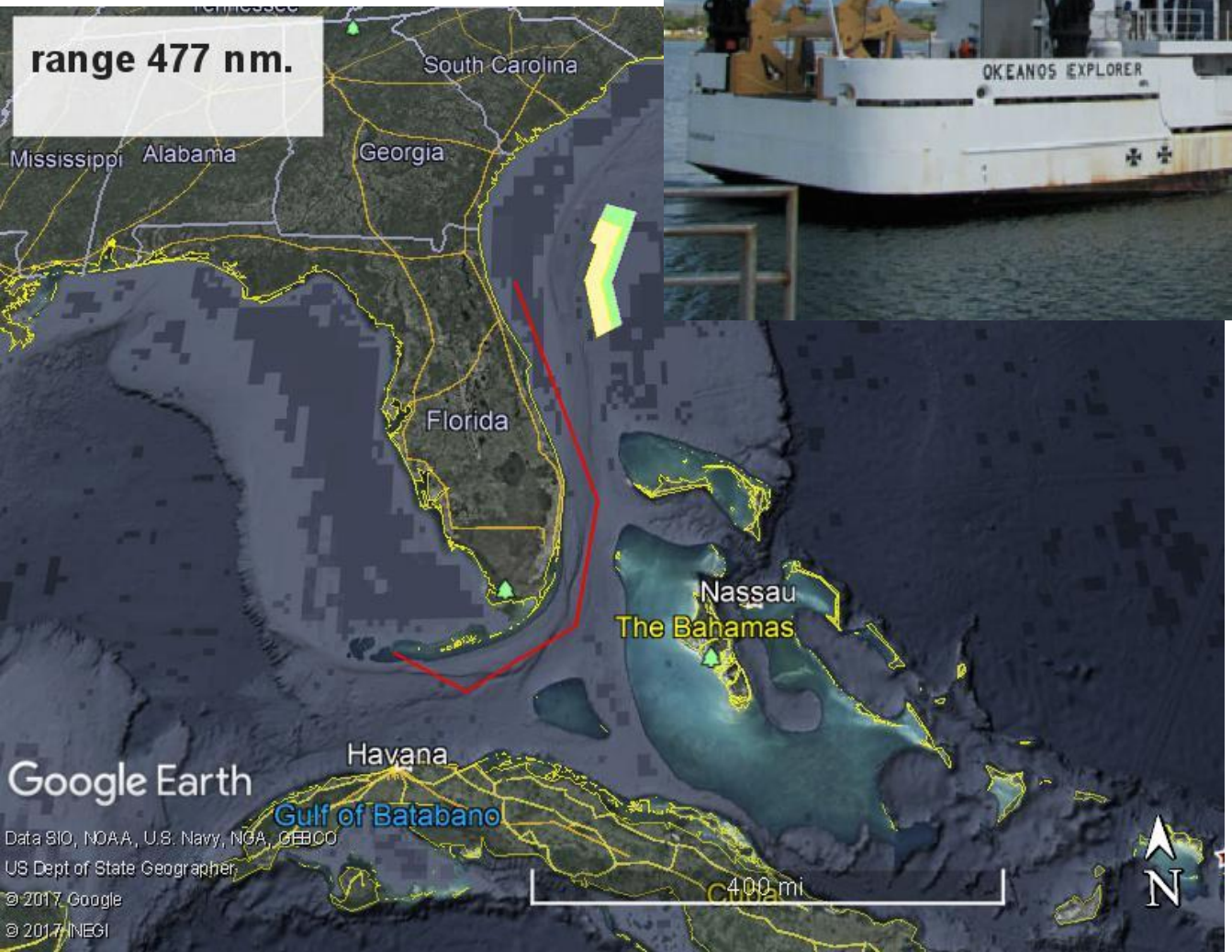






May 2018
Cal/Val Cruise



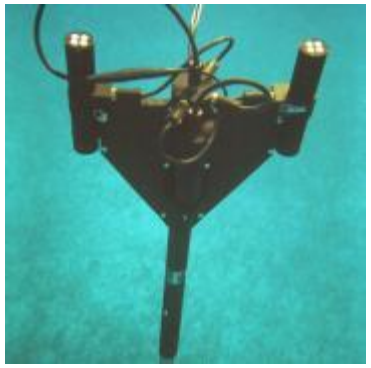


Instrument Shorthand	Full Identification/Purpose	Manufacturer or Citation
ac-9	In situ spectrophotometer - 9 channel resolution	WET Labs
ac-s	In situ spectrophotometer – high spectral resolution	WET Labs
ADCP	Acoustic Doppler Current Profiler	Teledyne RD Instruments
ASD	Analytical Spectral Device; HandHeld2-Pro visible and near infrared spectrophotometer	PANalytical
BB-3	Backscatter – 3 channels	
BB7FL2	Backscatter – 7 channels, Fluorescence – 2 channels	WET Labs
C-OPS	compact hyperspectral optical profiling system	Biospherical Instruments, Inc.
CTD	Conductivity, Temperature, Depth	Generic, various manufacturers
ECO-Puck Triplet Fluorometer	Fluorescence at 3 channels for determining chlorophyll, CDOM and phycoerythrin	WET Labs
ECO-Puck Triplet Scatterometer	Scatter – 3 channels (443, 550, 860)	WET Labs
GER	Field portable spectroradiometer	Spectra Vista Corporation
FlowCam	Dynamic imaging particle analysis for species composition and size measurements	Fluid Imaging Technologies, Inc.
HyperOCI	Hyperspectral irradiance sensor	Satlantic LP
HyperOCR	Hyperspectral radiance sensor	Satlantic LP
HyperPro, HyperPro-II	Free-falling hyperspectral optical profiler	Satlantic LP
HyperSAS	Above water optical system	Satlantic LP
HyperSAS-POL	Above water optical system with sky polarimeter	Satlantic LP with modifications by CCNY
HyperTSRB	Hyperspectral radiometer configured to float on the sea surface	Satlantic LP
Imaging Flow CytoBot (IFCB)	Automated microscopic imaging instrument	McLane Research Labs
Microtops	Handheld sun photometer (atmospheric aerosols and optical depth)	Solar Light Company
NURADS	Upwelling Radiance Distribution Camera System	Voss and Chapin, 2005
Sartorius CPA 2250	Balance	Sartorius
RISBA	Radiometer Incorporating the Sky Blocking Approach	Lee et al. 2013
SBE 49	Conductivity, Temperature, Depth	SeaBird Scientific
VSF-9	Volume scattering function – 9 channels	WET Labs
SR1900 (Spectral Evolution)	Spectroradiometer, handheld	Spectral Evolution, Inc.

Instruments used to measure Remote Sensing Reflectance

Profilers



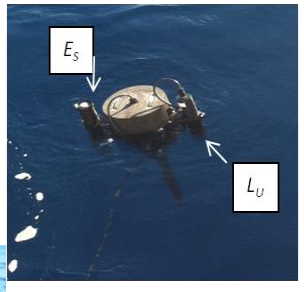


Hyp (Satlantic) – Hyperpro free-falling hyperspectral optical profiler. 10 nm bands sampled every 3 nm. Radiance FOV 8.5 degrees. Calibrated from 350 to 800 nm.



C-OPS (Biospherical Instruments, Inc.) – compact multispectral optical profiling system. a spectral range from 300 nm to 900 nm, with 19 wavebands wavelengths each: 305 nm, 320 nm, 340 nm, 380 nm, 395 nm, 412 nm, 443 nm, 465 nm, 490 nm, 510 nm, 532 nm, 555 nm, 565 nm, 625 nm, 665 nm, 683 nm, 710 nm, 780 nm, and 875 nm.

Instruments used to measure Remote Sensing Reflectance



Surface

Float (Satlantic) – HyperTSRB. Same instrument as hyperpro but collared to float at surface.



SBA (Satlantic) – Sky- Blocking Apparatus (SBA) radiometer package composed of one HyperOCR radiance sensor and one irradiance sensor. directly measures the water-leaving radiance Lw while blocking out sky-light (Lee et al., 2013).

Above-water

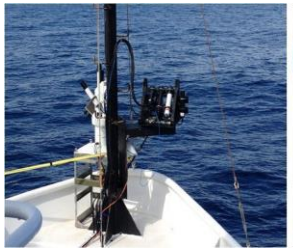


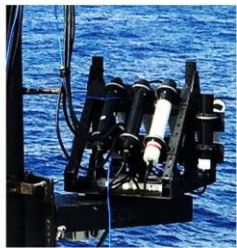
ASD Analytical Spectral Device (PANalytical) – Handheld 2 above-water spectrometer. Spectral range of 325 to 1075 nm. Spectral Resolution <3.0 nm, FOV 10 degrees. 2nd asd has 7 degrees FOV.



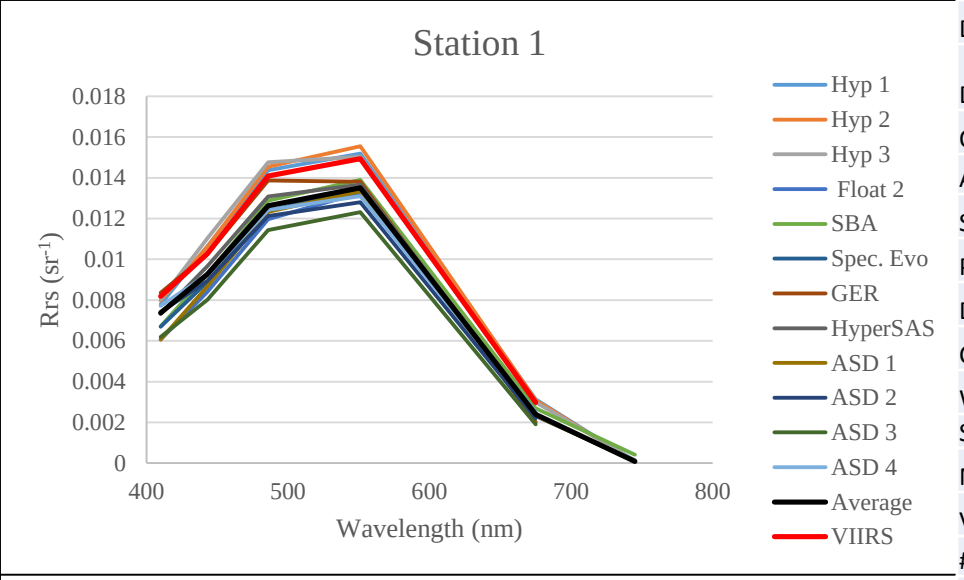
GER (Spectra Vista Corporation) – The GER 1500, Field Portable hand-held Spectroradiometer. Wavelengths from 350 nm to 1050 nm at 3 nm resolution with 4° nominal field of view (FOV).

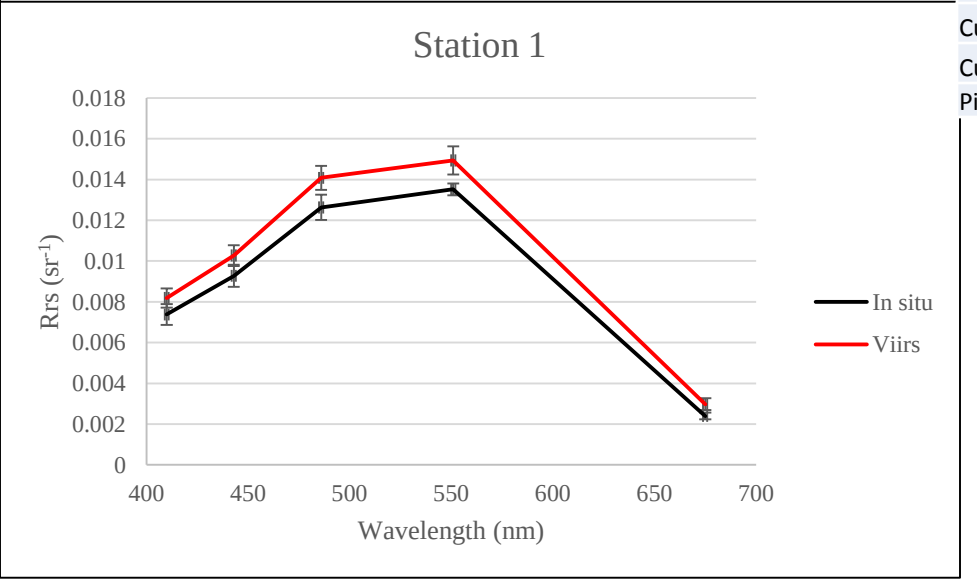
HyperSAS (Satlantic) – Autonomous above-water OCR's with narrow FOV of 3 degrees. Also set up to measure polarization



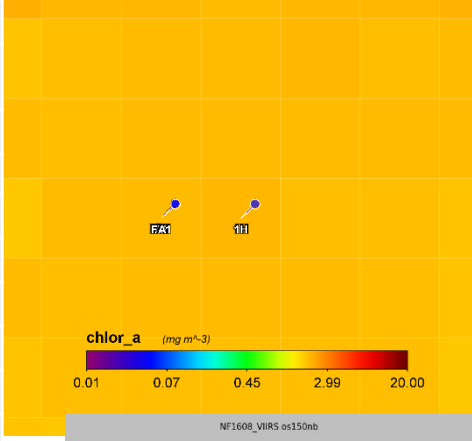


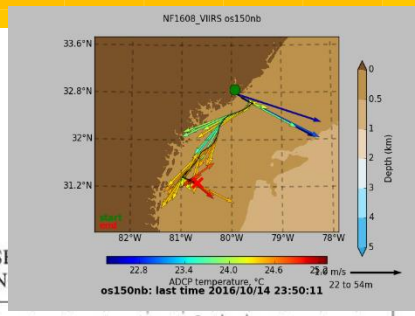
Spec-Evo – Spectral Evolution above water radiometer.

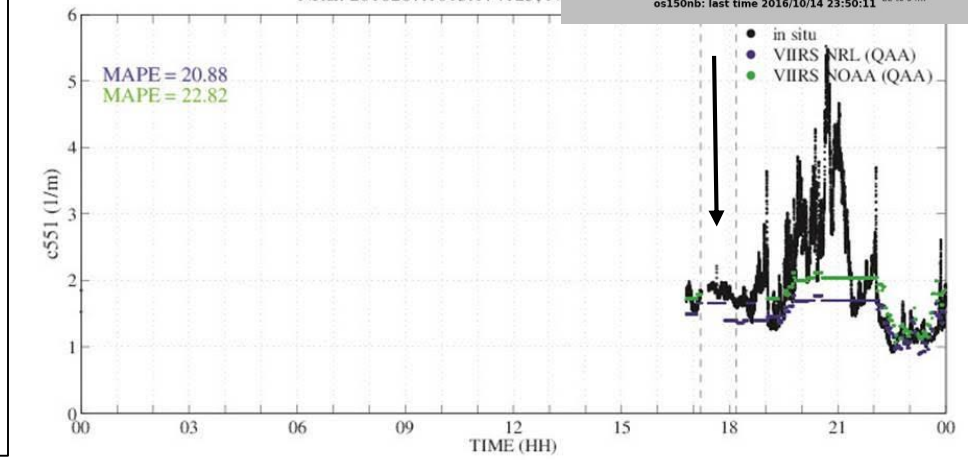




Date:	10/13, 287
Description:	Just off Charleston
Overpass time:	1740
Above time:	1843
Surf. Time:	1743
Profile time:	1720
Depth (m):	17
Cloud cover (%):	0
Wind speed (kts):	10
Seas (ft)	3
Meas. Chl (mg/m³)	1.39
VIIRS Chl (mg/m³)	2.02
# pixels in 5 x 5	21
Current (m/s):	0.5
Current source direction:	45
Pixel travel OP - sta	0

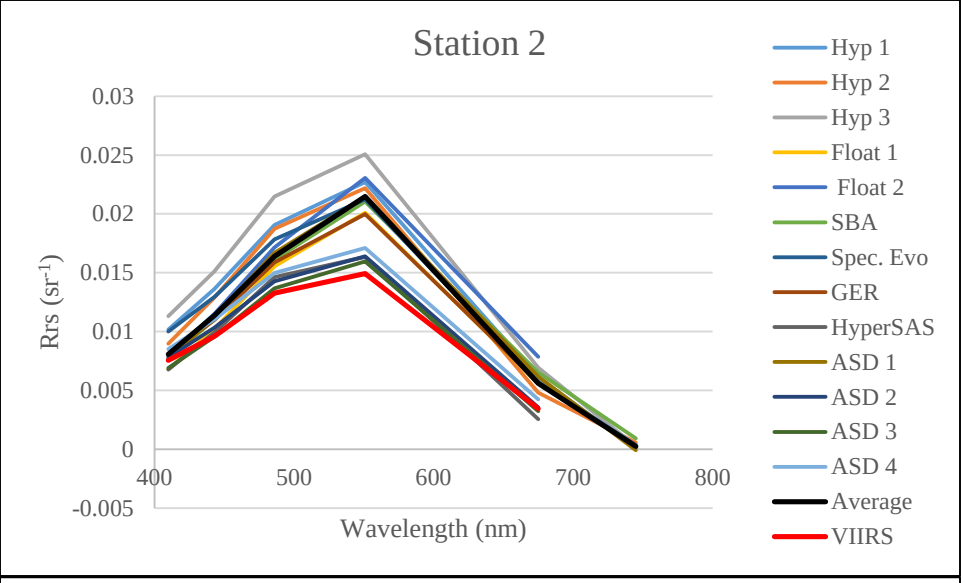


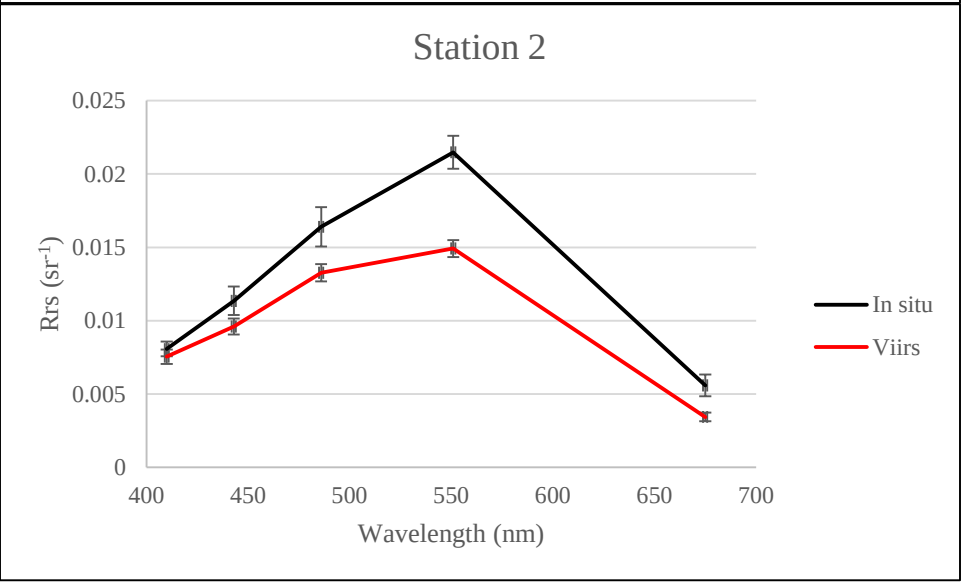




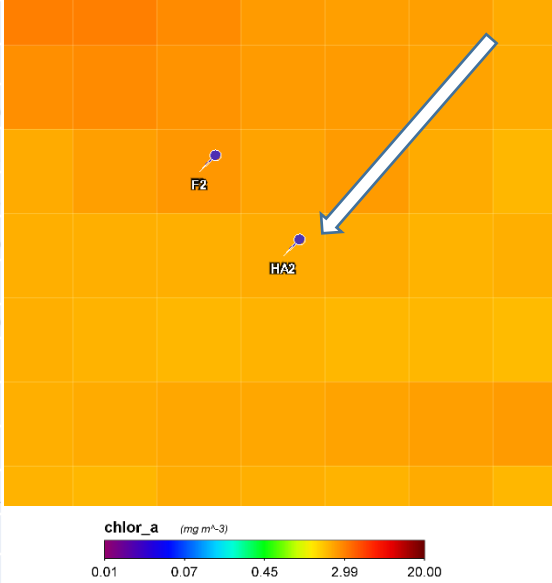
Percent difference relative to Average

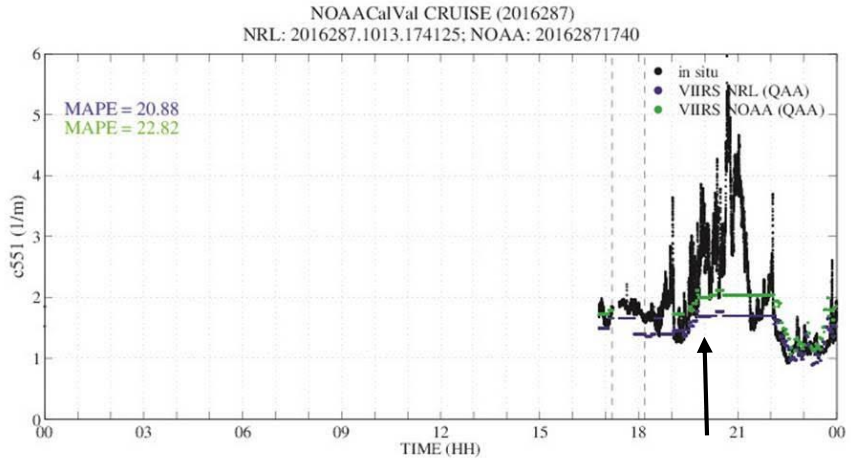
Band	Hyp 1	Hyp 2	Hyp 3	Float 1	Float 2	SBA	Spec. Evo	GER	HyperSAS	ASD 1	ASD 2	ASD 3	ASD 4
410	12.32	12.19	16.48		-11.18	-2.24	-6.13	-8.43	8.30	2.06	-5.56	-15.46	-2.35
443	10.47	11.73	13.41		-8.02	-0.99	-4.98	-5.27	6.59	0.51	-6.84	-12.10	-4.50
486	10.18	12.71	8.99		-3.70	0.83	-2.01	-3.32	0.10	-0.90	-7.21	-10.67	-5.01
551	25.84	23.64	20.16		-4.08	7.98	-7.15	-6.52	-19.45	-5.68	-11.61	-23.74	0.60
675	-40.25	-47.81	-4.85			217.45	-5.32	-19.23					





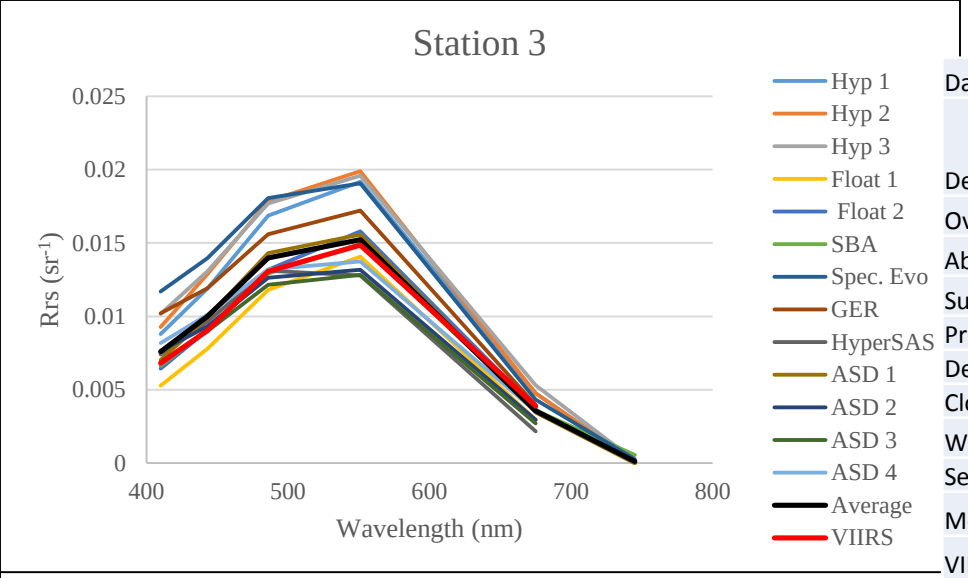
Date:	10/13, 287
Description:	8 km away
Overpass time:	1740
Above time:	2018
Surf. Time:	2046
Profile time:	2010
Depth (m):	17
Cloud cover (%):	0
Wind speed (kts):	9
Seas (ft)	3
Meas. Chl (mg/m³)	1.81
VIIRS Chl (mg/m³)	2.24
# pixels in 5 x 5	21
Current (m/s):	0.5
Current source direction:	45
Pixel travel OP - sta	5

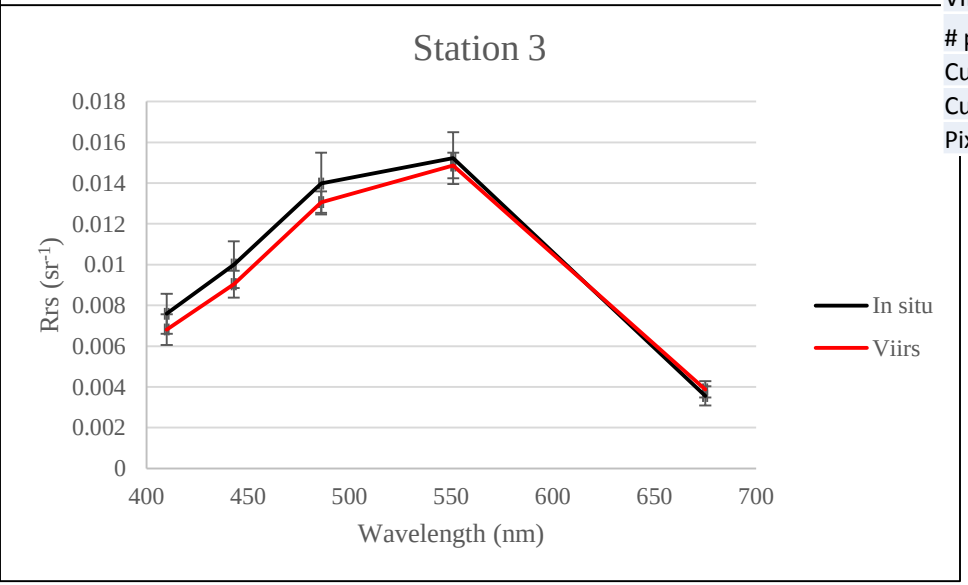




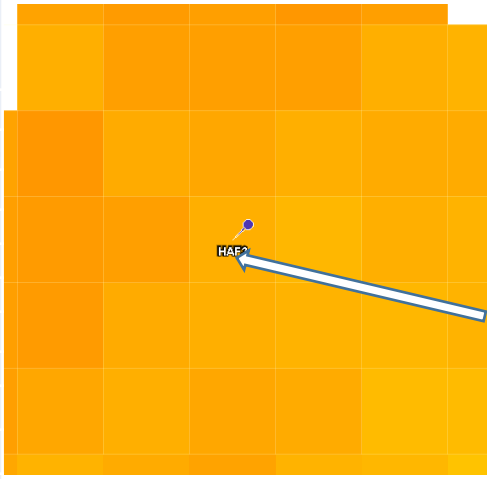
Percent difference relative to Average

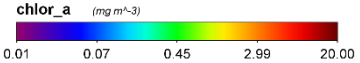
Band	Hyp 1	Hyp 2	Hyp 3	Float 1	Float 2	SBA	Spec. Evo	GER	HyperSAS	ASD 1	ASD 2	ASD 3	ASD 4
410	21.90	7.64	35.59	-18.54	-5.54	-7.79	19.86	-9.20	-3.30	-18.98	-6.45	-17.19	1.98
443	17.78	11.32	30.72	-11.56	-0.55	-4.68	11.87	-2.82	-5.04	-14.29	-10.76	-17.31	-4.68
486	14.66	12.65	29.19	-6.44	3.28	-3.04	7.36	0.51	-4.46	-12.00	-14.13	-17.68	-9.90
551	12.44	9.82	24.14	-0.54	14.06	4.18	5.15	6.19	-1.04	-19.07	-18.88	-21.06	-15.39
675	15.00	-9.10	30.90	4.92	48.40	23.09	7.51	16.31	6.84	-51.95	-33.12	-38.96	-19.84

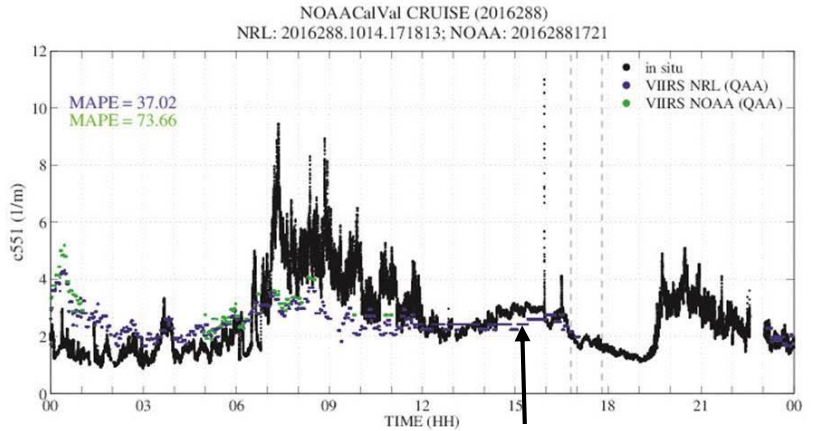




Date:	10/14, 288
Description:	17 miles off Savannah
Overpass time:	1901
Above time:	1600
Surf. Time:	1535
Profile time:	1531
Depth (m):	18
Cloud cover (%):	15
Wind speed (kts):	9
Seas (ft)	3
Meas. Chl (mg/m³)	1.846
VIIRS Chl (mg/m³)	2.18
# pixels in 5 x 5	22
Current (m/s):	0.2
Current source direction:	100
Pixel travel OP - sta	4

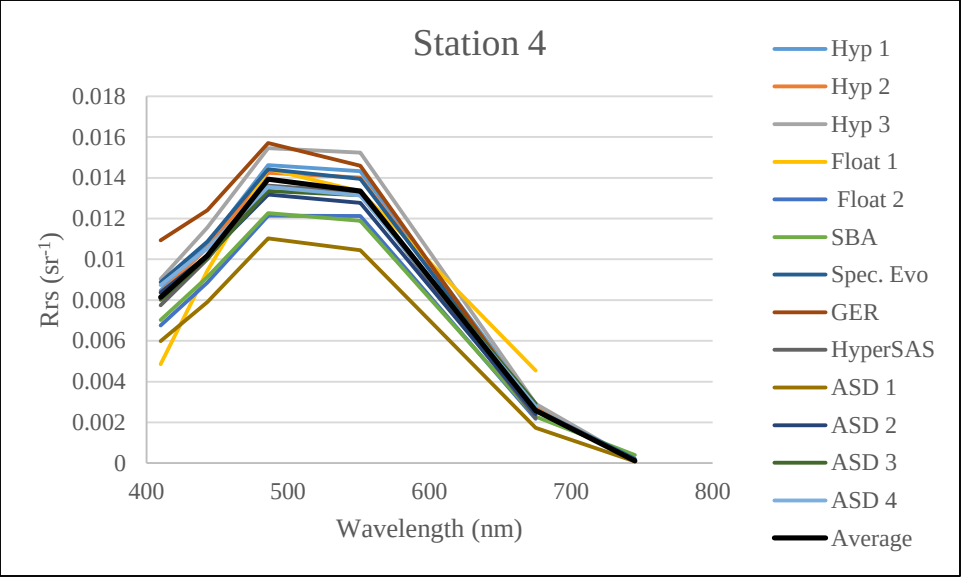


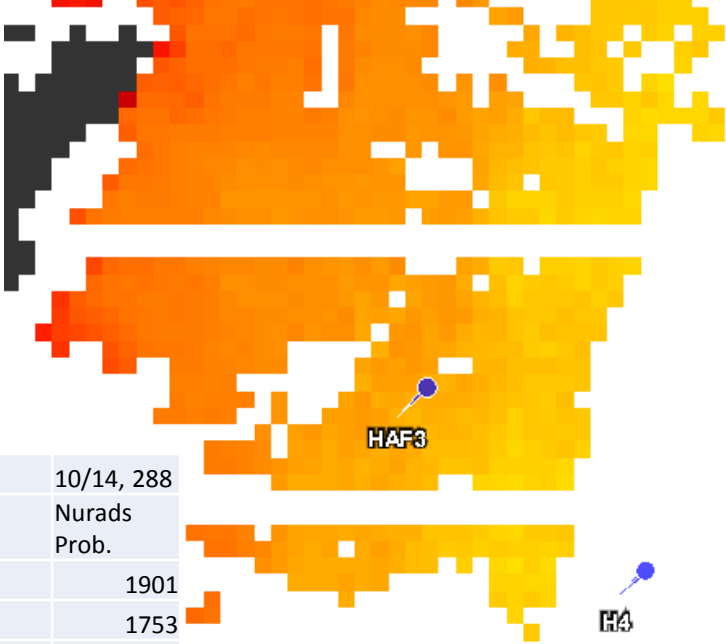




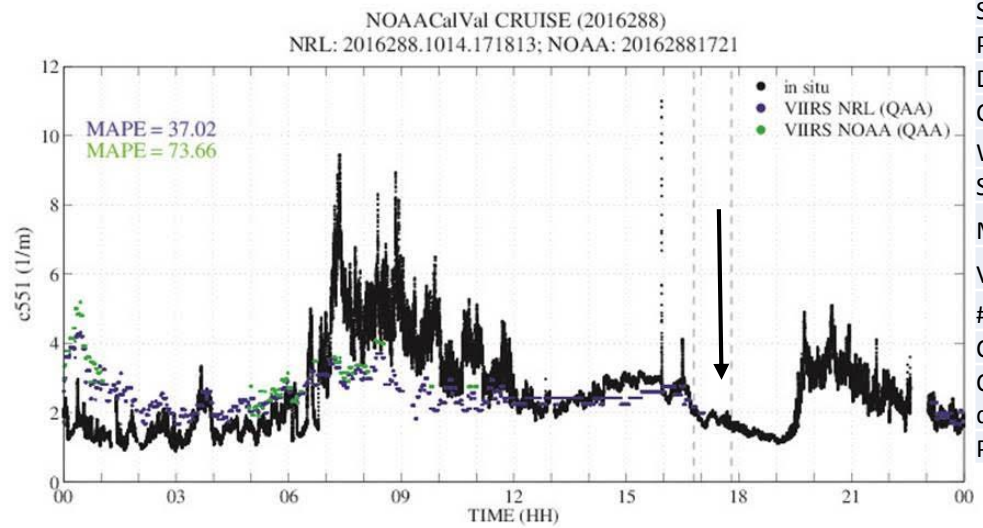
Percent difference relative to Average

Band	Hyp 1	Hyp 2	Hyp 3	Float 1	Float 2	SBA	Spec. Evo	GER	HyperSAS	ASD 1	ASD 2	ASD 3	ASD 4
410	8.23	14.04	25.20	-35.02	-20.74	-18.29	43.86	-13.54	25.70	-8.91	-6.10	-15.23	0.80
443	12.37	21.56	23.50	-26.52	-14.44	-13.99	31.82	-6.16	12.54	-8.96	-12.10	-15.01	-4.61
486	15.75	22.52	21.48	-18.98	-9.53	-11.35	24.00	-1.75	7.02	-9.95	-13.26	-16.58	-9.40
551	19.94	24.39	22.55	-11.96	-1.27	-6.53	19.20	-2.55	7.67	-20.00	-17.58	-19.80	-14.07
675	28.50	28.20	43.02	-20.69	1.09	-2.53	16.65	-7.04	6.52	-41.64	-20.19	-26.84	-5.04

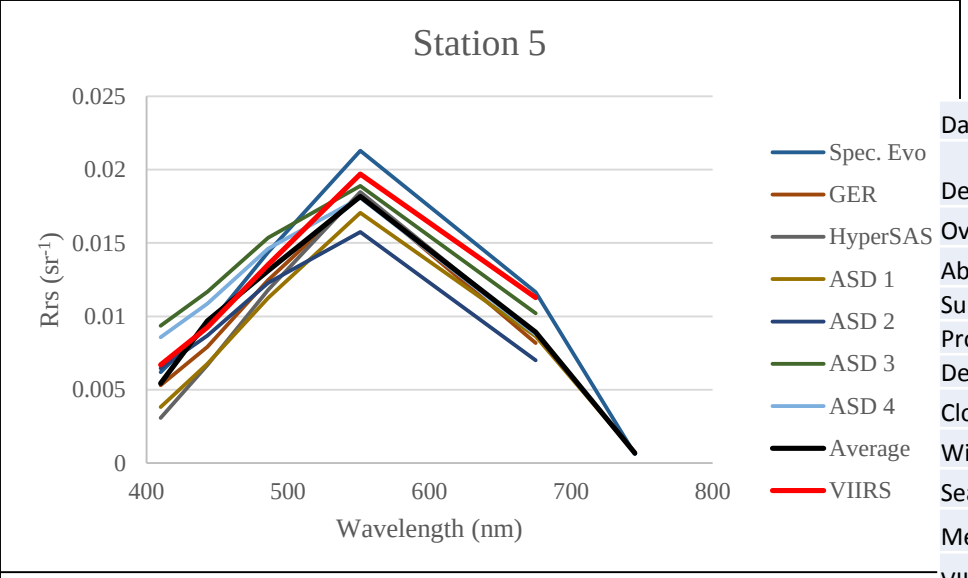




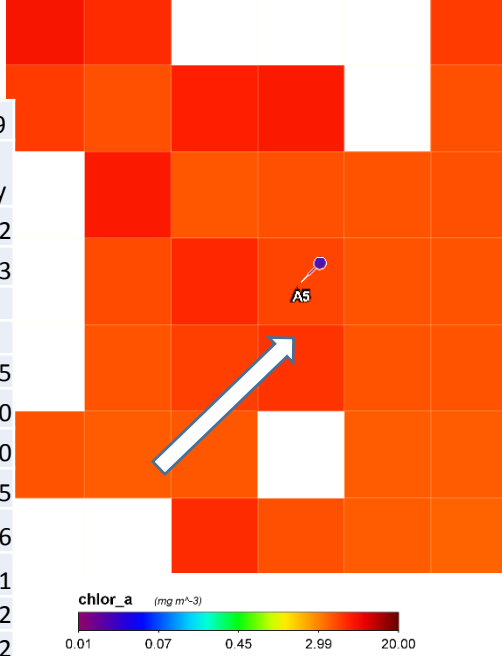
Date:	10/14, 288
Description:	Nurads Prob.
Overpass time:	1901
Above time:	1753
Surf. Time:	1840
Profile time:	1753
Depth (m):	9
Cloud cover (%):	50
Wind speed (kts):	15
Seas (ft)	5
Meas. Chl (mg/m^3)	1.84
VIIRS Chl (mg/m^3)	N/A
# pixels in 5 x 5	N/A
Current (m/s):	N/A
Current source direction:	N/A
Pixel travel OP - sta	N/A

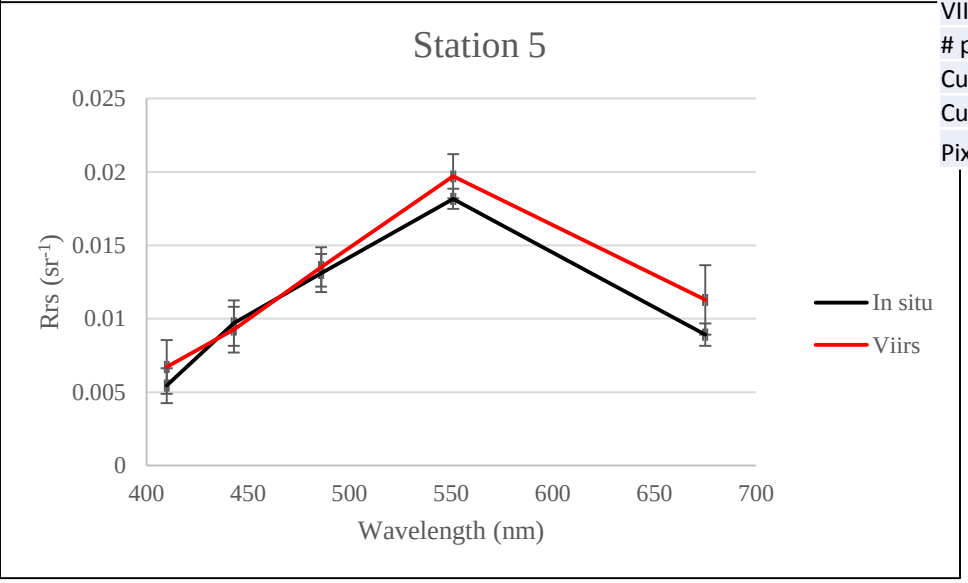


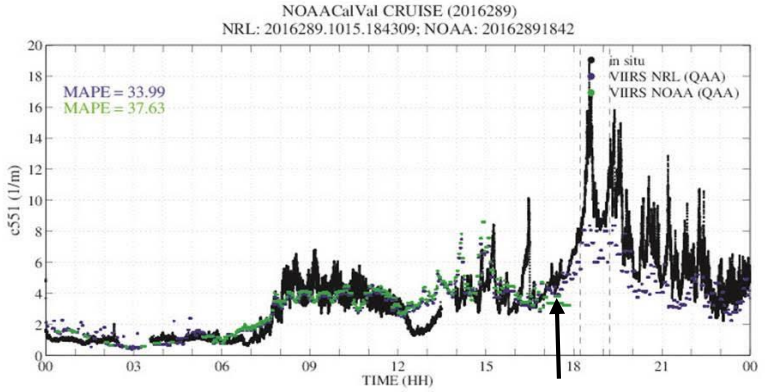
Band	Hyp 1	Hyp 2	Hyp 3	Float 1	Float 2	SBA	Spec. Evo	GER	HyperSAS	ASD 1	ASD 2	ASD 3	ASD 4
410	6.67	5.29	13.94	-38.83	-14.83	-11.51	11.78	-24.50	37.70	-2.37	5.49	1.00	10.16
443	5.75	3.86	13.56	-7.29	-12.90	-10.38	6.84	-22.29	21.90	-1.77	-0.03	-0.86	3.60
486	6.84	3.98	12.89	5.43	-11.35	-10.44	5.32	-19.49	14.64	-0.54	-3.75	-2.48	-1.05
551	8.13	5.75	15.01	0.65	-8.45	-10.27	5.31	-21.18	10.06	0.32	-3.66	-0.79	-0.87
675	5.25	1.96	9.26	70.52	-18.49	-14.66	-1.35	-35.03	-5.51	-16.28	-9.73	9.93	4.14



Date:	10/15, 289
Description:	Windy, above only
Overpass time:	1842
Above time:	1843
Surf. Time:	none
Profile time:	none
Depth (m):	15
Cloud cover (%):	40
Wind speed (kts):	20
Seas (ft)	5
Meas. Chl (mg/m³)	5.466
VIIRS Chl (mg/m³)	4.81
# pixels in 5 x 5	22
Current (m/s):	0.2
Current source direction:	225
Pixel travel OP - sta	0

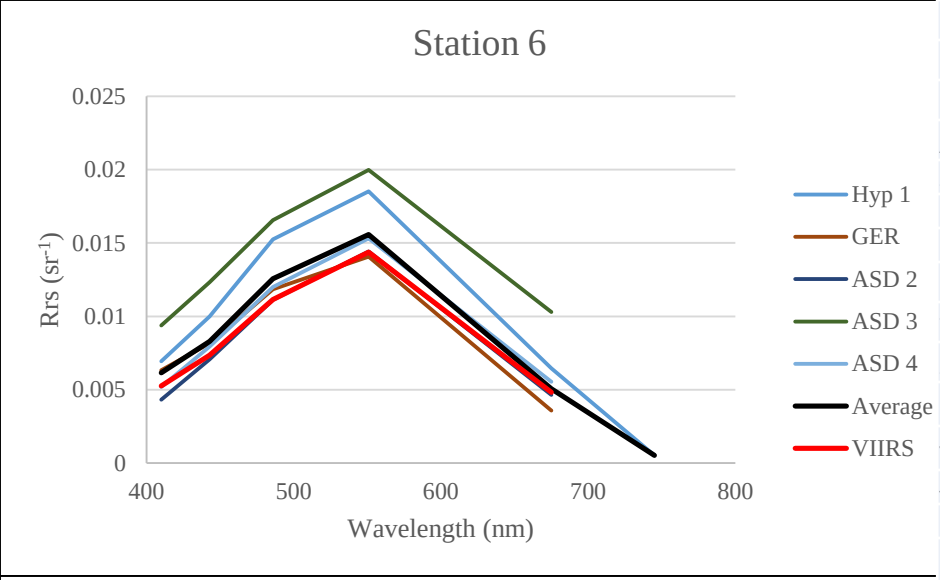




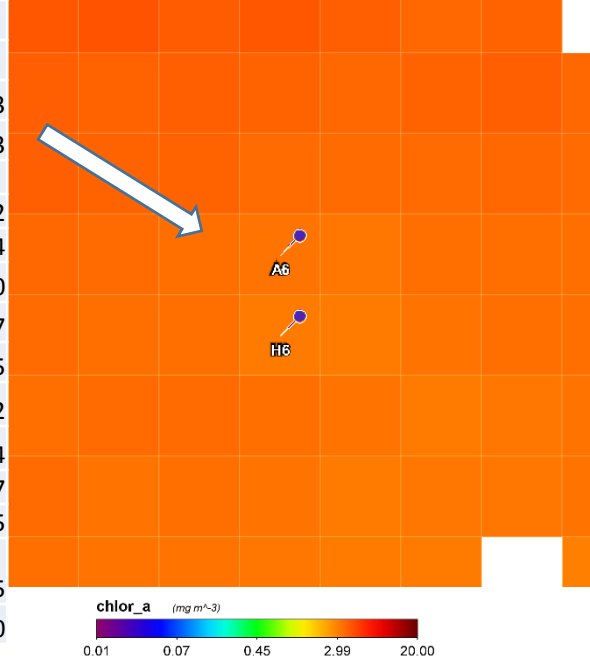


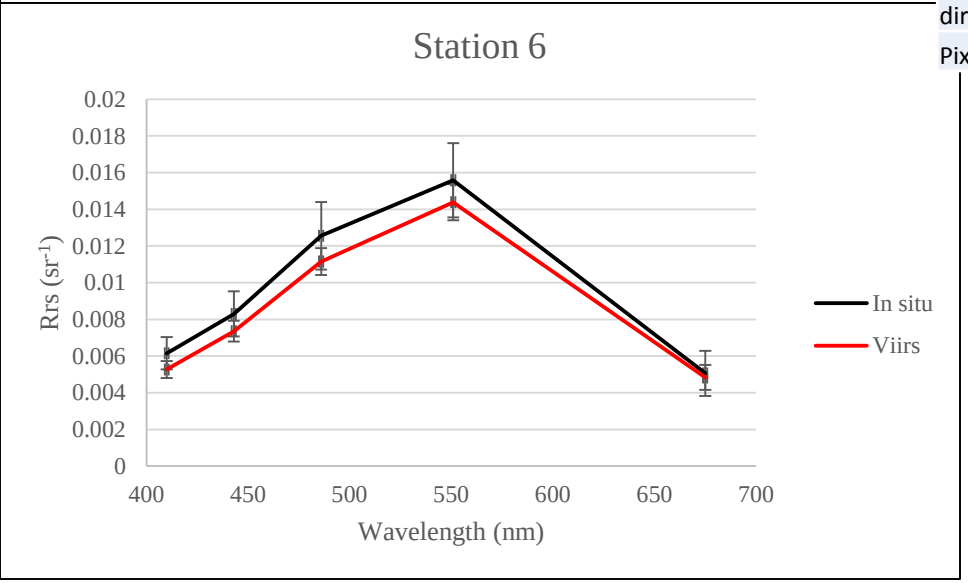
Percent difference relative to Average

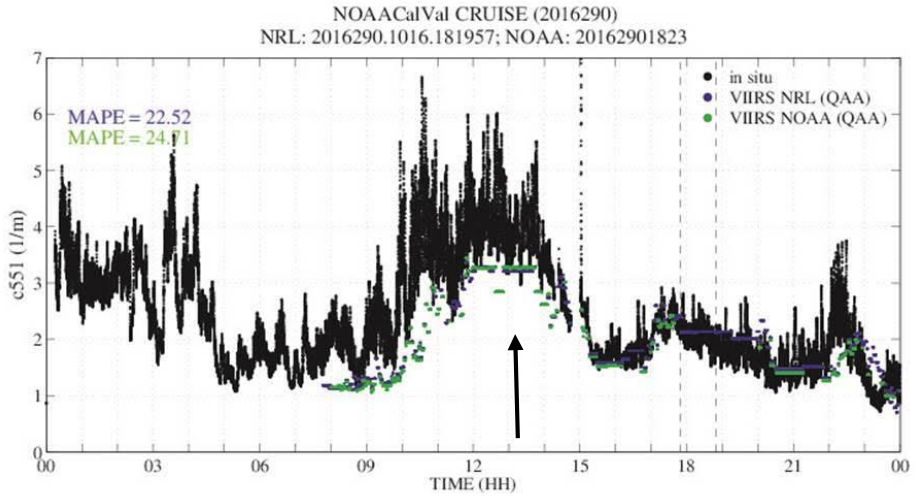
Band	Hyp 1	Hyp 2	Hyp 3	Float 1	Float 2	SBA	Spec. Evo	GER	HyperSAS	ASD 1	ASD 2	ASD 3	ASD 4
410							1.52	-37.42	-13.27	-49.72	5.60	53.03	40.26
443							5.21	-23.40	-10.35	-24.53	-1.81	31.91	22.96
486							9.15	-14.44	-5.28	-10.33	-6.71	16.62	11.00
551							16.54	-6.60	0.18	1.16	-13.76	3.46	-0.98
675							29.03	-4.41	-9.32	-2.94	-22.44	12.97	-2.89



Date:	10/16, 290
Description:	Windy,
Overpass time:	1823
Above time:	1343
Surf. Time:	none
Profile time:	1352
Depth (m):	14
Cloud cover (%):	50
Wind speed (kts):	17
Seas (ft)	5
Meas. Chl (mg/m³)	2.62
VIIRS Chl (mg/m³)	3.24
# pixels in 5 x 5	17
Current (m/s):	0.5
Current source direction:	315
Pixel travel OP - sta	10

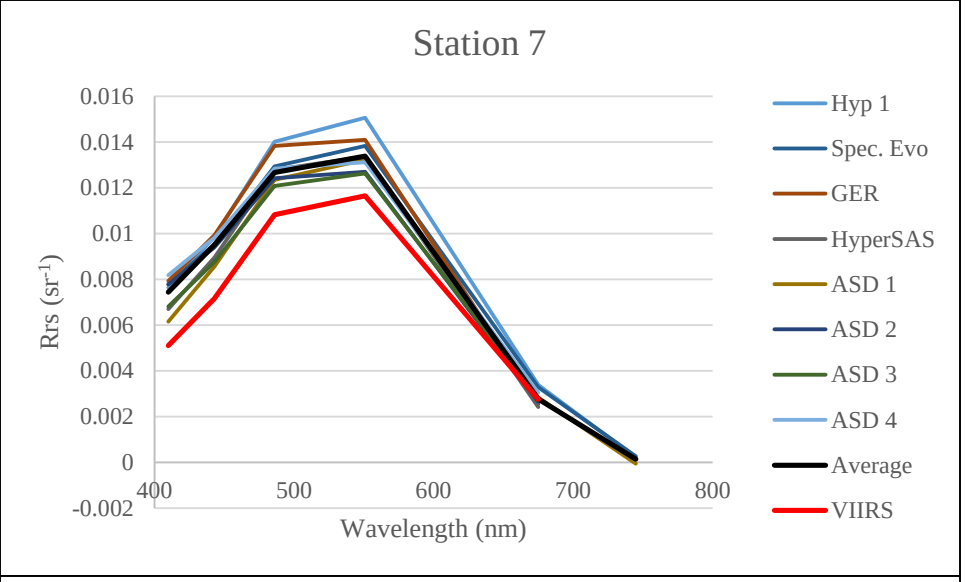


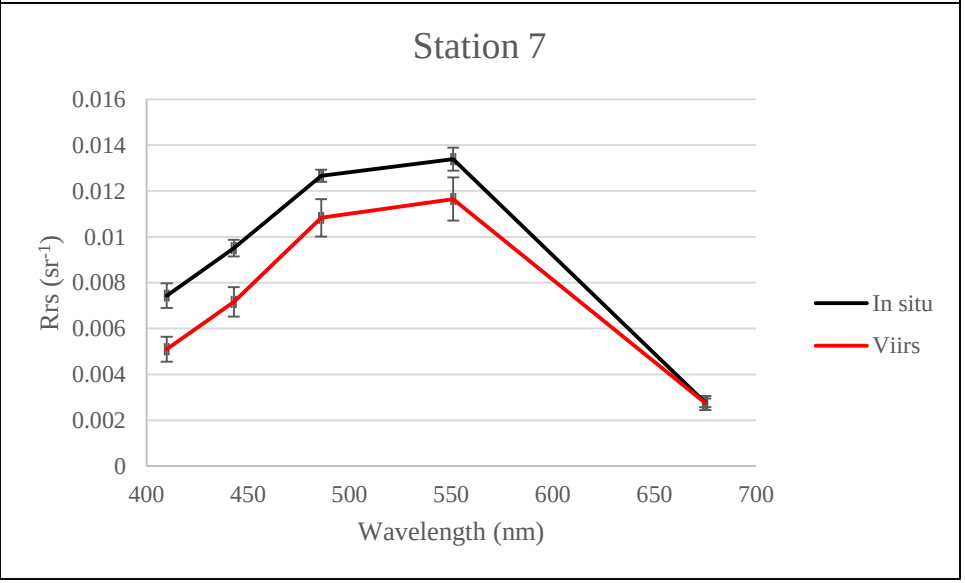




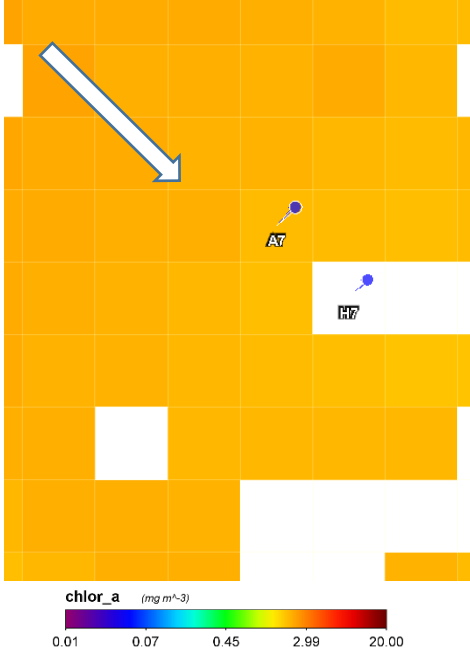
Percent difference relative to Average

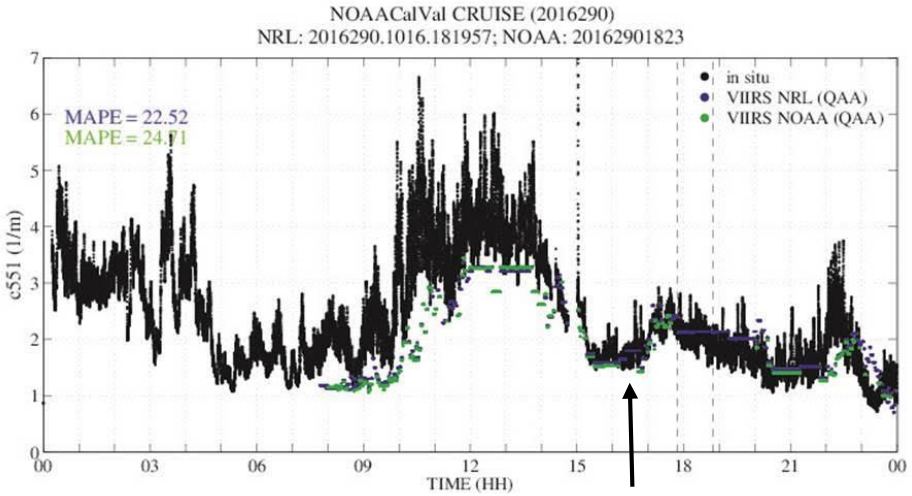
Band	Hyp 1	Hyp 2	Hyp 3	Float 1	Float 2	SBA	Spec. Evo	GER	HyperSAS	ASD 1	ASD 2	ASD 3	ASD 4
410	7.84								-1.67		-32.79	45.73	-19.11
443	9.83								-10.33		-22.30	35.42	-12.63
486	14.26								-11.36		-16.70	23.90	-10.11
551	12.48								-14.48		-12.35	21.35	-7.00
675	5.67								-41.30		-23.66	68.53	-9.24





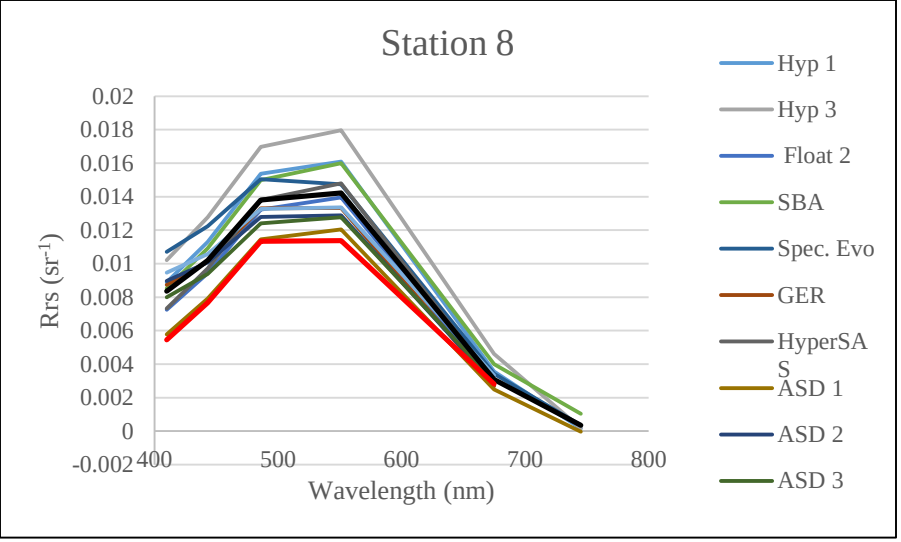
Date:	10/16, 290
Description:	Windy,
Overpass time:	1823
Above time:	1600
Surf. Time:	none
Profile time:	1625
Depth (m):	14
Cloud cover (%):	50
Wind speed (kts):	17
Seas (ft)	6
Meas. Chl (mg/m³)	1.47
VIIRS Chl (mg/m³)	1.9
# pixels in 5 x 5	20
Current (m/s):	0.5
Current source direction:	335
Pixel travel OP - sta	4



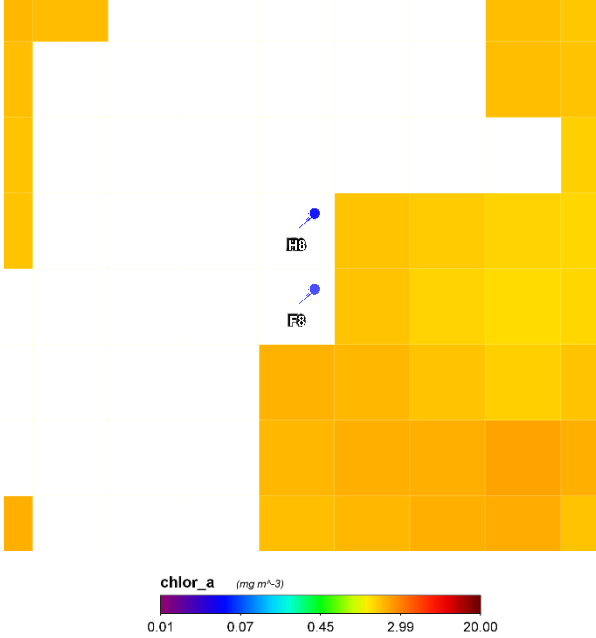


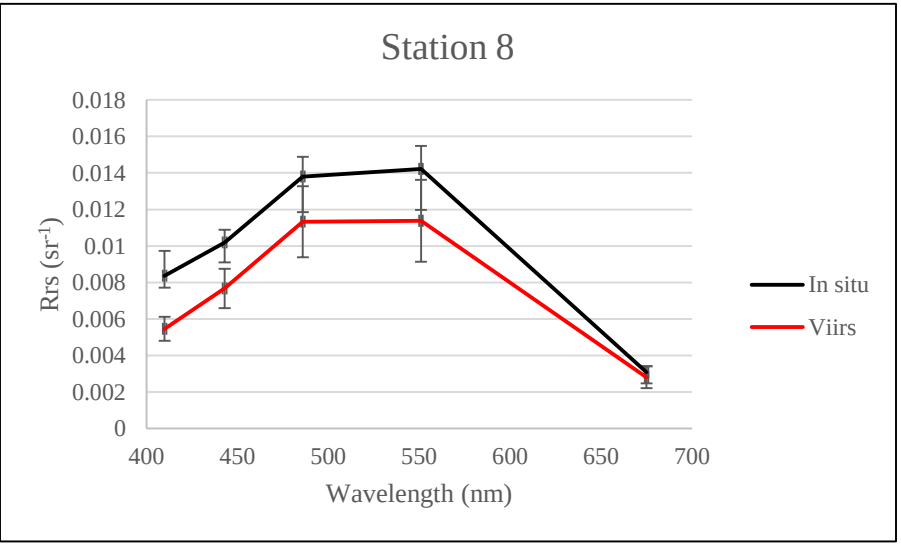
Percent difference relative to Average

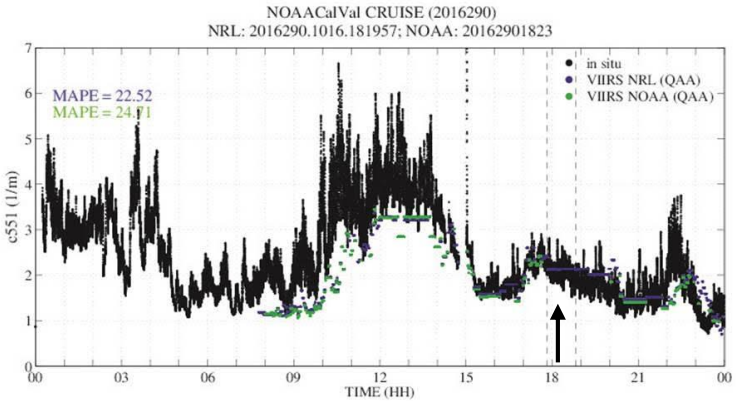
Band	Hyp 1	Hyp 2	Hyp 3	Float 1	Float 2	SBA	Spec. Evo	GER	HyperSAS	ASD 1	ASD 2	ASD 3	ASD 4
410	3.51						5.68	-16.53	7.66	-9.18	5.45	-7.60	11.03
443	5.46						1.88	-8.40	6.19	-4.24	0.53	-6.36	4.92
486	8.58						0.19	-4.32	7.21	-0.99	-3.75	-6.36	-0.56
551	11.52						2.41	-2.05	4.41	-1.00	-5.92	-6.51	-2.87
675	18.24						14.54	-1.07	-11.14	-15.58	-8.01	-3.33	6.35



Date:	10/16, 290
Description:	Off Savannah
Overpass time:	1823
Above time:	1803
Surf. Time:	1830
Profile time:	1803
Depth (m):	18
Cloud cover (%):	40
Wind speed (kts):	19
Seas (ft)	5
Meas. Chl (mg/m³)	1.59
VIIRS Chl (mg/m³)	1.9
# pixels in 5 x 5	7
Current (m/s):	0.3
Current source direction:	0
Pixel travel OP - sta	0

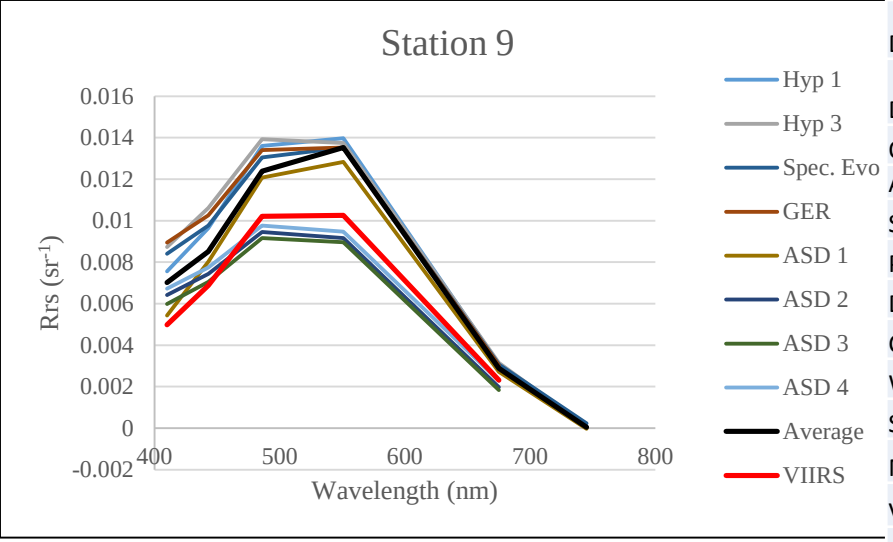




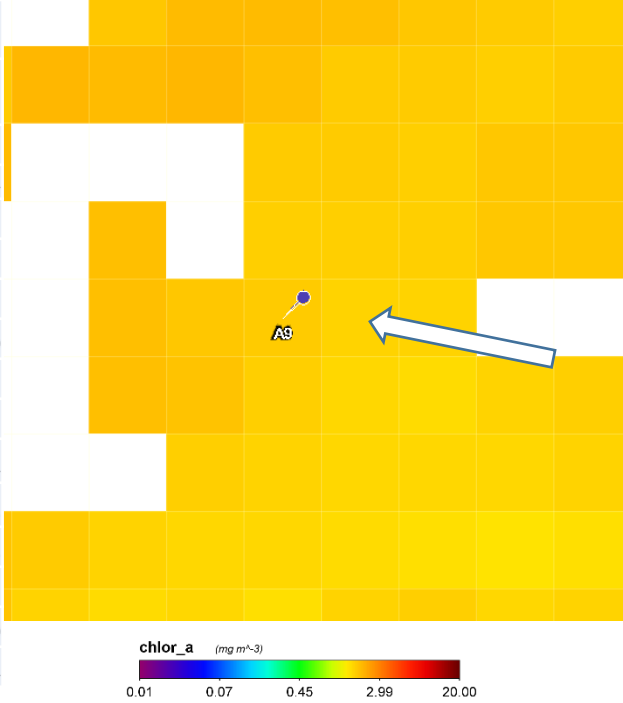


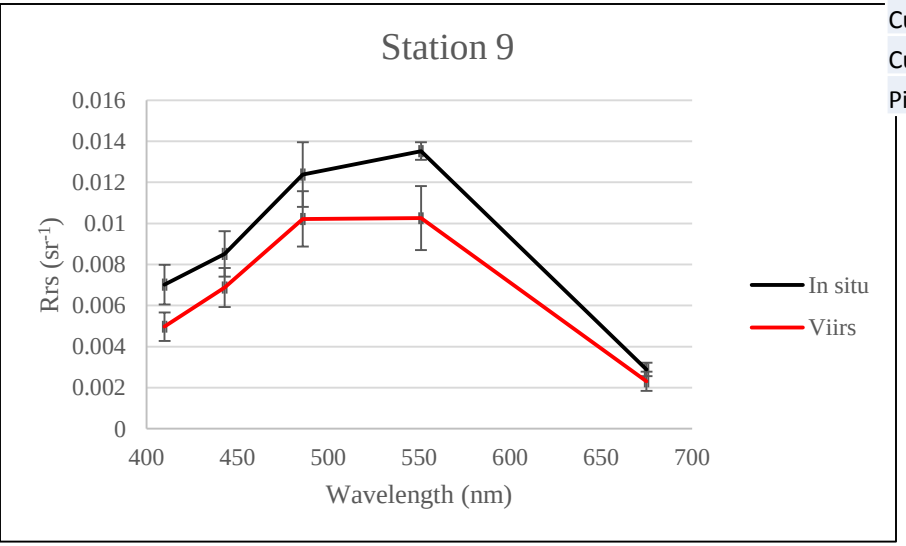
Percent difference relative to Average

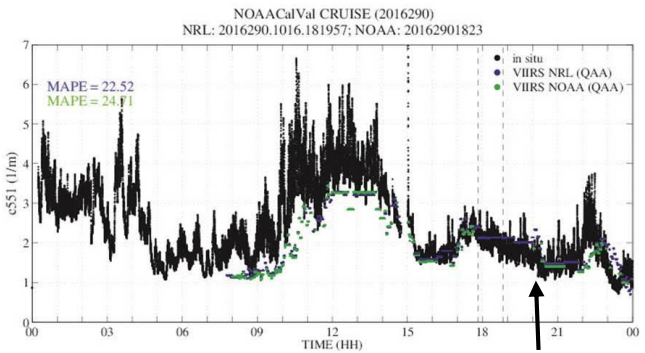
Band	Hyp 1	Hyp 2	Hyp 3	Float 1	Float 2	SBA	Spec. Evo	GER	HyperSAS	ASD 1	ASD 2	ASD 3	ASD 4
410	4.29		19.67		-14.94	-0.12	25.48	-32.22	2.35	-14.25	5.18	-6.29	10.85
443	8.53		22.67		-9.32	4.91	17.60	-23.83	-2.84	-6.60	-3.05	-9.66	1.60
486	10.78		22.29		-4.66	8.04	8.46	-17.47	-4.07	-0.57	-7.86	-10.57	-4.37
551	12.09		25.17		-2.84	11.45	2.60	-16.15	-7.20	3.08	-10.27	-11.03	-6.90
675	9.57		42.06		-13.97	23.07	5.67	-23.32	-17.22	-7.14	-12.45	-8.71	2.44



Date:	10/16, 290
Description:	Off Savannah
Overpass time:	1823
Above time:	2054
Surf. Time:	none
Profile time:	2015
Depth (m):	18.7
Cloud cover (%):	20
Wind speed (kts):	5
Seas (ft)	5
Meas. Chl (mg/m³)	1.34
VIIRS Chl (mg/m³)	1.78
# pixels in 5 x 5	18
Current (m/s):	0.7
Current source direction:	100
Pixel travel OP - sta	4

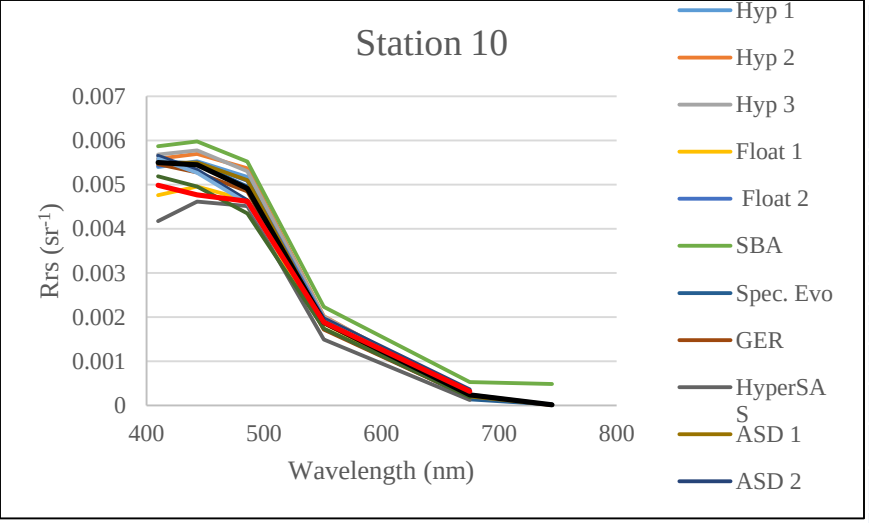


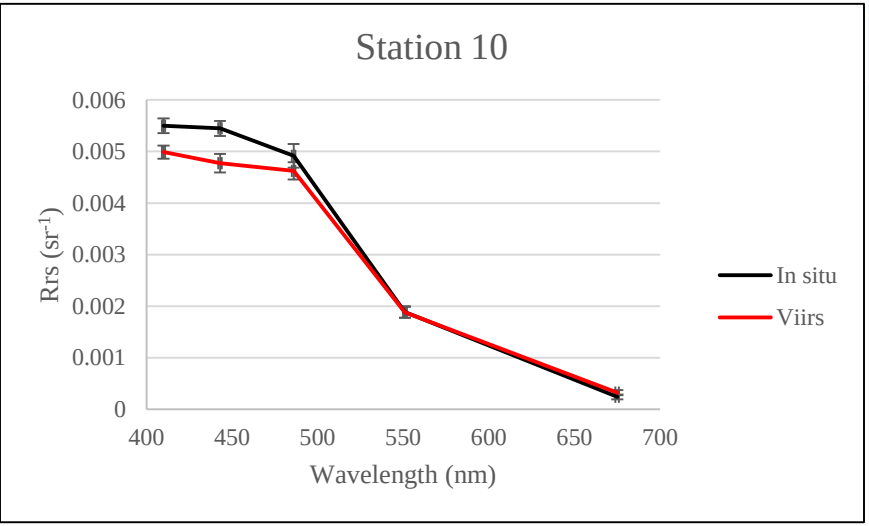




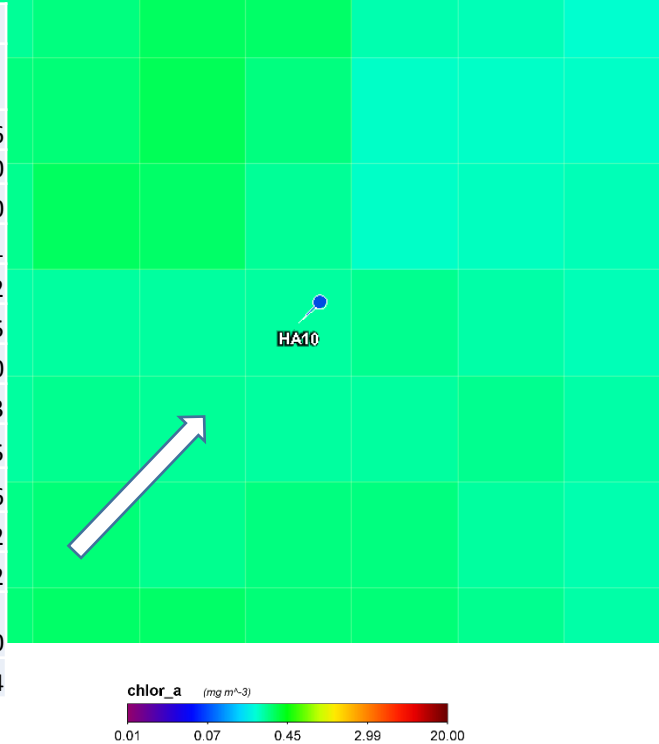
Percent difference relative to Average

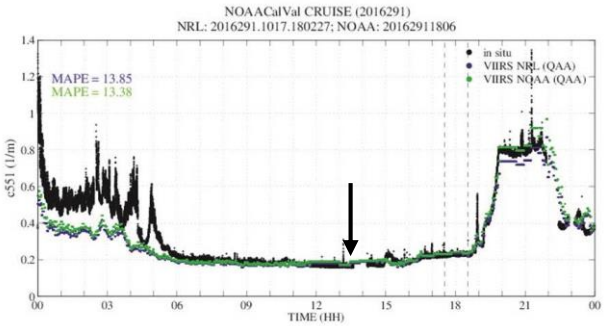
Band	Hyp 1	Hyp 2	Hyp 3	Float 1	Float 2	SBA	Spec. Evo	GER	HyperSAS	ASD 1	ASD 2	ASD 3	ASD 4
410	3.94		19.98				15.62	-25.38	22.95		-11.81	-17.74	-7.57
443	9.43		20.48				10.82	-9.10	16.33		-15.75	-19.96	-12.24
486	15.29		17.96				10.57	2.32	13.51		-19.95	-22.38	-17.33
551	17.47		15.48				13.62	7.85	13.64		-22.96	-24.73	-20.37
675	16.24		19.28				16.23	2.92	14.48		-25.24	-30.34	-13.55





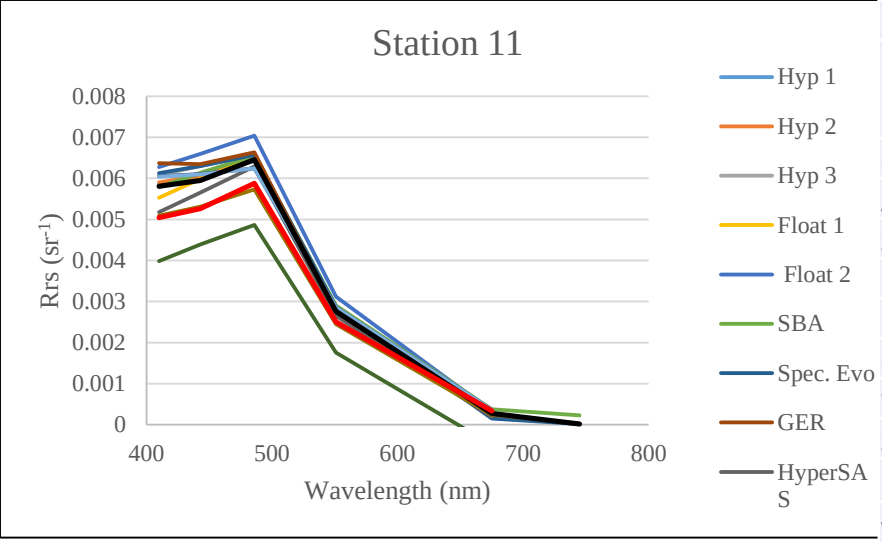
Date:	10/17, 291
Description:	Good offshore conditions
Overpass time:	1806
Above time:	1340
Surf. Time:	1420
Profile time:	1341
Depth (m):	92
Cloud cover (%):	5
Wind speed (kts):	10
Seas (ft)	3
Meas. Chl (mg/m³)	2.15
VIIRS Chl (mg/m³)	0.26
# pixels in 5 x 5	22
Current (m/s):	0.2
Current source direction:	210
Pixel travel OP - sta	4



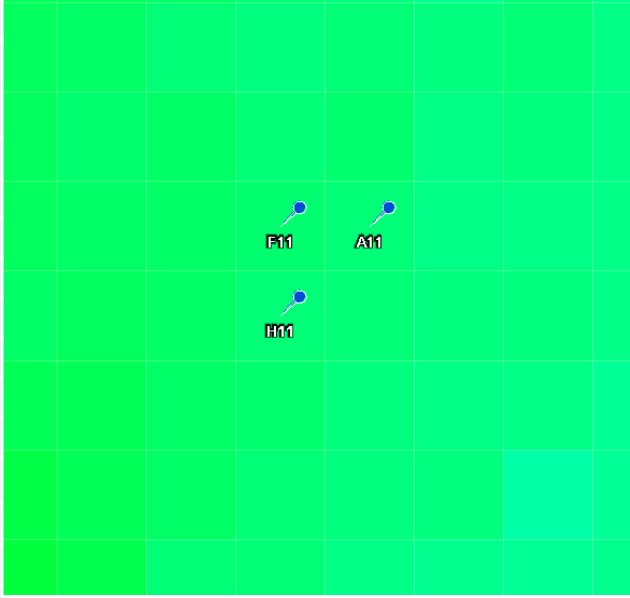


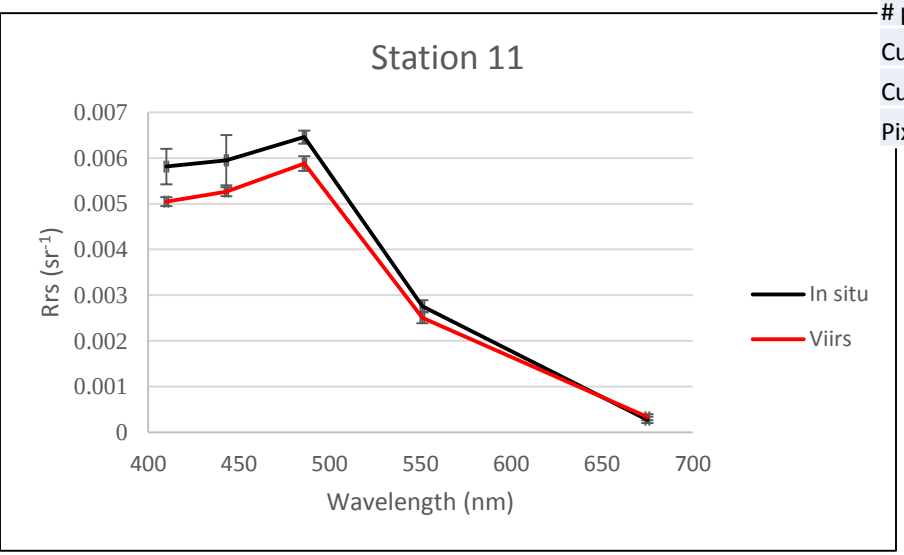
Percent difference relative to Average

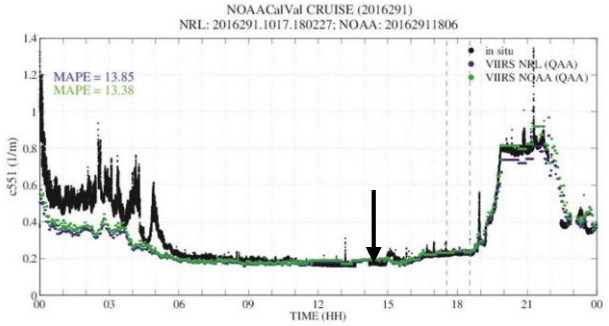
Band	Hyp 1	Hyp 2	Hyp 3	Float 1	Float 2	SBA	Spec. Evo	GER	HyperSAS	ASD 1	ASD 2	ASD 3	ASD 4
410	0.50	4.10	5.82	-11.36	1.06	9.29	3.03	2.14	1.78	-22.24	5.22	-3.34	4.00
443	2.89	5.96	7.47	-7.78	2.41	11.25	1.93	2.35	-1.81	-14.17	-0.76	-7.78	-1.97
486	4.97	8.85	7.61	-5.77	3.18	12.00	0.56	3.46	-1.64	-8.51	-5.78	-11.82	-7.10
551	3.51	7.42	6.50	-7.80	3.80	18.47	0.65	-1.23	-8.55	-20.72	4.58	-7.75	1.11
675	-6.43	-18.24	-3.45	-0.26	27.97	107.62	-46.07	-20.33	-25.11	-51.91	43.21	-24.45	17.45



Date:	10/17, 291
Description:	Good offshore conditions
Overpass time:	1806
Above time:	1733
Surf. Time:	1800
Profile time:	1733
Depth (m):	27
Cloud cover (%):	5
Wind speed (kts):	9.9
Seas (ft)	2
Meas. Chl (mg/m³)	0.328
VIIRS Chl (mg/m³)	0.307
# pixels in 5 x 5	22
Current (m/s):	0.2
Current source direction:	0
Pixel travel OP - sta	0

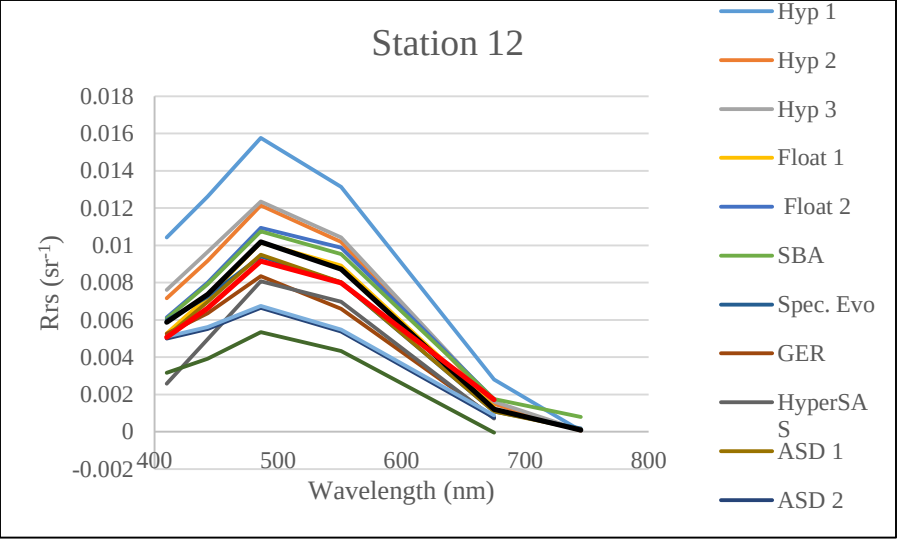


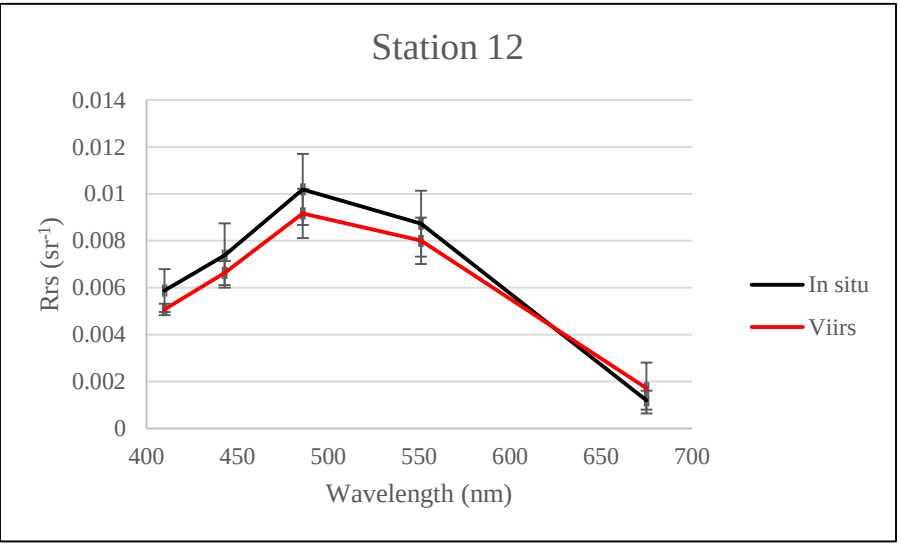




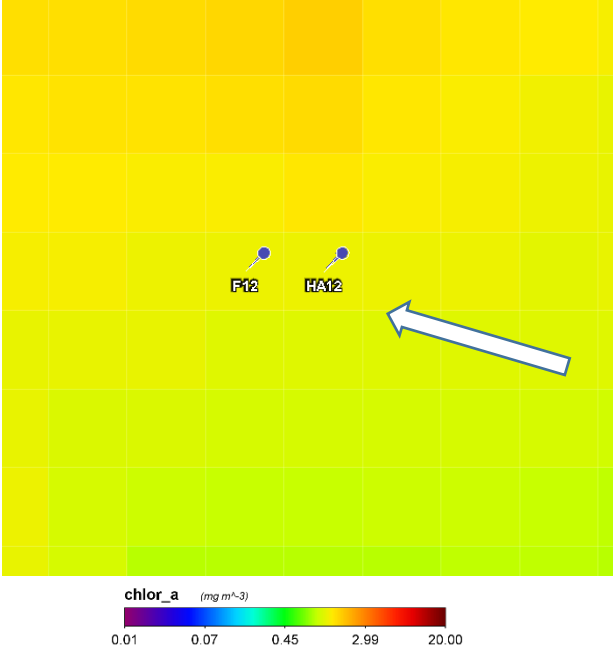
Percent difference relative to Average

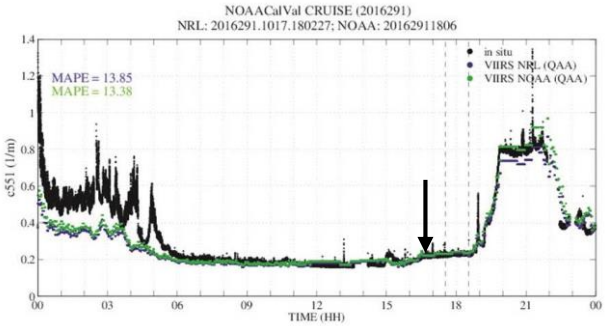
Band	Hyp 1	Hyp 2	Hyp 3	Float 1	Float 2	SBA	Spec. Evo	GER	HyperSAS	ASD 1	ASD 2	ASD 3	ASD 4
410	2.70	3.32	6.37	-3.26	9.78	1.21	7.25	-10.89	11.49	-9.36	5.86	-30.28	5.81
443	1.85	1.85	5.83	0.69	10.81	3.12	5.87	-10.73	6.71	-4.92	2.58	-26.18	2.53
486	1.59	2.91	4.20	2.68	11.36	3.60	3.96	-9.35	4.90	-0.44	-1.17	-23.01	-1.23
551	-0.58	1.11	4.80	2.80	15.07	7.15	5.61	-9.50	0.54	-2.26	5.32	-35.26	5.20
675	22.40	4.95	26.72	34.83	46.51	71.51	-32.88	10.56	20.73	-11.89	65.14	-322.21	63.62





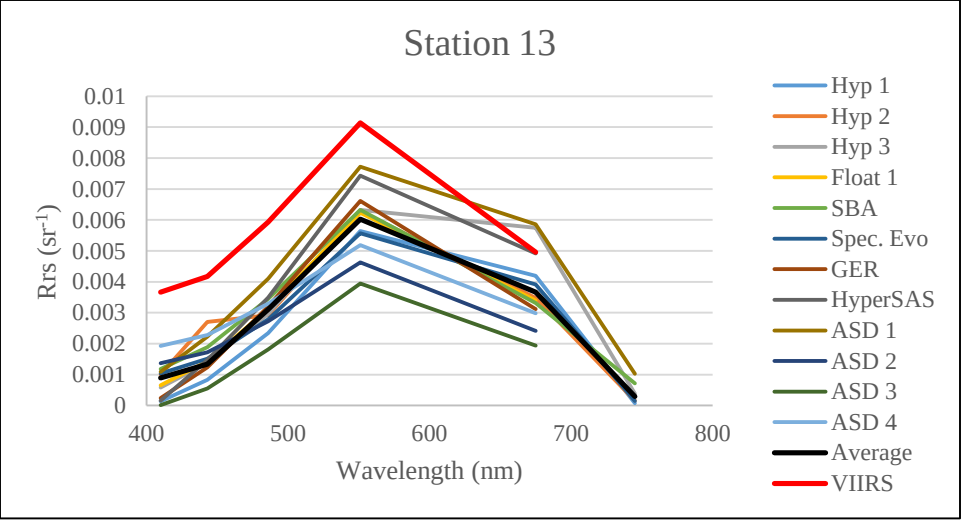
Date:	10/17, 291
Description:	Good offshore conditions
Overpass time:	1806
Above time:	2015
Surf. Time:	2045
Profile time:	2015
Depth (m):	35
Cloud cover (%):	0
Wind speed (kts):	8
Seas (ft)	2
Meas. Chl (mg/m³)	0.591
VIIRS Chl (mg/m³)	1.23
# pixels in 5 x 5	22
Current (m/s):	0.2
Current source direction:	100
Pixel travel OP - sta	2



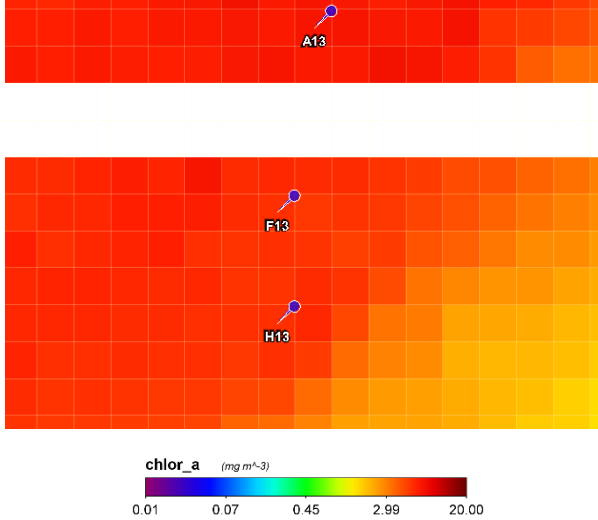


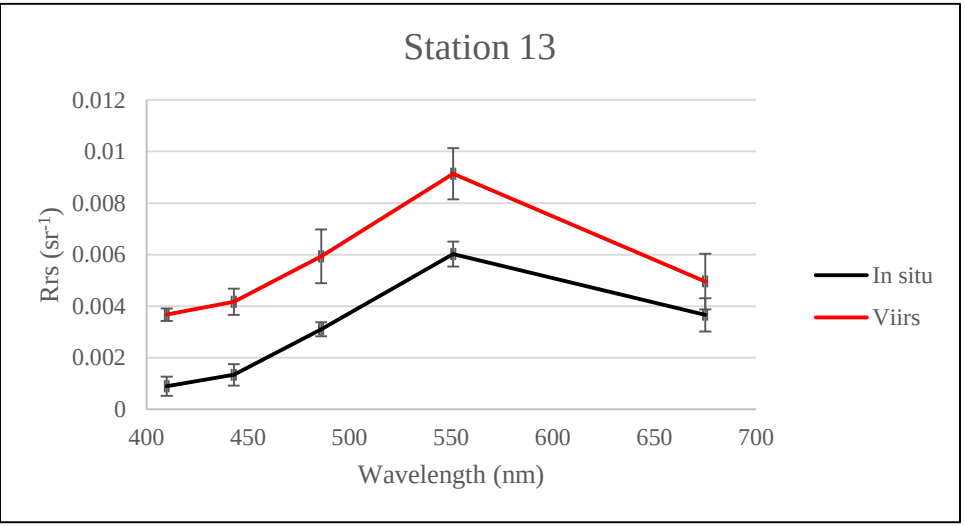
Percent difference relative to Average

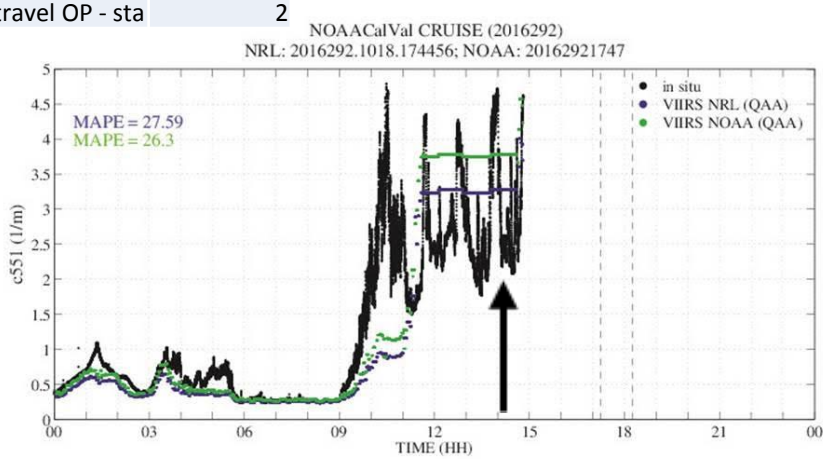
Band	Hyp 1	Hyp 2	Hyp 3	Float 1	Float 2	SBA	Spec. Evo	GER	HyperSAS	ASD 1	ASD 2	ASD 3	ASD 4
410	80.81	24.47	32.08	-8.57	6.53	5.24	3.80	-11.12	-8.65	-55.13	-13.19	-44.93	-11.32
443	72.37	25.14	31.84	-1.21	9.30	8.25	-1.07	-4.85	-13.23	-32.20	-24.69	-46.42	-23.22
486	62.37	25.13	27.19	4.53	12.72	10.85	-2.98	-2.09	-13.98	-16.86	-31.52	-44.96	-30.41
551	59.76	23.86	26.93	8.53	20.07	16.00	-2.70	-2.43	-19.74	-15.11	-34.57	-47.33	-33.26
675	128.60	21.59	31.41	7.42	41.22	42.94	-12.02	-10.95	-38.37	-42.04	-37.40	-103.77	-28.62



Date:	10/18, 292
Description:	Near shore, lots of mud
Overpass time:	1747
Above time:	1340
Surf. Time:	1420
Profile time:	1318
Depth (m):	14
Cloud cover (%):	0
Wind speed (kts):	4
Seas (ft)	1
Meas. Chl (mg/m^3)	2.5
VIIRS Chl (mg/m^3)	1.63
# pixels in 5 x 5	22
Current (m/s):	0.1
Current source direction:	315
Pixel travel OP - sta	2







Percent difference relative to Average

Band	Hyp 1	Hyp 2	Hyp 3	Float 1	Float 2	SBA	Spec. Evo	GER	HyperSAS	ASD 1	ASD 2	ASD 3	ASD 4
410	-81.75	27.84	-25.00	-16.90		50.94	32.79	39.59	-69.58	-79.98	74.08	-97.92	145.89
443	-48.37	68.69	-13.74	-10.48		17.76	-5.54	38.79	-22.64	-7.97	7.13	-65.86	42.24
486	-22.45	-3.22	-1.76	3.73		14.33	-7.76	35.79	6.15	15.63	-9.57	-39.98	9.11
551	-5.79	4.70	5.50	4.04		5.58	-7.04	28.86	10.35	24.13	-22.77	-34.20	-13.37
675	11.05	-7.67	52.21	-9.91		-12.31	3.82	55.34	-17.45	30.34	-35.91	-48.50	-20.99

Instrument Percent difference relative to average of all instruments

2014 VIIRS Validation Cruise

Band	Hyperpro	Hyperpro	Micropro	C-OPS	SBA	HyperTSRB	ASD	ASD	GER	HyperSAS
410	4.83	-0.41	1.93	-1.49	-9.01	-4.29	6.47	-1.82	4.04	-0.75
443	6.84	3.12	-0.35	-4.21	-8.90	-0.28	1.34	-3.30	6.19	-1.31
486	4.83	3.81	-0.37	-2.19	-9.86	1.01	-4.71	-2.21	10.38	-0.75
551	5.22	4.14	-1.86	-7.24	-9.12	5.52	-0.11	-4.75	8.53	-1.16
675	-9.18	-14.02	-14.91	-17.22	-8.57	36.15	38.47	0.24	5.46	-11.25
All	2.51	-0.67	-3.11	-6.47	-9.09	7.62	8.29	-2.37	6.92	-3.04

2015 VIIRS Validation Cruise

Band	Hyperpro	Hyperpro	Spec Evo	SBA	HTSRB 1	HTSRB 2	ASD 1	ASD 2	ASD 3	GER	HyperSAS
410	3.88	13.32	14.46	-1.04	-0.97	-1.68	-6.04	2.29	-12.15	-7.30	-17.42
443	4.97	10.15	10.09	0.48	-1.31	0.41	-10.97	-3.32	-12.94	-4.97	-4.86
486	6.45	9.93	4.84	1.37	-2.34	3.36	-15.05	-8.95	-14.12	1.09	0.92
551	7.39	3.18	6.46	-2.70	-2.06	6.48	-10.68	-2.11	-8.75	-5.98	-3.61
675	-5.43	-17.26	-3.61	-33.49	50.99	72.27	-5.04	9.29	-7.03	-44.38	-35.22
Average	3.45	3.86	6.45	-7.08	8.86	16.17	-9.56	-0.56	-11.00	-12.31	-12.04

2016 VIIRS Validation Cruise

Band	Hyp 1	Hyp 2	Hyp 3	Float 1	Float 2	SBA	Spec. Evo	GER	HyperSAS	ASD 1	ASD 2	ASD 3	ASD 4
410	6.80	7.56	17.28	-21.40	-8.72	-4.86	13.96	-16.20	12.09	-10.46	-2.70	-6.48	2.52
443	8.62	9.46	17.59	-10.49	-5.03	-1.72	9.17	-9.93	5.19	-6.61	-6.72	-8.32	-2.58
486	10.32	10.44	16.13	-4.61	-2.25	-0.31	6.16	-5.71	3.23	-4.06	-9.32	-9.91	-6.56
551	10.72	10.20	15.33	-3.37	2.38	3.61	5.84	-4.66	0.52	-7.57	-8.89	-11.63	-6.62
675	14.03	5.24	23.49	17.86	12.49	30.87	-2.98	-7.06	-7.12	-25.26	-3.56	-40.01	4.69
avg all	10.10	8.58	17.96	-4.40	-0.22	5.52	6.43	-8.71	2.78	-10.79	-6.24	-15.27	-1.71

MSL12 VIIRS Percent difference relative to in situ

2014 VIIRS Cal/Val Cruise

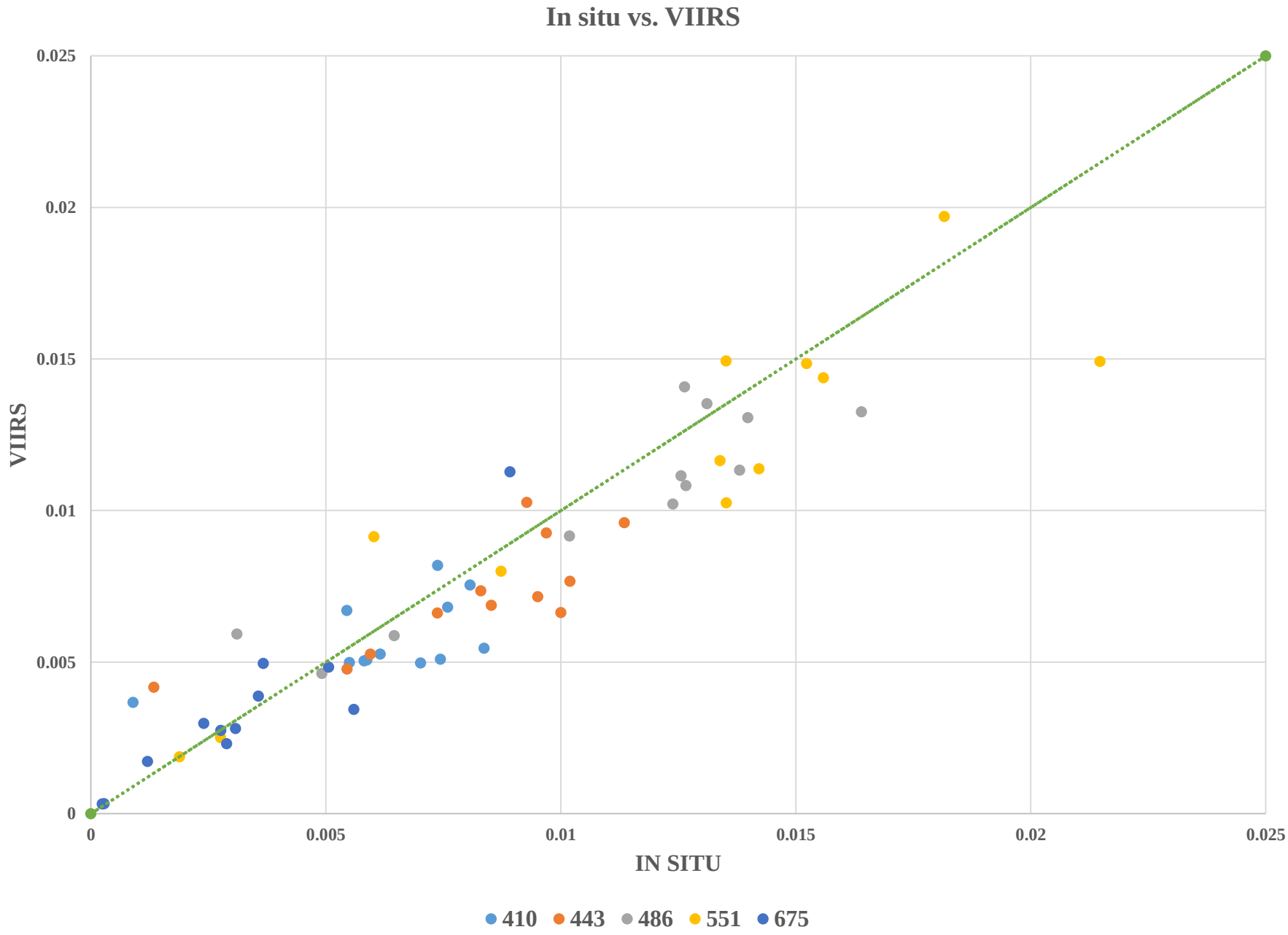
Band	Hyperpro	Hyperpro	Micropro	C-OPS	SBA	HyperTSRB	ASD	ASD	GER	HyperSAS	Average
410	-6.73	-3.36	-5.39	-2.15	10.31	1.57	-8.17	-8.73	3.33	3.85	**-3.79**
443	-13.15	-10.87	-7.45	-3.93	4.15	-7.42	-8.53	-9.38	-8.44	-3.90	**-8.31**
486	-6.49	-5.70	-1.44	0.45	11.28	-2.84	3.67	-2.83	-8.83	0.35	**-2.30**
551	-3.58	-2.71	4.05	10.21	14.65	-2.89	2.89	3.18	-2.82	5.52	**1.17**
675	-10.37	-0.44	1.06	1.70	-3.34	-28.45	-25.91	-9.02	-22.89	-4.94	**-17.04**
All	-8.07	-4.62	-1.83	1.26	7.41	-8.01	-7.21	-5.36	-7.93	0.18	**-6.05**

2015 VIIRS Cal/Val Cruise

Band	Hyperpro	Hyperpro	Spec Evo	SBA	HTSRB	HTSRB	ASD 1	ASD 2	ASD 3	GER	HyperSAS	Average
410	-10.71	-33.17	-32.44	0.69	-17.95	-2.30	-5.63	-13.05	-6.59	11.00	33.56	**-6.96**
443	-18.16	-31.21	-29.54	-8.79	-22.38	-11.47	-4.18	-11.97	-8.68	-4.17	-4.42	**-14.09**
486	-10.39	-19.94	-14.26	-0.97	-12.37	-5.97	13.50	4.83	4.68	-2.64	-2.58	**-4.19**
551	-20.75	-24.85	-24.76	-7.82	-24.11	-18.53	-0.83	-12.52	-11.21	-6.12	-7.59	**-14.46**
675	-5.97	-7.69	1.95	82.36	-45.75	-40.02	0.21	-15.49	-9.78	82.26	56.15	**8.93**
Average	-13.20	-23.37	-19.81	13.09	-24.51	-15.66	0.62	-9.64	-6.32	16.07	15.02	**-6.16**

2016 VIIRS Cal/Val Cruise

Band	Hyp 1	Hyp 2	Hyp 3	Float 1	Float 2	SBA	Spec. Evo	GER	HyperSA	ASD 1	ASD 2	ASD 3	ASD 4	Average
410	-21.14	-13.021	-14.58	-8.6991	-10.169	-5.1651	-17.349	9.41287	-13.086	-9.5444	-13.751	-15.726	-14.526	-11.33
443	-23.637	-18.248	-16.385	-9.1118	-12.199	-9.3288	-13.487	-6.5252	-10.053	-9.5982	-6.3806	-4.6875	-12.335	-11.6
486	-19.977	-19.423	-10.79	-8.2182	-5.8882	-8.393	-12.214	-8.6991	-9.2464	-3.9016	-0.0429	-8.7008	-4.4225	-9.224
551	-20.499	-16.072	-14.42	-5.4567	-10.169	-12.975	-13.573	-4.5217	-7.5895	-5.0782	-7.3789	0.5504	-1.7808	-9.150
675	-9.0381	23.9794	8.34418	8.53912	6.38464	-10.026	10.6155	13.2666	12.936	30.5061	10.9994	18.1037	0.3017	9.6085
avg all	-18.858	-8.5568	-9.5662	-4.5893	-6.4082	-9.1776	-9.2014	0.58669	-5.4078	0.47673	-3.3107	-2.0921	-6.5525	-6.358


In situ vs. VIIRS
0.025
0.02
0.015
0.01
0.005
0
VIIRS
0
0.005
0.01
0.015
0.02
0.025
IN SITU
410
443
486
551
675

Summary:

Despite Hurricane, we were able to conduct several good validation stations while optically characterizing the aftermath of a hurricane path.

Variability between in situ measurements in coastal waters is dominated by inter-pixel variability despite some biases between measurements.

10 to 20% variation between independent in situ measurements in coastal waters. Simultaneous measurements with identical, inter-calibrated instruments and identical processing greatly reduces the variability.

VIIRS is slightly under-estimating radiances in coastal water relative to shipboard measurements.