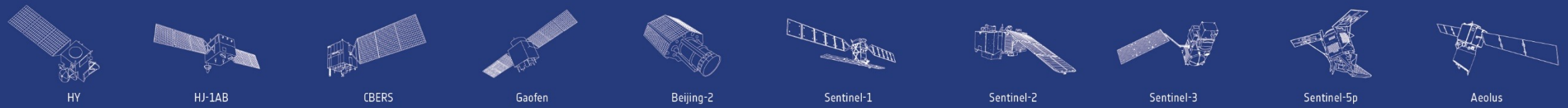


2023 DRAGON 5 SYMPOSIUM

3rd YEAR RESULTS REPORTING

11-15 SEPTEMBER 2023

PROJECT ID. 59053

VALIDATION OF OLCI AND COCTS/CZI PRODUCTS AND THEIR POTENTIAL UTILIZATION IN MONITORING OF THE DYNAMIC AND QUALITY OF THE CHINESE AND EUROPEAN COASTAL WATERS

Dragon 5 3rd Year Results Project

<DAY 4, THURSDAY, 14/SEP/2023, S.4.5: CAL/VAL>

ID. 59053

PROJECT TITLE: VALIDATION OF OLCI AND COCTS/CZI PRODUCTS AND THEIR POTENTIAL UTILIZATION IN MONITORING OF THE DYNAMIC AND QUALITY OF THE CHINESE AND EUROPEAN COASTAL WATERS

PRINCIPAL INVESTIGATORS: BING HAN NOTC (CHINA) **CÉDRIC JAMET** LOG (FRANCE)

CO-AUTHORS: JIANHUA ZHU, DI JIA, KAI GUO ; NOTC (CHINA)
CORENTIN SUBIRADE XAVIER MÉRIAUX, HUBERT LOISEL; LOG (FRANCE)
CHAOFEI MA, JIANQIANG LIU; NSOAS(CHINA)

PRESENTED BY : CEDRIC JAMET ON BEHALF OF BING HAN, NOTC(CHINA)

Objectives

(1) Characterization of the error budgets of officially distributed products of OLCI onboard Sentinel 3 satellites and COCTS/CZI onboard HY-1 satellites in coastal waters around China and Europe, e.g., Yellow Sea in China, English Channel in Europe, French Guiana in South America.

(2) Examination of the consistency between OLCI and COCTS/CZI, and among other ocean color sensors in these waters.

(3) Development and refinement regional algorithms to accurately retrieve marine environment parameters (optical and biogeochemical) in these regions of interest.

(4) Utilization of OLCI and COCTS/CZI products to monitor the dynamic and quality of the Chinese and European coastal waters.

EO Data Delivery

Data access (list all missions and issues if any). NB. in the tables please insert cumulative figures (since July 2020) for no. of scenes of high bit rate data (e.g. S1 100 scenes). If data delivery is low bit rate by ftp, insert “ftp”

ESA /Copernicus Missions	No. Scenes
1. Sentinel 3A / OLCI (L2 FR NR)	3000+
2. Sentinel 3B / OLCI (L2 FR NR)	3000+
3.	
4.	
5.	
6.	
Total:	6000+
Issues:	

ESA Third Party Missions	No. Scenes
1. AQUA / MODIS (L2)	2000+
2.	
3.	
4.	
5.	
6.	
Total:	2000+
Issues:	

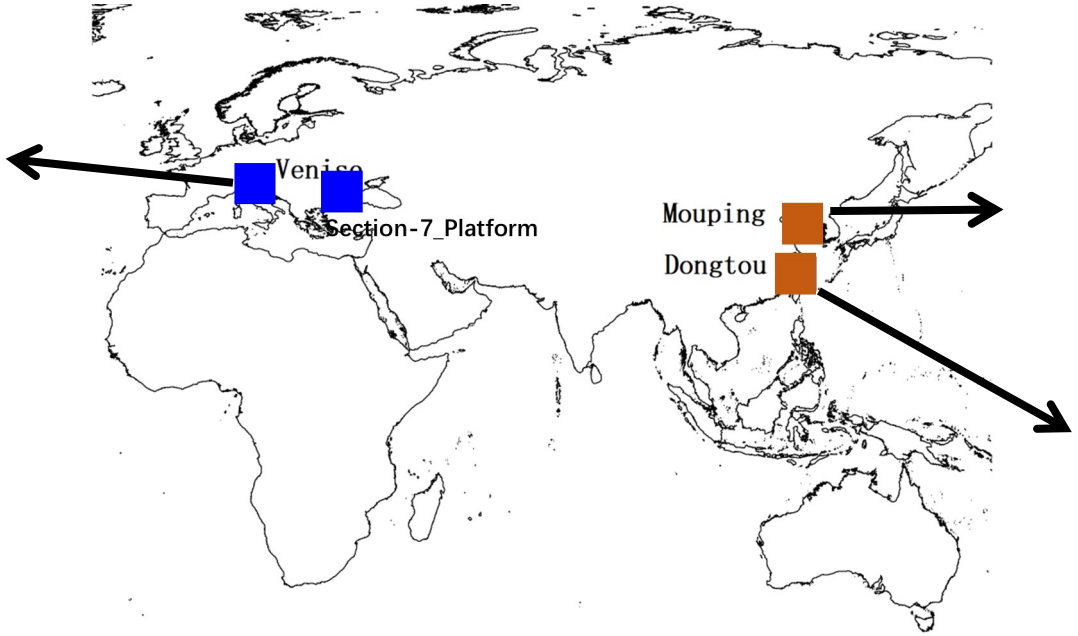
Chinese EO data	No. Scenes
1. HAIYANG 1C / COCTS (L2A /L2B)	4000+/4000+
2. HAIYANG 1D / COCTS (L2A /L2B)	2500+/2500+
3.	
4.	
5.	
6.	
Total:	13000+
Issues:	

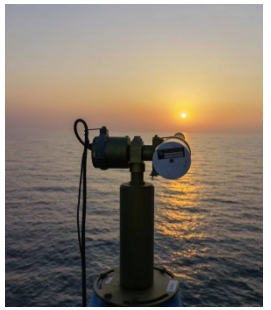
Data and Methodology

(1) In-situ data: automatic measurements by SeaPRISM (CIMEL Inc., France) sun photometer operationally deployed in AERONET-OC

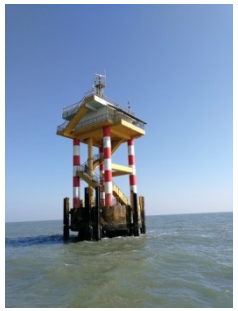
- Venise Adriatic Sea, Europe Operated by JRC, EU
- Section-7_Platform Black Sea, Europe Operated by JRC, EU
- Dongtou East Sea, China Operated by NSOAS, MNR, China
- Muping Yellow Sea, China Operated by NSOAS, MNR, China

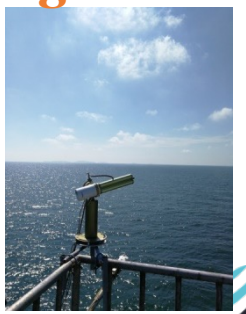
Venise





Muping





Dongtou

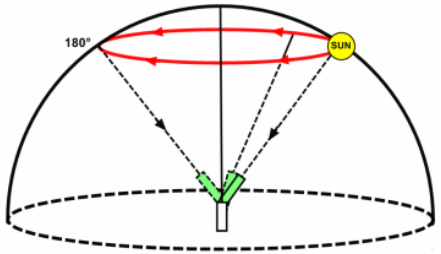
国家海洋技术中心 NATIONAL OCEAN TECHNOLOGY CENTER

Data and Methodology

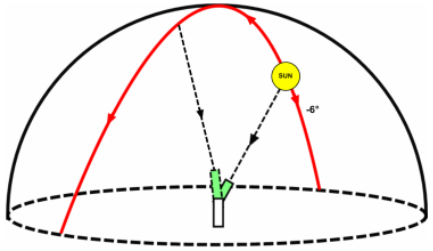
(1) In-situ data

- **Automatic** measurement of sun, sky and sea surface periodically
- **Sun irradiance(Es), sky radiance(Li)** and**surface radiance (Lt)** can be determined
- **Aerosol Optical Thickness (AOT)** can be determined through sun irradiance measurement
- **Remote Sensing Reflectance (Rrs)** can be determined by irradiance and sky/surface radiance measurement
- **Chlorophyll-a concentration (Chla)** retrieved from Rrs based

Reference: "G.Zibordi et al. A Network for Standardized Ocean Color Validation Measurements. Eos Transactions, 87: 293, 297, 2006." See also aeronet.gsfc.nasa.gov



Almucantar



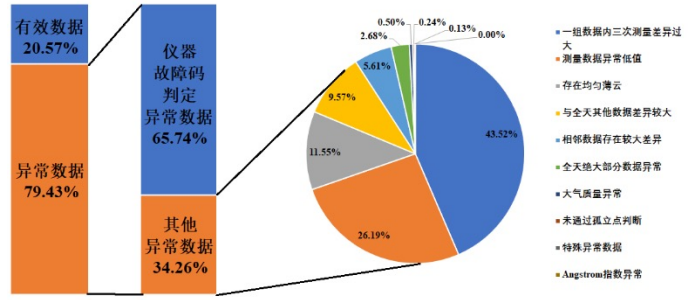
Principle Plan

$$R_{rs} = \frac{L_w}{E_s}$$

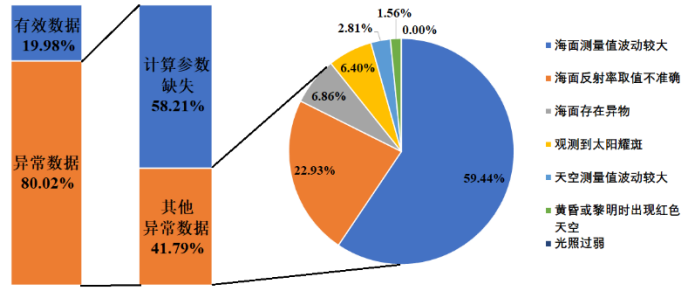
$$L_w = L_t - \rho \cdot L_i$$

Fresnel reflectance depending on sea state and sky condition

Quality Control @ Dongtou



~20% Direct Sun Measurement



Sea Surface Measurement

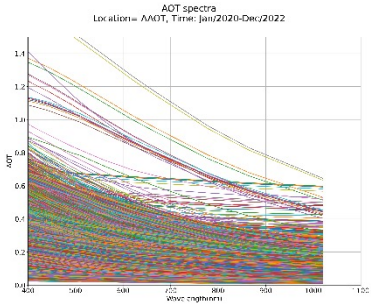
Jia et al., 2020, Proc. SPIE 11427; Jia et al., 2022, Proc. SPIE 12169

Data and Methodology

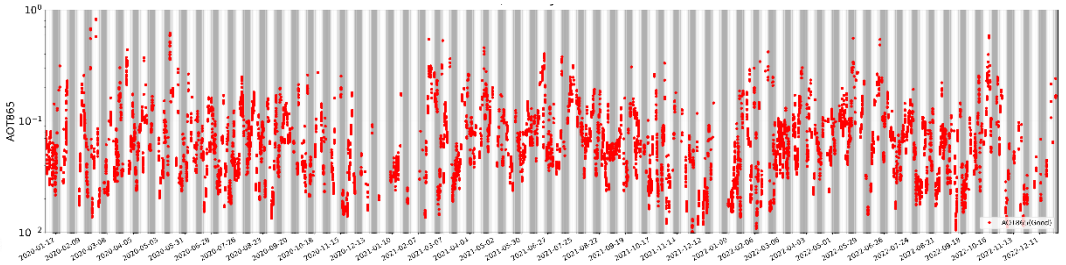
(1) In-situ data(Jan/2020-Dec/2022)

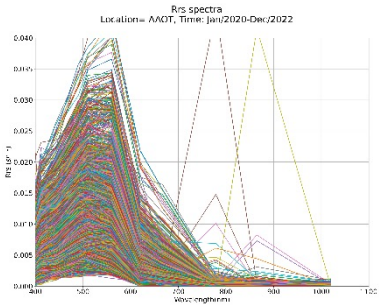
Reference: "G.Zibordi et al. A Network for Standardized Ocean Color Validation Measurements. Eos Transactions, 87: 293, 297, 2006." See also aeronet.gsfc.nasa.gov

- Vesite site locates in coastal waters in the **Adriatic Sea** around Italy
- **~15km** away from mainland
- **~17m** deep
- SeaPRISM ~10m above surface
- Since **April 2002**
- L1.5 data used, fully available on AERONET-OC website

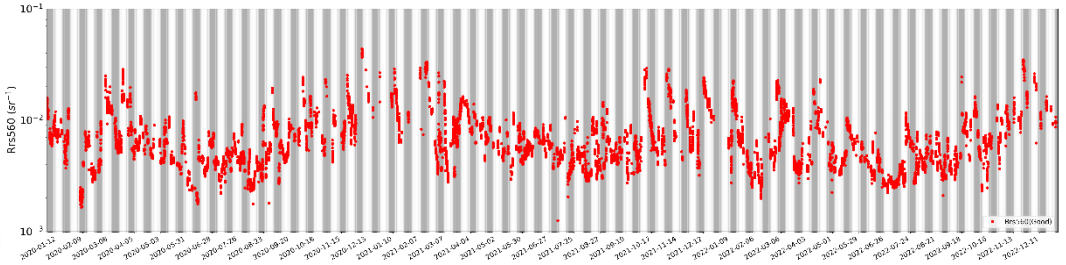


Aerosol Optical Thickness @ 865nm





Remote-sensing Reflectance @ 560nm



● L1.5 data

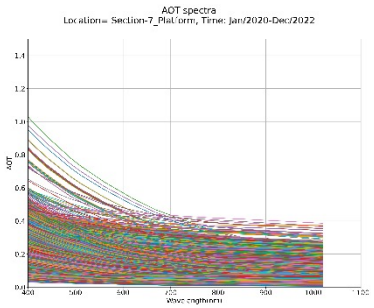
L1.5 Data Curtesy: https://aeronet.gsfc.nasa.gov/new_web/ocean_color.html

Data and Methodology

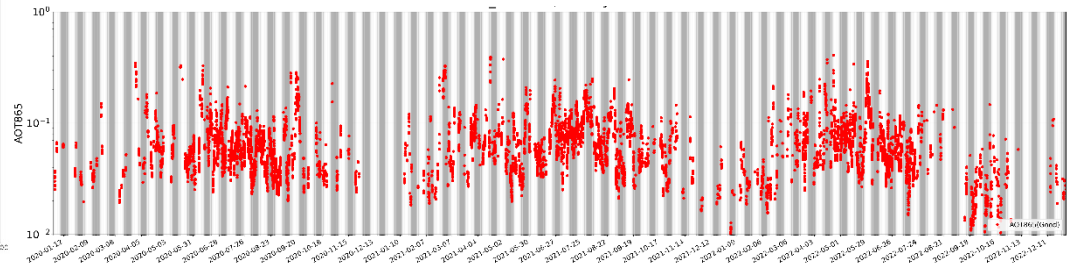
(1) In-situ data(Jan/2020-Dec/2022)

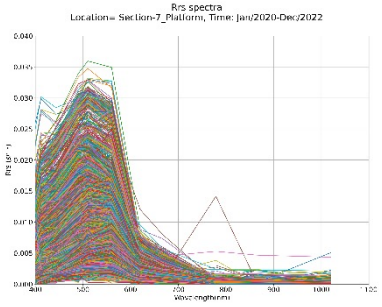
Reference: "G.Zibordi et al. A Network for Standardized Ocean Color Validation Measurements. Eos Transactions, 87: 293, 297, 2006." See also aeronet.gsfc.nasa.gov

- Section-7_Platform site locates in coastal waters in the **Black Sea** around Romania
- **~22km** away from mainland
- **~17m** deep
- SeaPRISM ~30m above surface
- Since **August 2019**
- L1.5 data used, fully available on AERONET-OC website

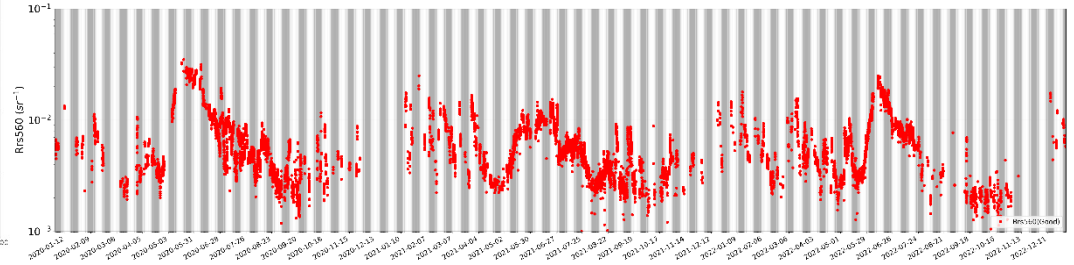


Aerosol Optical Thickness @ 865nm





Remote-sensing Reflectance @ 560nm



● L1.5 data

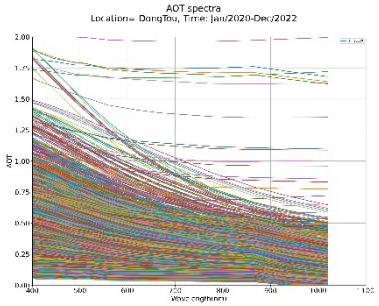
L1.5 Data Curtesy: https://aeronet.gsfc.nasa.gov/new_web/ocean_color.html

Data and Methodology

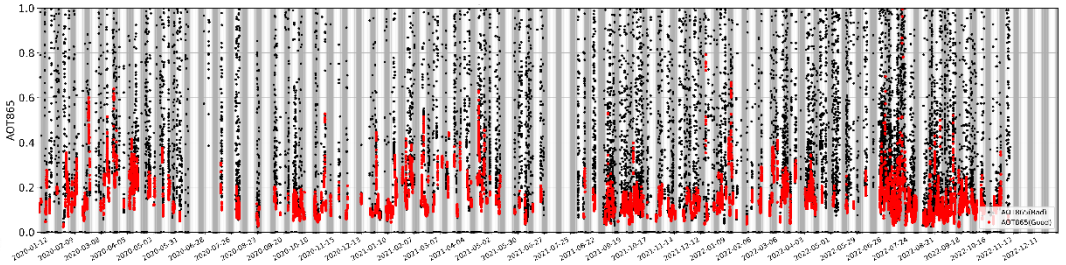
(1) In-situ data(Jan/2020-Dec/2022)

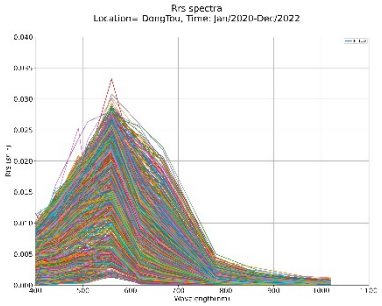
Reference: "G.Zibordi et al. A Network for Standardized Ocean Color Validation Measurements. Eos Transactions, 87: 293, 297, 2006." See also aeronet.gsfc.nasa.gov

- Dongtou site locates in coastal waters around the **East China Sea**
- **~30km** away from mainland
- **~25m** deep
- SeaPRISM ~15m above surface (**offshore platform**)
- Since **March 2019**
- Data processed following AERONET-OC protocol, available upon request

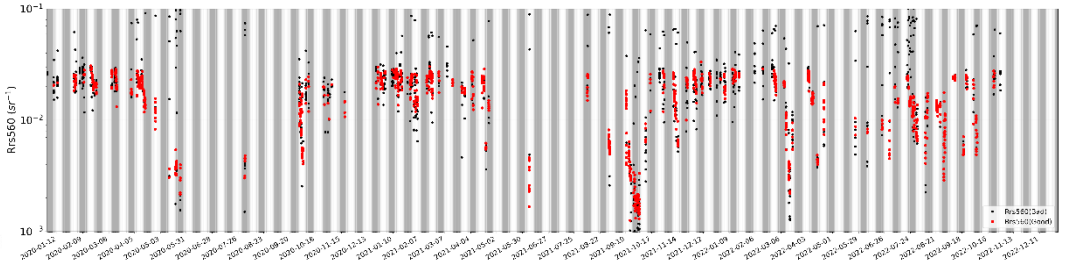


Aerosol Optical Thickness @ 865nm





Remote-sensing Reflectance @ 560nm



- L1.0 data
- QC passed

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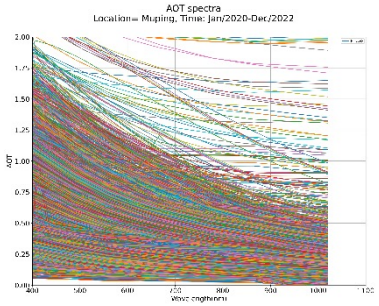
Data and Methodology

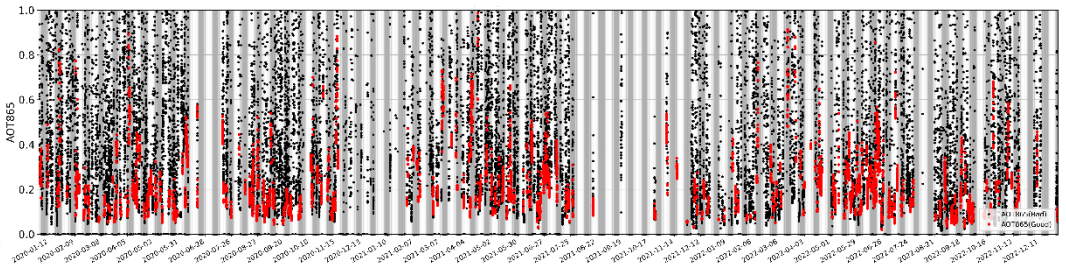
(1) In-situ data(Jan/2020-Dec/2022)

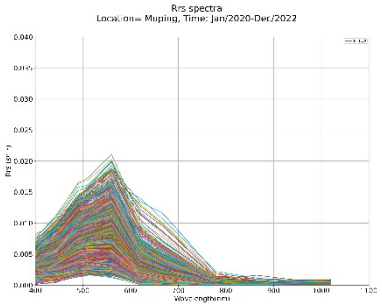
Reference: "G.Zibordi et al. A Network for Standardized Ocean Color Validation Measurements. Eos Transactions, 87: 293, 297, 2006." See also aeronet.gsfc.nasa.gov

- Muping site locates in coastal waters around the **Yellow Sea**
- **~30km** away from mainland
- **~20m** deep
- SeaPRISM ~10m above surface (**offshore platform**)
- Since **January 2020**
- Data processed following AERONET-OC protocol, available upon request

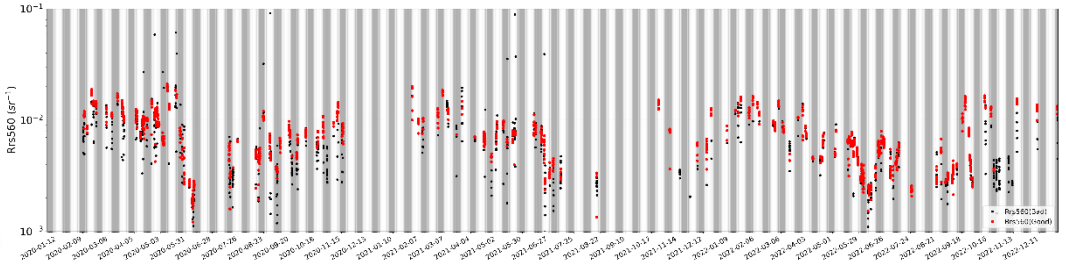


Aerosol Optical Thickness @ 865nm





Remote-sensing Reflectance @ 560nm



- L1.0 data
- QC passed

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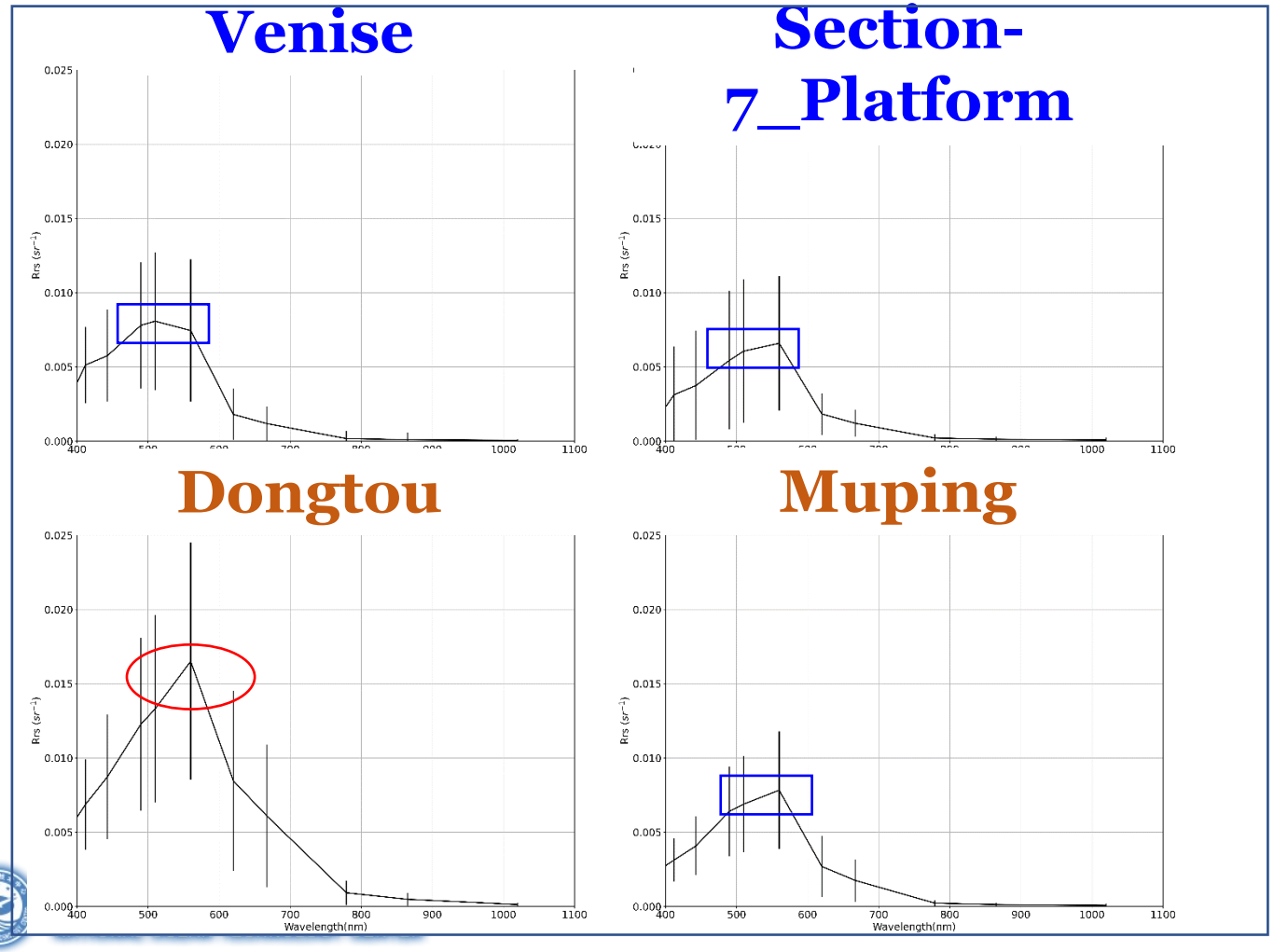
Data and Methodology

(1) In-situ data: site-dependent variability

Average Rrs

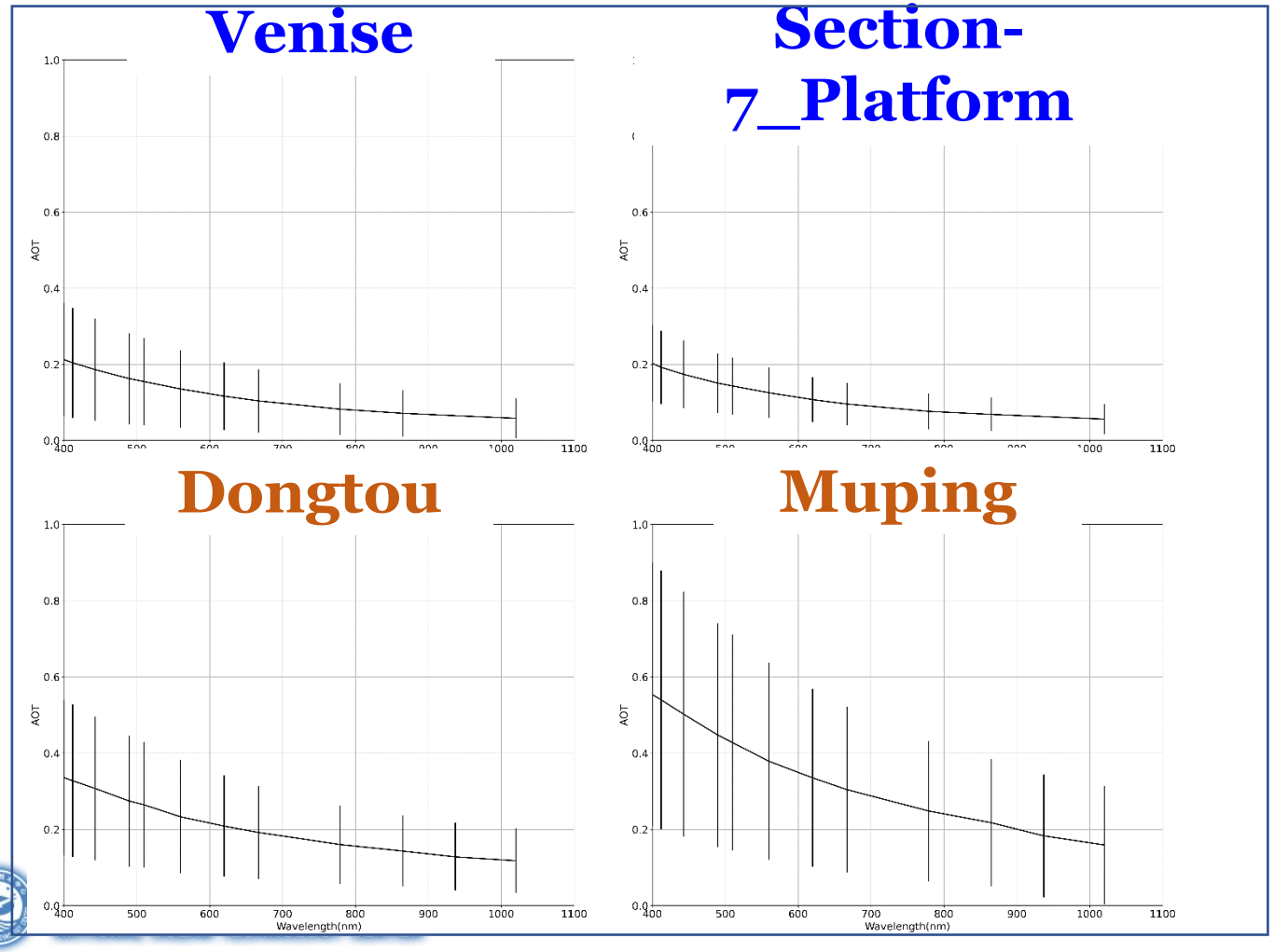


- Typical **Case 2** spectral characteristics (see Rrs), but sometimes Case 1 for Venise
- **Rrs peaks** around 560nm @ Dongtou, but flat shoulders appears between 490-532nm@other sites

Data and Methodology

(1) In-situ data: site-dependent variability

Average AOT

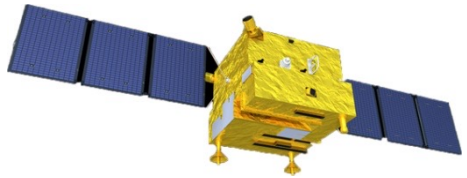


- **Exponential spectral slope:** Muping > Dongtou > Venise, Section-7_Platform
- **Aerosol load:** Muping > Dongtou > Venise, Section-7_Platform

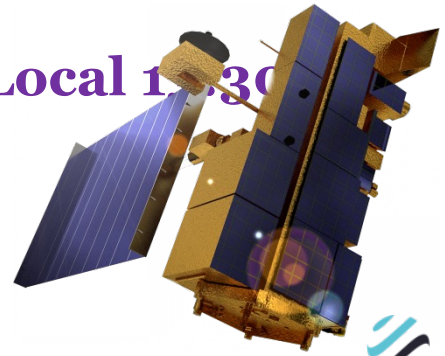
Data and Methodology

(2) EO Data (Ocean Color)

- **OLCI/Sentinel 3A/3B** **(Launch: Feb 16, 2016 / Apr 25 2018)**
  - L2 Full Resolution/Near-Realtime
  - 16 spectral bands in VIS-NIR
  - 300m spatial resolution, global coverage (~1270km swath)
- **COCTS/Haiyang 1C/1D** **(Launch: Sep 7, 2018 / Jun 11, 2020)** **~Local 10:30/13:30**
  - L2A, L2B
  - 8 spectral bands in VIS-NIR
  - 1000m spatial resolution, global coverage (~2900km swath)



- **MODIS/AQUA** **(Launch: May 4, 2002)** **~Local 1[illegible]30**
  - L2
  - 8 spectral bands in VIS-NIR
  - 1200m spatial resolution, global coverage (~2330km swath)



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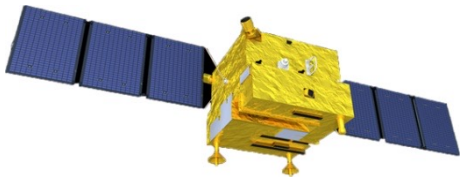
Data and Methodology

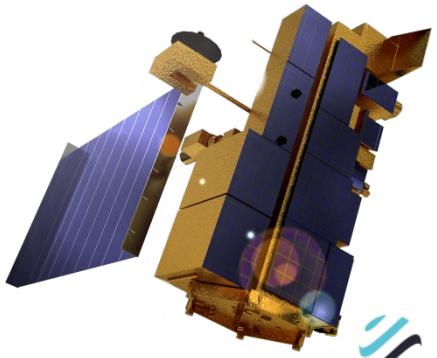
(2) EO Data (Ocean Color) --- Standard Products

- **Rrs** ⟹
- **AOT**
- **Chla (chlorophyll a)**

Band Registration

	Reference Data			Target Data	
NO.	SeaPRISM @Dongtou	SeaPRISM @Venise	MODIS	OLCI	COCTS
1	400			400	
2	412	412	412	412	412
3	443	443	443	443	443
4	490	490	488	490	490
5	510			510	520
6		532	531		
7	560	551	555	560	565
8	620			620	
9	667	667	667	665	670
10			678	674	
11				754	750
12	779			779	
13	865	870		865	865
14	1020	1020		1016	



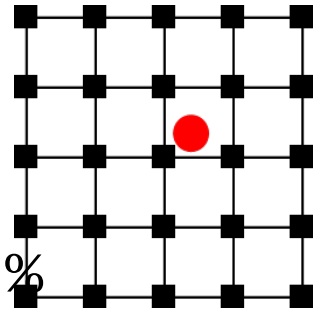


Data and Methodology

(4) Validation Protocol -- Math-up and Statistics

- **In-situ data vs EO data (validation)**

Match-up criteria



- ✓ Time window: 1 hour
- ✓ Spatial window: 5*5 pixels
- ✓ Percentage of valid pixels: >50%
- ✓ Spatial Homogeneity: CV < 0.3
- ✓ sun zenith and sensor zenith checked
- ✓ Product flags checked
- ✓ Average over defined box

Venise (Adriatic Sea)	E 12.508° N 45.314°
Section-7_Platform (East China Sea)	E 29°~30° N 44°~45°
Dongtou (East China Sea)	E 121.358° N 27.675°
Muping (Yellow Sea)	E 121.701° N 37.681°

Statistical Indicator

$$\overline{RPD} = \frac{\sum_{i=1}^{N} \frac{y_i - x_i}{x_i}}{N} \times 100\%$$

$$\overline{APD} = \frac{\sum_{i=1}^{N} \left| \frac{y_i - x_i}{x_i} \right|}{N} \times 100\%$$

xi – reference measurement

yi – target measurement

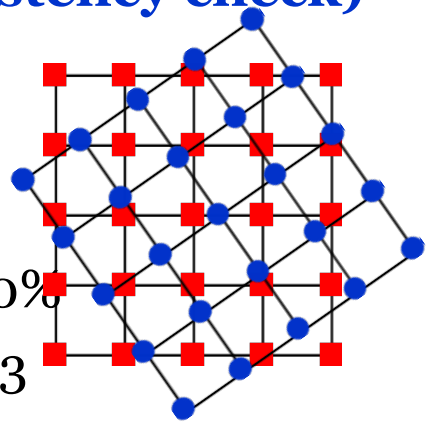
N – number of match-ups

Data and Methodology

(4) Validation Protocol -- Math-up and Statistics

- **EO data vs EO data (consistency check)**

Match-up criteria



- ✓ Time window: 1 hour
- ✓ Spatial window: 5*5 pixels
- ✓ Percentage of valid pixels: >50%
- ✓ Spatial Homogeneity: CV < 0.3
- ✓ sun zenith < 70°, sensor zenith < 60°
- ✓ Product flags not identified
- ✓ Average over defined box

Consistency Check

Regions of Interest (ROIs) -- 1° * 1°

Venise (Adriatic Sea)	E 12°~13° N 45°~46°
Dongtou (East China Sea)	E 121°~122° N 27°~28°

Statistical Indicator

$$\overline{RPD} = \frac{\sum_{i=1}^{N} \frac{y_i - x_i}{x_i}}{N} \times 100\%$$

$$\overline{APD} = \frac{\sum_{i=1}^{N} \left|\frac{y_i - x_i}{x_i}\right|}{N} \times 100\%$$

xi – reference measurement

yi – target measurement

N – number of match-ups

3rd Year Results

(1) Validation Activities – Ongoing

- Referenced with SeaPRISM measurements
  - ✓ OLCI L2, Sentinel 3A/3B
  - ✓ COCTS L2A/L2B, Haiyang 1C/1D
  - ✓ MODIS L2, AQUA

- Venise
- Section-7_Platform
- Dongtou
- Muping

(2) Consistency Check – First Results

- OLCI L2 (Sentinel 3A/3B) vs MODIS L2 (Terra)
- COCTS L2A/L2B (Haiyang 1C/1D) vs MODIS L2 (Terra)

(3) Young Scientists Training

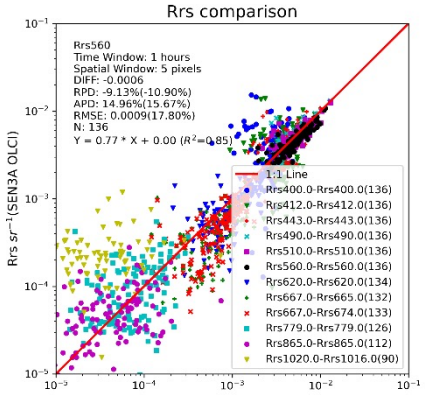
3rd Year Results

(1) Validation Activities – Ongoing

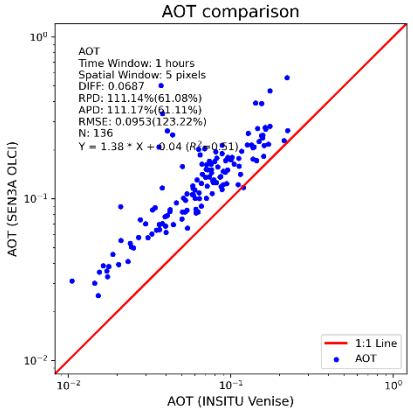
OLCI/Sentinel 3A ---- L2 FR NR
Jan/2020 – Dec/2022

- **Venise**
- Section-7_Platform
- Dongtou
- Muping

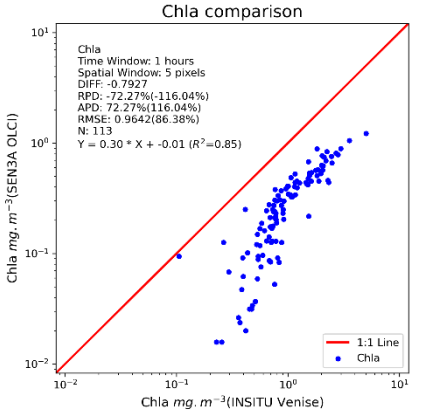
Rrs



AOT



Chla



Product	N	RPD	APD
Rrs412-Rrs412	136	11.6%	50.6%
Rrs443-Rrs443	136	8.4%	30.8%
Rrs490-Rrs490	136	0.2%	15.7%
Rrs551-Rrs560	136	-9.1%	15.0%
Rrs665-Rrs667	132	-23.6%	48.0%
Rrs865-Rrs870	112	56.7%	96.6%
Rrs1016-Rrs1020	90	1647.7 %	1652.5 %
AOT	136	111.1%	111.2%
Chla	92	-72.3%	72.3%

Significantly Over-estimated

Significantly Under-

NATIONAL OCEAN TECHNOLOGY CENTER

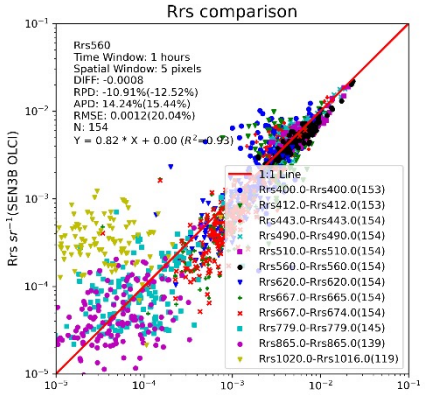
3rd Year Results

(1) Validation Activities – Ongoing

OLCI/Sentinel 3B ---- L2 FR NR
Jan/2020 – Dec/2022

- **Venise**
- Section-7_Platform
- Dongtou
- Muping

Rrs



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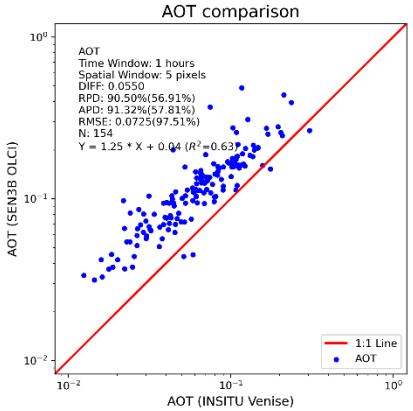
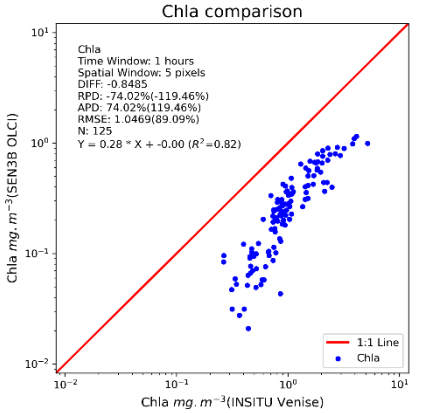


Chla



Product	N	RPD	APD
Rrs412-Rrs412	153	11.9%	45.2%
Rrs443-Rrs443	154	7.1%	26.6%
Rrs490-Rrs490	154	-0.8%	15.4%
Rrs551-Rrs560	154	-10.9%	14.2%
Rrs665-Rrs667	154	-18.9%	54.8%
Rrs865-Rrs870	139	86.0%	132.0%
Rrs1016-Rrs1020	119	3124.5 %	3126.4 %
AOT	154	90.5%	91.3%
Chla	104	-73.9%	73.9%

Significantly Over-estimated

Significantly Under-

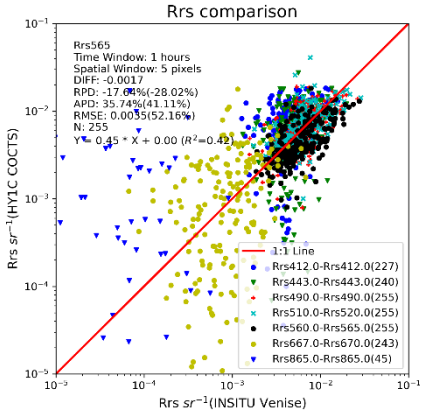
3rd Year Results

(1) Validation Activities – Ongoing

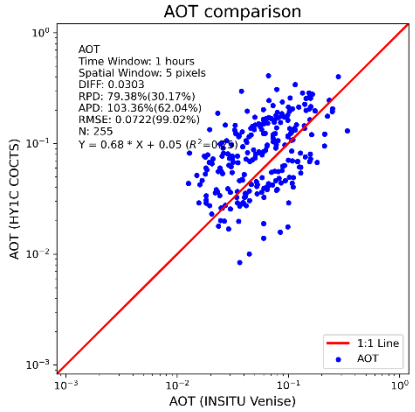
COCTS/Haiyang 1C ---- L2A
Jan/2020 – Dec/2022

- **Venise**
- Section-7_Platform
- Dongtou
- Muping

Rrs



AOT



Product	N	RPD	APD
Rrs412-Rrs412	123	69.6%	90.5%
Rrs443-Rrs443	128	32.4%	65.7%
Rrs490-Rrs490	130	2.7%	37.0%
Rrs565-Rrs551	130	7.2%	36.7%
Rrs670-Rrs667	124	60.7%	153.9%
AOT	139	79.4%	103.4%

Chla Not Available

Significantly Over-estimated

Significantly Under-

国家海洋技术中心 NATIONAL OCEAN TECHNOLOGY CENTER

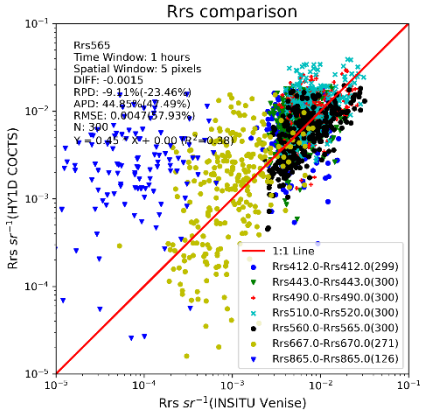
3rd Year Results

(1) Validation Activities – Ongoing

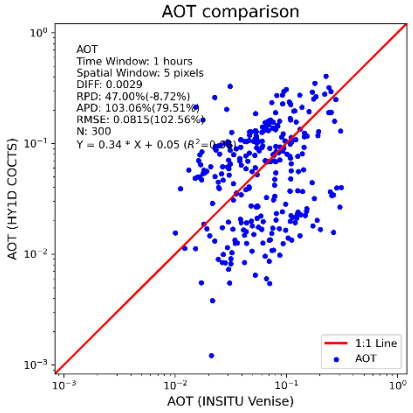
COCTS/Haiyang 1D ---- L2A
Jan/2020 – Dec/2022

- **Venise**
- Section-7_Platform
- Dongtou
- Muping

Rrs



AOT



Product	N	RPD	APD
Rrs412-Rrs412	167	54.4%	78.0%
Rrs443-Rrs443	167	46.7%	66.3%
Rrs490-Rrs490	167	25.0%	52.3%
Rrs565-Rrs551	167	41.2%	67.8%
Rrs670-Rrs667	163	152.9%	192.8%
AOT	166	47.0%	103.1%

Chla Not Available

Significantly Over-estimated

Significantly Under-

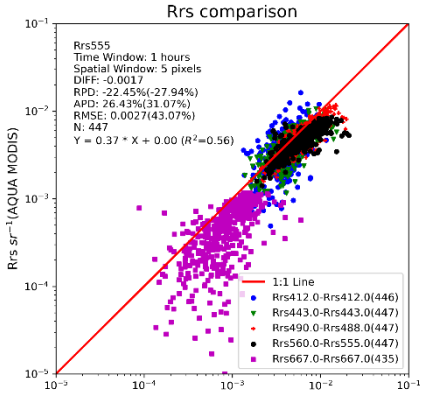
3rd Year Results

(1) Validation Activities – Ongoing

MODIS/AQUA ---- L2 – for reference
Jan/2020 – Dec/2022

- **Venise**
- Section-7_Platform
- Dongtou
- Muping

Rrs



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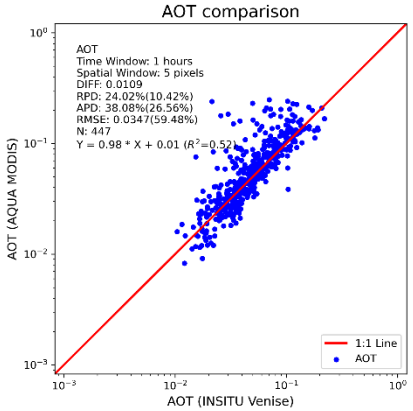
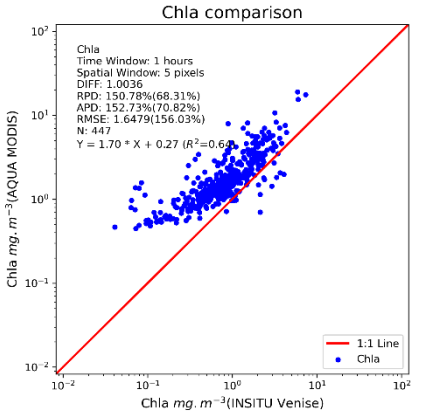


Chla



Product	N	RPD	APD
Rrs412-Rrs412	446	-7.9%	31.4%
Rrs443-Rrs443	447	-10.8%	21.7%
Rrs488-Rrs490	447	-17.8%	19.9%
Rrs555-Rrs560	447	-22.5%	26.4%
Rrs667-Rrs667	435	-40.8%	49.3%
AOT	447	24.0%	38.1%
Chla	447	150.8%	152.7%

Significantly Over-estimated

Significantly Under-

NATIONAL OCEAN TECHNOLOGY CENTER

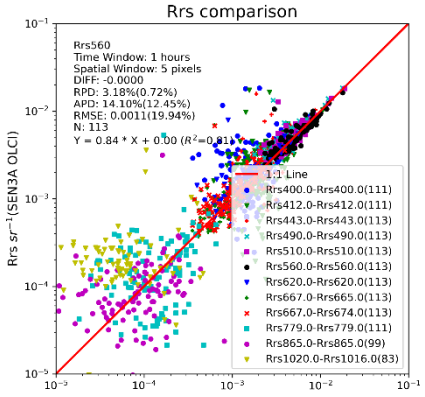
3rd Year Results

(1) Validation Activities – Ongoing

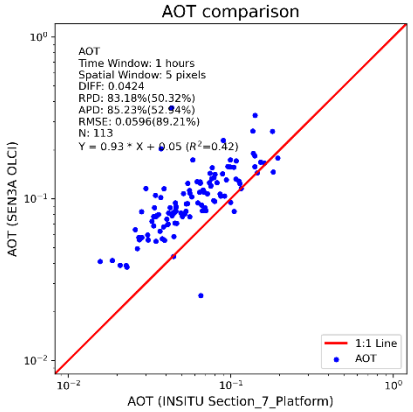
OLCI/Sentinel 3A ---- L2 FR NR
Jan/2020 – Dec/2022

- Venise
- **Section-7_Platform**
- Dongtou
- Muping

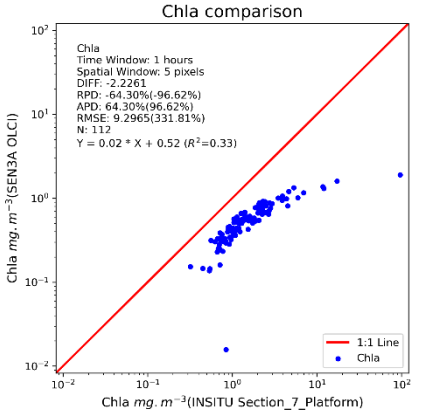
Rrs



AOT



Chla



Product	N	RPD	APD
Rrs412-Rrs412	111	31.7%	75.6%
Rrs443-Rrs443	113	27.3%	48.3%
Rrs490-Rrs490	113	14.2%	20.9%
Rrs551-Rrs560	113	3.2%	14.1%
Rrs665-Rrs667	113	15.9%	35.0%
Rrs865-Rrs870	99	83.0%	130.9%
Rrs1016-Rrs1020	83	558.4%	570.3%
AOT	113	83.2%	85.2%
Chla	111	-64.4%	64.4%

Significantly Over-estimated

Significantly Under-

NATIONAL OCEAN TECHNOLOGY CENTER

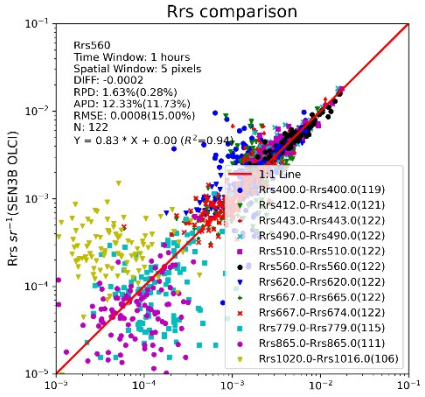
3rd Year Results

(1) Validation Activities – Ongoing

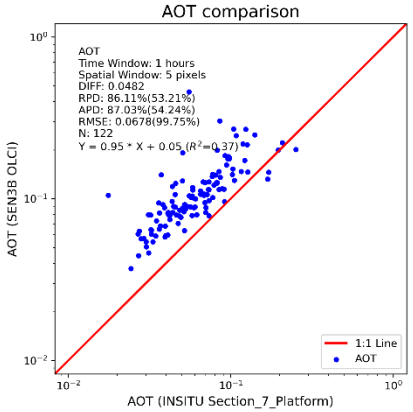
OLCI/Sentinel 3B ---- L2 FR NR
Jan/2020 – Dec/2022

- Venise
- **Section-7_Platform**
- Dongtou
- Muping

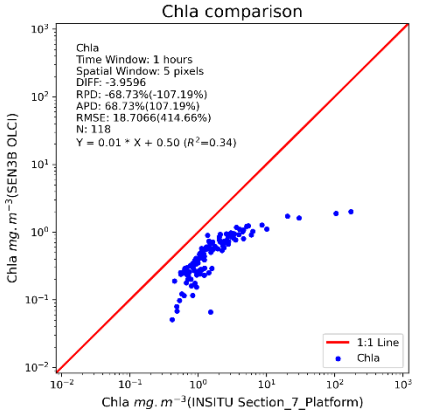
Rrs



AOT



Chla



Product	N	RPD	APD
Rrs412-Rrs412	121	40.0%	68.7%
Rrs443-Rrs443	122	33.3%	45.4%
Rrs490-Rrs490	122	17.7%	23.7%
Rrs551-Rrs560	122	1.6%	12.3%
Rrs665-Rrs667	122	12.3%	34.9%
Rrs865-Rrs870	111	1.2%	63.7%
Rrs1016-Rrs1020	106	1550.1 %	1555.0 %
AOT	115	-68.8%	68.8%
Chla	122	86.1%	87.0%

Significantly Over-estimated

Significantly Under-

NATIONAL OCEAN TECHNOLOGY CENTER

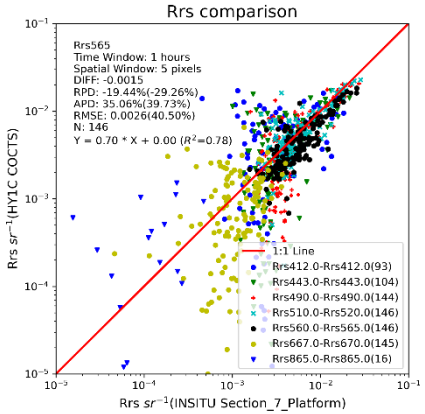
3rd Year Results

(1) Validation Activities – Ongoing

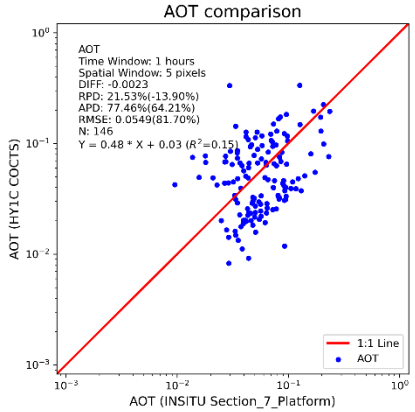
COCTS/Haiyang 1C ---- L2A
Jan/2020 – Dec/2022

- Venise
- **Section-7_Platform**
- Dongtou
- Muping

Rrs



AOT



Product	N	RPD	APD
Rrs412-Rrs412	44	104.2%	155.4%
Rrs443-Rrs443	47	24.0%	90.1%
Rrs490-Rrs490	64	-12.0%	51.8%
Rrs565-Rrs551	64	0.6%	33.0%
Rrs670-Rrs667	64	0.4%	95.9%
AOT	65	21.5%	77.5%

Chla Not Available

Significantly Over-estimated

Significantly Under-

国家海洋技术中心 NATIONAL OCEAN TECHNOLOGY CENTER

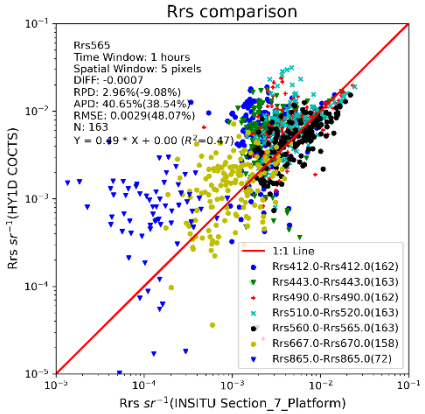
3rd Year Results

(1) Validation Activities – Ongoing

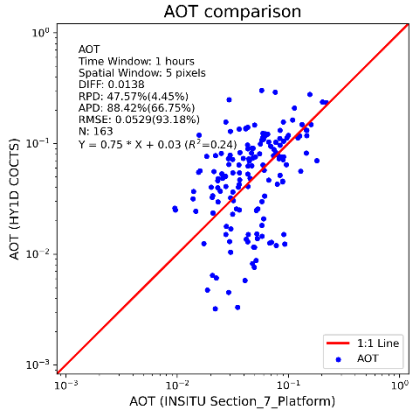
COCTS/Haiyang 1D ---- L2A
Jan/2020 – Dec/2022

- Venise
- **Section-7_Platform**
- Dongtou
- Muping

Rrs



AOT



Product	N	RPD	APD
Rrs412-Rrs412	89	247.0%	259.9%
Rrs443-Rrs443	89	151.1%	165.3%
Rrs490-Rrs490	89	77.2%	97.4%
Rrs565-Rrs551	89	75.9%	90.4%
Rrs670-Rrs667	84	90.4%	118.2%
AOT	89	47.6%	88.4%

Chla Not Available

Significantly Over-estimated

Significantly Under-

国家海洋技术中心 NATIONAL OCEAN TECHNOLOGY CENTER

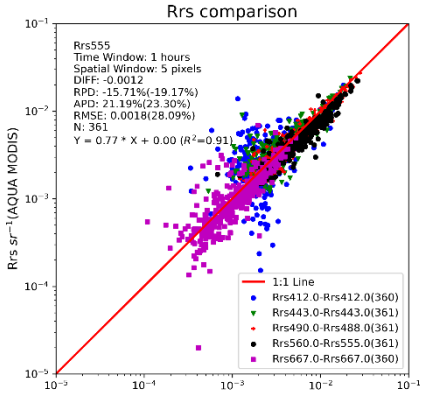
3rd Year Results

(1) Validation Activities – Ongoing

MODIS/AQUA ---- L2 – for reference
Jan/2020 – Dec/2022

- Venise
- **Section-7_Platform**
- Dongtou
- Muping

Rrs



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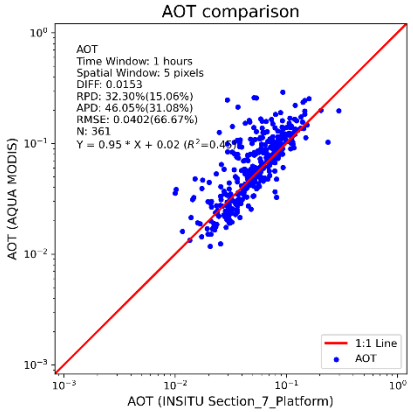
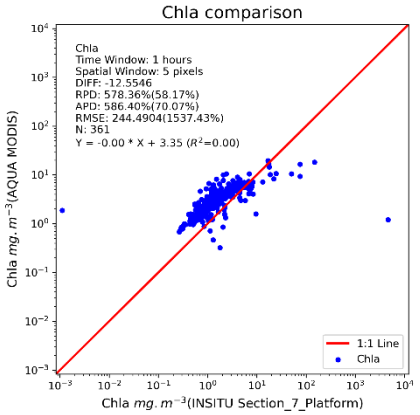


Chla



Product	N	RPD	APD
Rrs412-Rrs412	360	31.2%	58.1%
Rrs443-Rrs443	361	10.0%	27.3%
Rrs488-Rrs490	361	-4.2%	15.7%
Rrs555-Rrs560	361	-15.7%	21.2%
Rrs667-Rrs667	360	3.2%	33.8%
AOT	361	32.3%	46.1%
Chla	361	578.4%	586.4%

Significantly Over-estimated

Significantly Under-estimated

NATIONAL OCEAN TECHNOLOGY CENTER

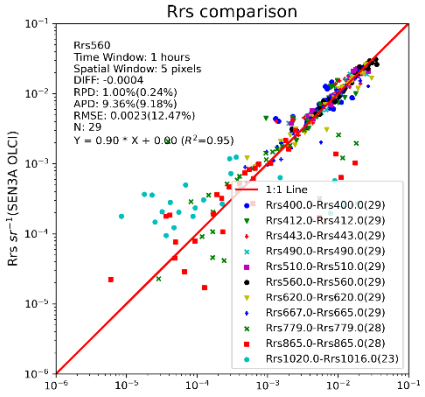
3rd Year Results

(1) Validation Activities – Ongoing

OLCI/Sentinel 3A ---- L2 FR NR
Jan/2020 – Dec/2022

- Venise
- Section-7_Platform
- **Dongtou**
- Muping

Rrs



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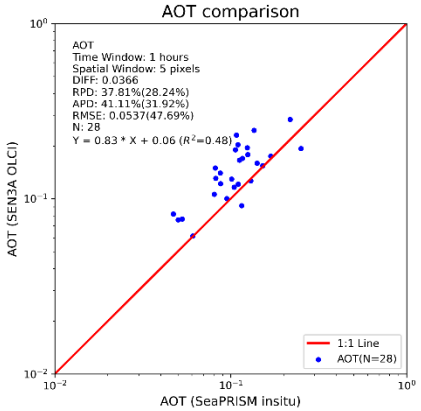
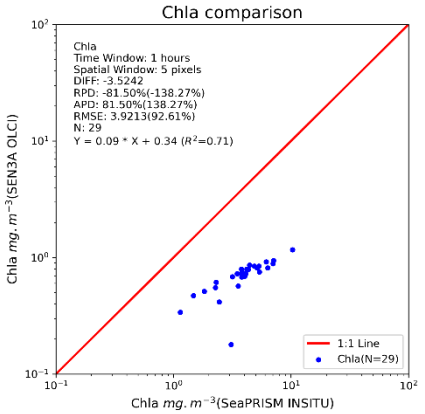


Chla



Product	N	RPD	APD
Rrs412-Rrs412	29	24.3%	37.5%
Rrs443-Rrs443	29	19.8%	26.7%
Rrs490-Rrs490	29	8.5%	13.7%
Rrs560-Rrs560	29	1.0%	9.4%
Rrs665-Rrs667	29	1.3%	19.3%
Rrs865-Rrs865	28	29.2%	77.7%
Rrs1016-Rrs1020	23	385.6%	424.4%
AOT	28	37.8%	41.1%
Chla	29	-81.5%	81.5%

Significantly Over-estimated

Significantly Under-estimated

NATIONAL OCEAN TECHNOLOGY CENTER

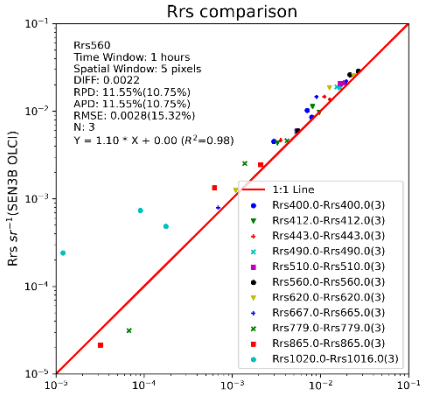
3rd Year Results

(1) Validation Activities – Ongoing

OLCI/Sentinel 3B ---- L2 FR NR
Jan/2020 – Dec/2022

- Venise
- Section-7_Platform
- **Dongtou**
- Muping

Rrs



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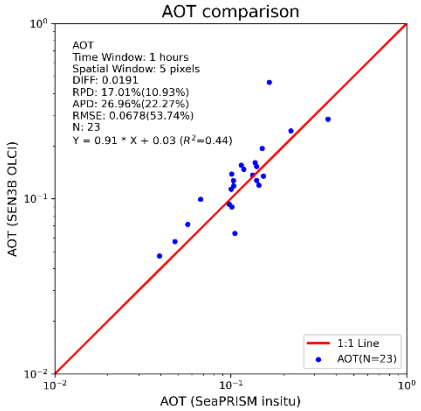
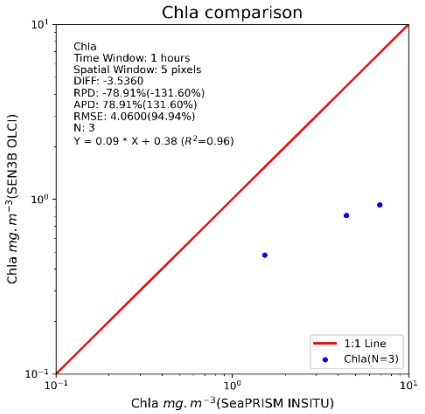


Chla



Product	N	RPD	APD
Rrs412-Rrs412	3	24.2%	24.2%
Rrs443-Rrs443	3	23.1%	23.1%
Rrs490-Rrs490	3	14.8%	14.8%
Rrs560-Rrs560	3	11.6%	11.6%
Rrs665-Rrs667	3	29.0%	29.0%
Rrs865-Rrs865	3	31.6%	53.7%
Rrs1016-Rrs1020	3	930.5%	930.5%
AOT	23	17.0%	27.0%
Chla	3	-78.9%	78.9%

Significantly Over-estimated

Significantly Under-estimated

NATIONAL OCEAN TECHNOLOGY CENTER

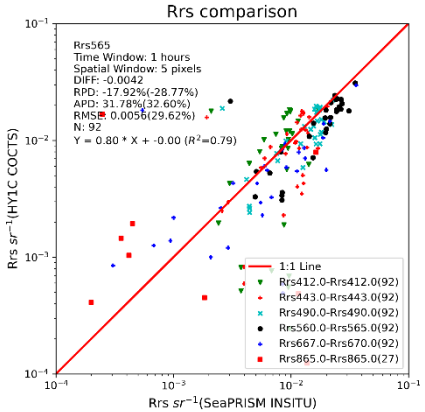
3rd Year Results

(1) Validation Activities – Ongoing

COCTS/Haiyang 1C ---- L2A
Jan/2020 – Dec/2022

- Venise
- Section-7_Platform
- **Dongtou**
- Muping

Rrs



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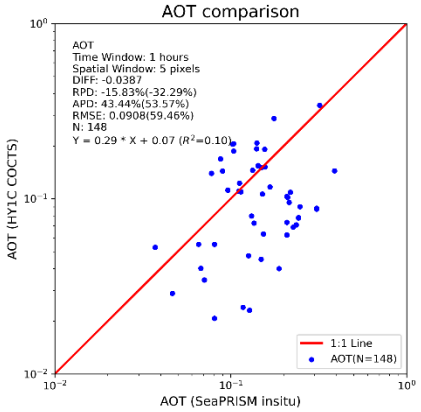


Product	N	RPD	APD
Rrs412-Rrs412	24	15.7%	54.5%
Rrs443-Rrs443	24	-3.5%	35.4%
Rrs490-Rrs490	24	-8.7%	28.1%
Rrs565-Rrs551	24	-17.9%	31.8%
Rrs670-Rrs667	24	23.9%	83.1%
AOT	40	-15.8%	43.4%

Chla Not Available

Significantly Over-estimated

Significantly Under-estimated

国家海洋技术中心 NATIONAL OCEAN TECHNOLOGY CENTER

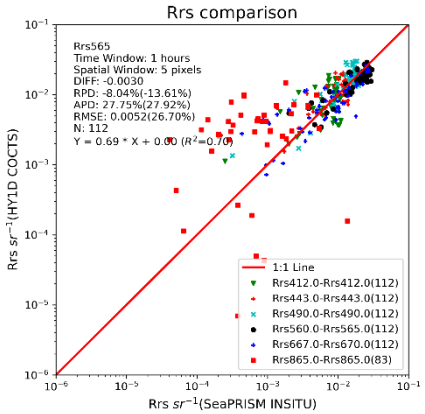
3rd Year Results

(1) Validation Activities – Ongoing

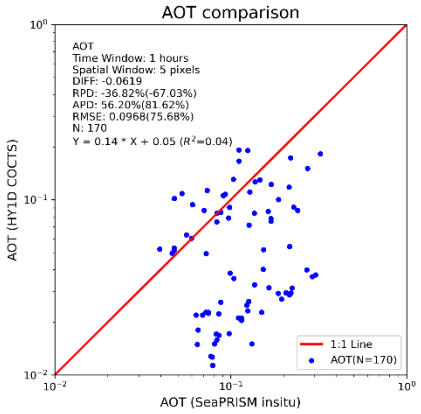
COCTS/Haiyang 1D ---- L2A
Jan/2020 – Dec/2022

- Venise
- Section-7_Platform
- **Dongtou**
- Muping

Rrs



AOT



Product	N	RPD	APD
Rrs412-Rrs412	45	29.5%	53.8%
Rrs443-Rrs443	45	37.5%	55.2%
Rrs490-Rrs490	45	22.8%	38.2%
Rrs565-Rrs551	45	-8.0%	27.8%
Rrs670-Rrs667	45	31.5%	62.9%
AOT	72	-36.8%	56.2%

Chla Not Available

Significantly Over-estimated

Significantly Under-estimated

国家海洋技术中心 NATIONAL OCEAN TECHNOLOGY CENTER

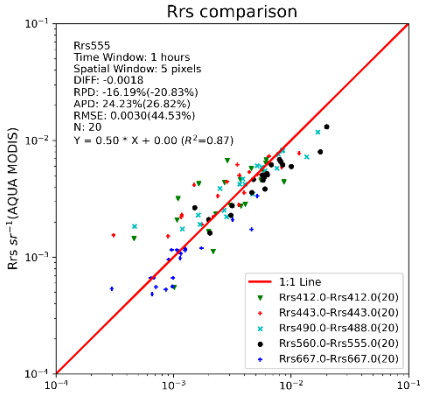
3rd Year Results

(1) Validation Activities – Ongoing

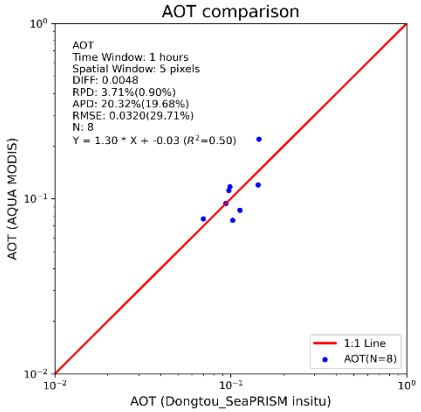
MODIS/AQUA ---- L2 – for reference
Jan/2020 – Dec/2022

- Venise
- Section-7_Platform
- **Dongtou**
- Muping

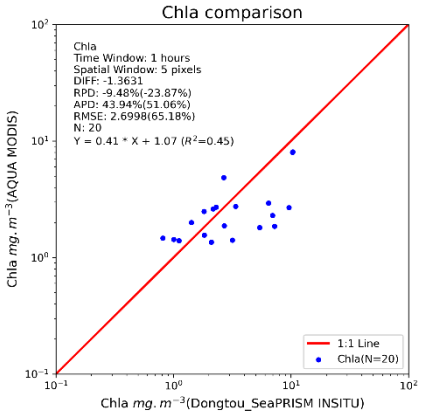
Rrs



AOT



Chla



Product	N	RPD	APD
Rrs412-Rrs412	20	33.5%	58.7%
Rrs443-Rrs443	20	49.4%	60.3%
Rrs488-Rrs490	20	17.2%	34.3%
Rrs555-Rrs560	20	-16.2%	24.2%
Rrs667-Rrs667	20	-12.5%	24.0%
AOT	8	3.7%	20.3%
Chla	20	-9.5%	43.9%

Significantly Over-estimated

Significantly Under-estimated

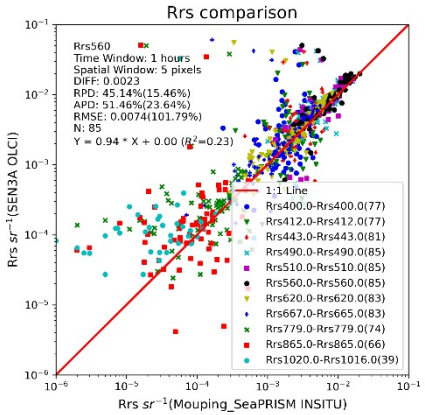
3rd Year Results

(1) Validation Activities – Ongoing

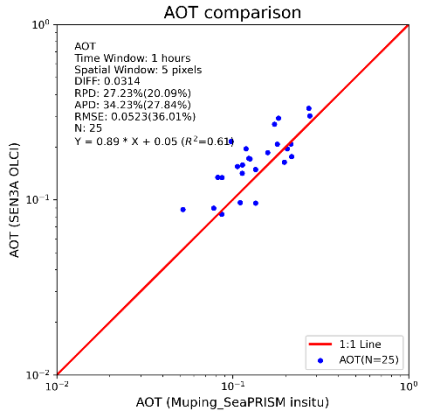
OLCI/Sentinel 3A ---- L2 FR NR
Jan/2020 – Dec/2022

- Venise
- Section-7_Platform
- Dongtou
- **Muping**

Rrs



AOT



Chla Not Available

Product	N	RPD	APD
Rrs412-Rrs412	77	93.4%	122.8%
Rrs443-Rrs443	81	74.6%	93.0%
Rrs490-Rrs490	85	45.2%	58.7%
Rrs560-Rrs560	85	45.1%	51.5%
Rrs665-Rrs667	83	577.0%	591.0%
Rrs865-Rrs865	66	5463.7 %	5495.6 %
Rrs1016-Rrs1020	39	2257.1 %	2262.5 %
AOT	25	27.2%	34.2%

Significantly Over-estimated

Significantly Under-estimated

国家海洋技术中心 NATIONAL OCEAN TECHNOLOGY CENTER

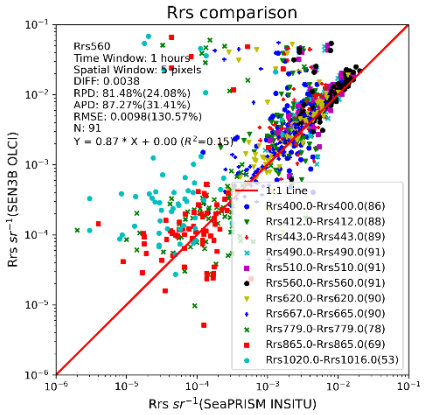
3rd Year Results

(1) Validation Activities – Ongoing

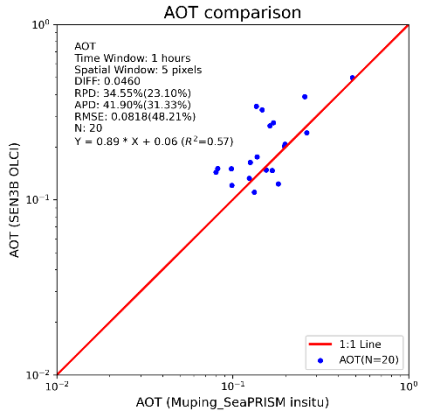
OLCI/Sentinel 3B ---- L2 FR NR
Jan/2020 – Dec/2022

- Venise
- Section-7_Platform
- Dongtou
- **Muping**

Rrs



AOT



Chla Not Available

Product	N	RPD	APD
Rrs412-Rrs412	88	197.5%	219.3%
Rrs443-Rrs443	89	163.6%	176.4%
Rrs490-Rrs490	91	91.5%	101.0%
Rrs560-Rrs560	91	81.5%	87.3%
Rrs665-Rrs667	90	678.2%	693.3%
Rrs865-Rrs865	69	3897.8%	3928.8%
Rrs1016-Rrs1020	53	15557.8%	15562.6 %
AOT	20	34.6%	41.9%

Significantly Over-estimated

Significantly Under-estimated

国家海洋技术中心
NATIONAL OCEAN TECHNOLOGY CENTER

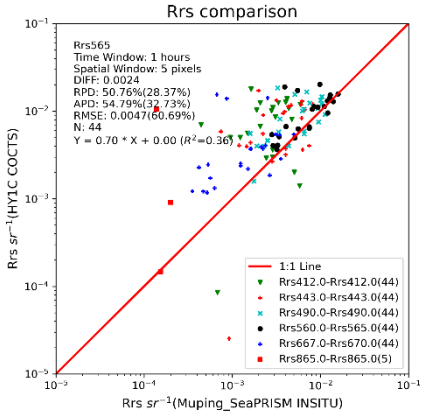
3rd Year Results

(1) Validation Activities – Ongoing

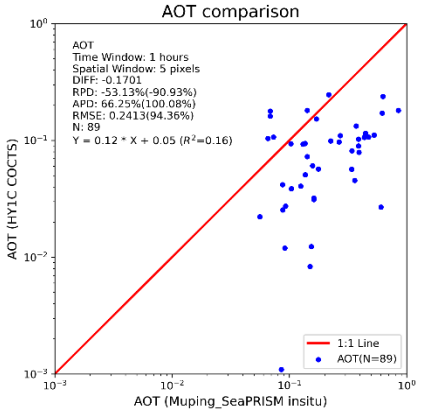
COCTS/Haiyang 1C ---- L2A
Jan/2020 – Dec/2022

- Venise
- Section-7_Platform
- Dongtou
- **Muping**

Rrs



AOT



Product	N	RPD	APD
Rrs412-Rrs412	19	349.3%	365.6%
Rrs443-Rrs443	19	191.1%	205.5%
Rrs490-Rrs490	19	89.1%	94.9%
Rrs565-Rrs551	19	50.8%	54.8%
Rrs670-Rrs667	19	299.6%	304.2%
AOT	37	-53.1%	66.3%

Chla Not Available

Significantly Over-estimated

Significantly Under-estimated

国家海洋技术中心 NATIONAL OCEAN TECHNOLOGY CENTER

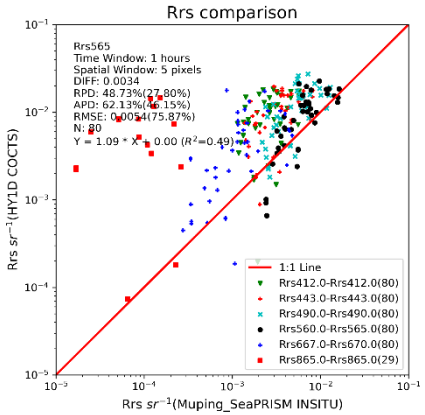
3rd Year Results

(1) Validation Activities – Ongoing

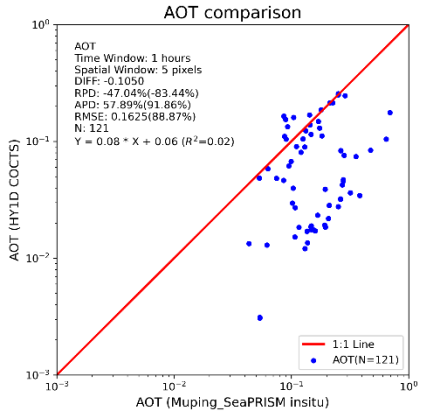
COCTS/Haiyang 1D ---- L2A
Jan/2020 – Dec/2022

- Venise
- Section-7_Platform
- Dongtou
- **Muping**

Rrs



AOT



Product	N	RPD	APD
Rrs412-Rrs412	33	321.0%	328.5%
Rrs443-Rrs443	33	234.3%	239.2%
Rrs490-Rrs490	33	142.5%	147.3%
Rrs565-Rrs551	33	48.7%	62.1%
Rrs670-Rrs667	33	288.7%	296.2%
AOT	44	-47.0%	57.9%

Chla Not Available

Significantly Over-estimated

Significantly Under-estimated

国家海洋技术中心 NATIONAL OCEAN TECHNOLOGY CENTER

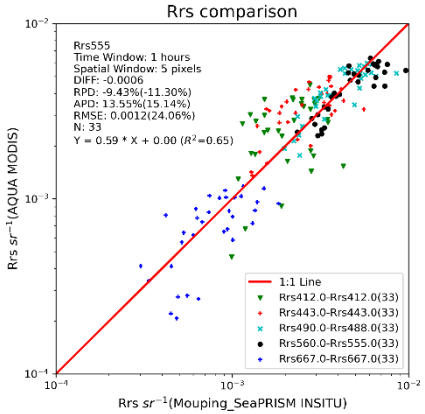
3rd Year Results

(1) Validation Activities – Ongoing

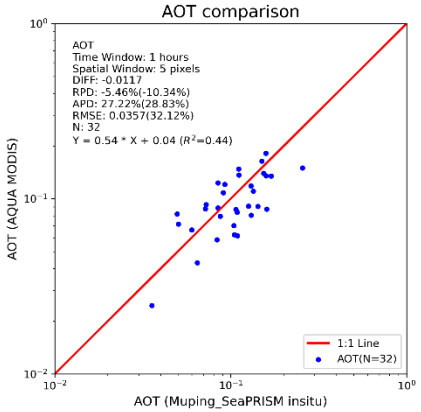
MODIS/AQUA ---- L2 – for reference
Jan/2020 – Dec/2022

- Venise
- Section-7_Platform
- Dongtou
- **Muping**

Rrs



AOT



Product	N	RPD	APD
Rrs412-Rrs412	33	27.6%	51.5%
Rrs443-Rrs443	33	30.4%	38.4%
Rrs488-Rrs490	33	3.0%	15.3%
Rrs555-Rrs560	33	-9.4%	13.5%
Rrs667-Rrs667	33	-7.6%	28.4%
AOT	32	-5.5%	27.2%

Chla Not Available

Significantly Over-estimated

Significantly Under-estimated

国家海洋技术中心 NATIONAL OCEAN TECHNOLOGY CENTER

3rd Year Results

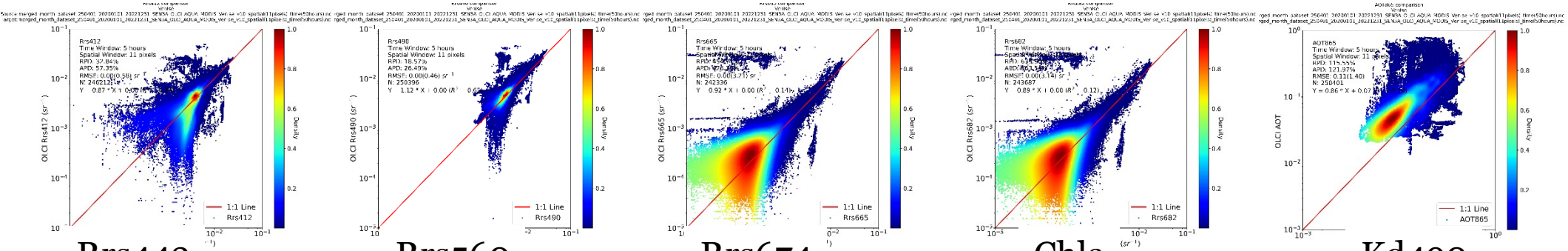
(2) Consistency Check – First Results

OLCI/Sentinel 3A vs MODIS/AQUA

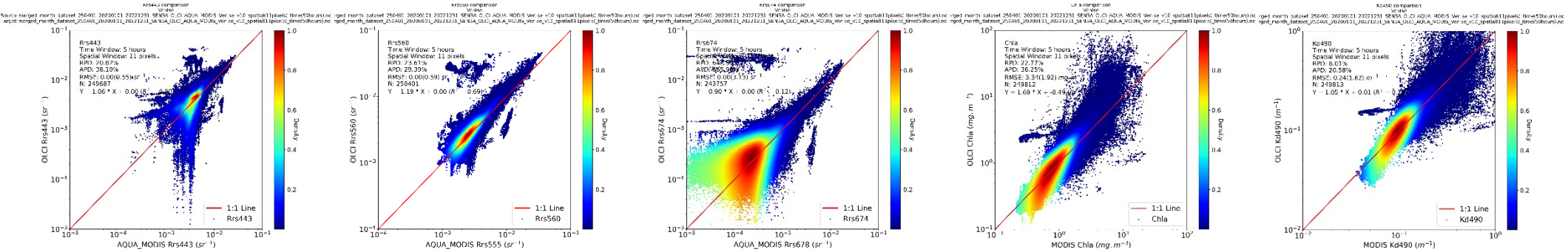
Three-Year (Jan/2020 – Dec/2022)

- **Venise**
- Section-7_Platform
- Dongtou
- Muping

Rrs412 Rrs490 Rrs665 Rrs682 AOT



Rrs443 Rrs560 Rrs674 Chla Kd490



Scatter Plot

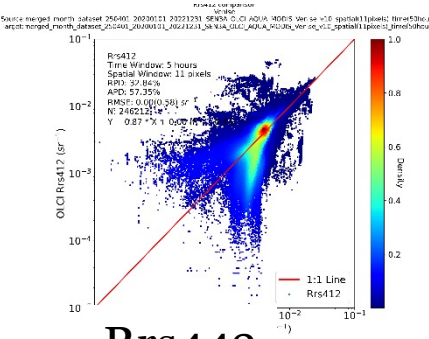
(2) Consistency Check – First Results

OLCI/Sentinel 3A vs MODIS/AQUA

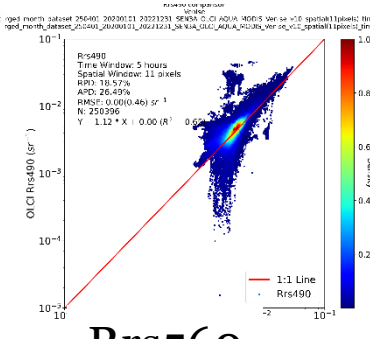
Three-Year (Jan/2020 – Dec/2022)

Product	N	RPD	APD
Rrs412	246,212	32.84%	57.35%
Rrs490	250,396	18.57%	26.49%
Rrs560	250,401	23.61%	29.39%
AOT	250,401	115.55%	121.97 %
Chla	249,,812	22.77%	36.25%
Kd490	249813	8.01%	20.58%

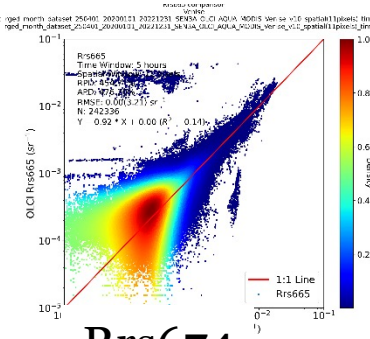
Rrs412



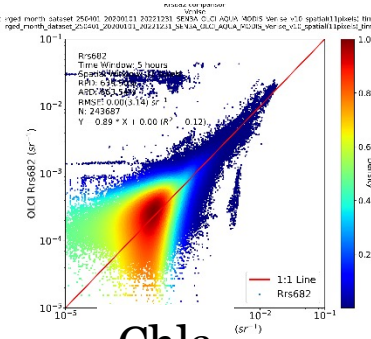
Rrs490

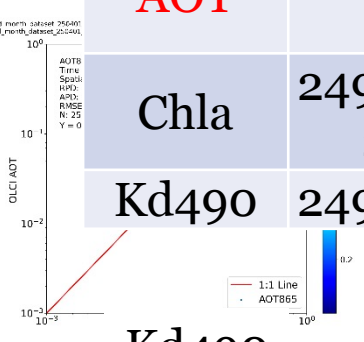


Rrs665

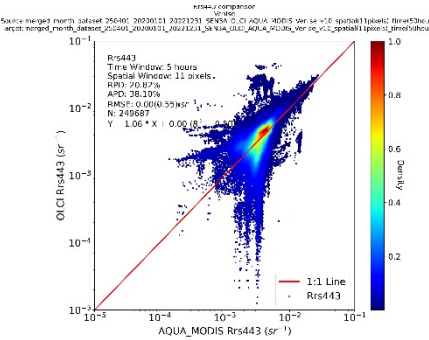


Rrs682

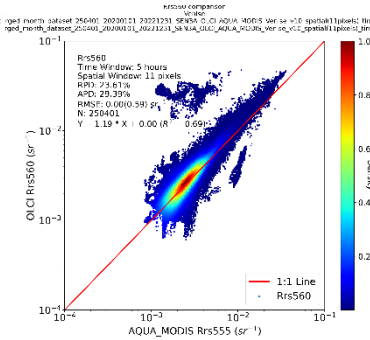




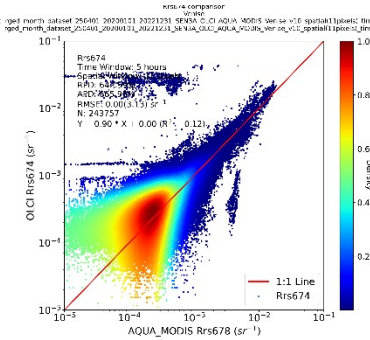
Rrs443



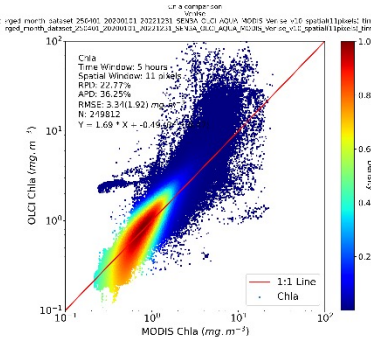
Rrs560



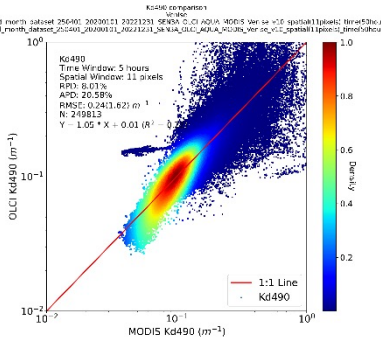
Rrs674



Chla



Kd490



Scatter Plot

3rd Year Results

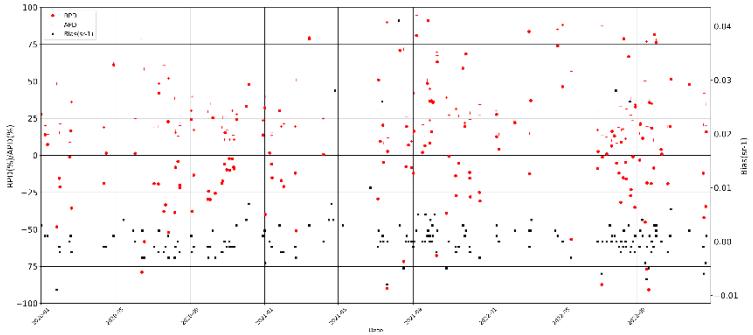
(2) Consistency Check – First Results

OLCI/Sentinel 3A vs MODIS/AQUA

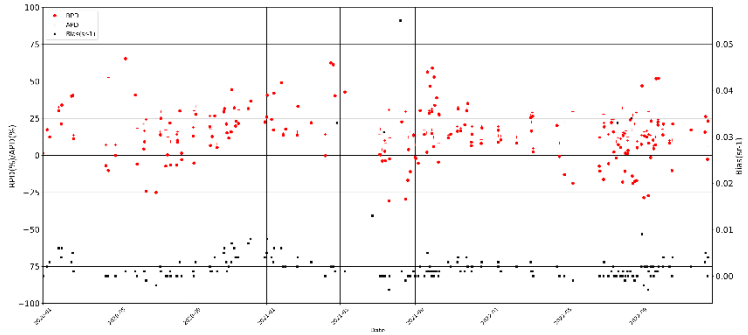
Three-Year (Jan/2020 – Dec/2022)

- **Venise**
- Section-7_Platform
- Dongtou
- Muping

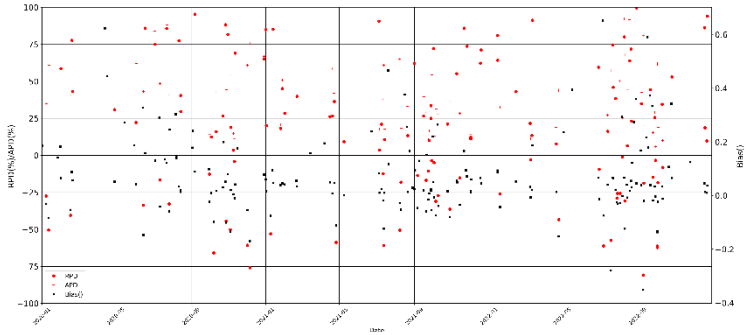
Rrs412



Rrs560



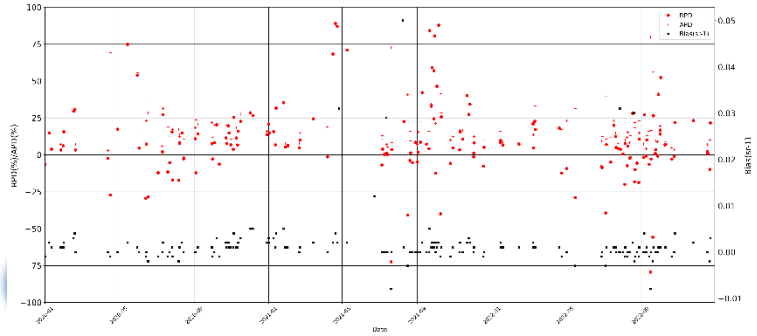
AOT



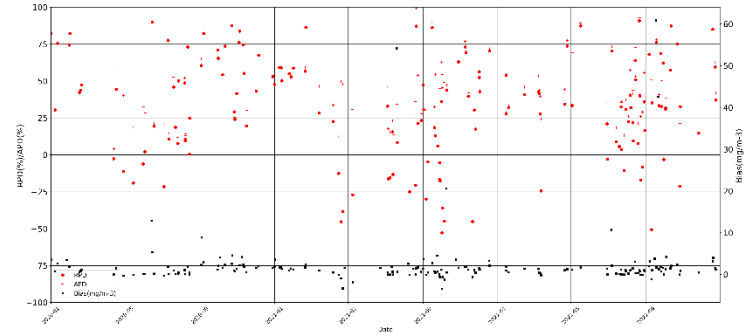
Error Tre

- RPD
- APD
- Bias

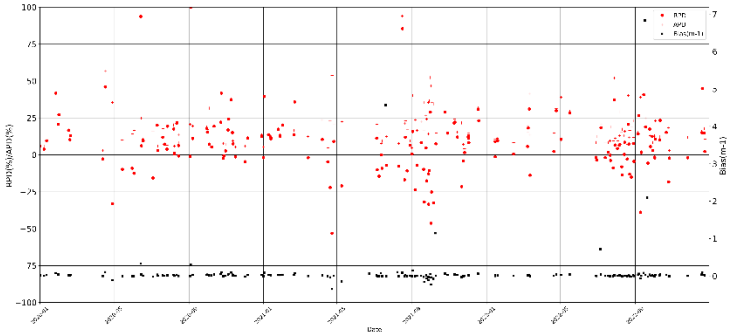
Rrs490



Chla



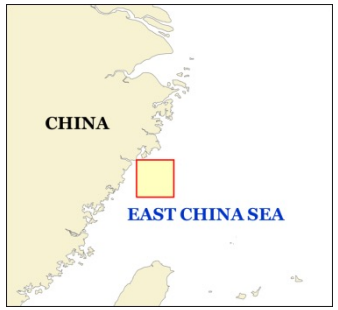
Kd490



3rd Year Results

(2) Consistency Check – First Results

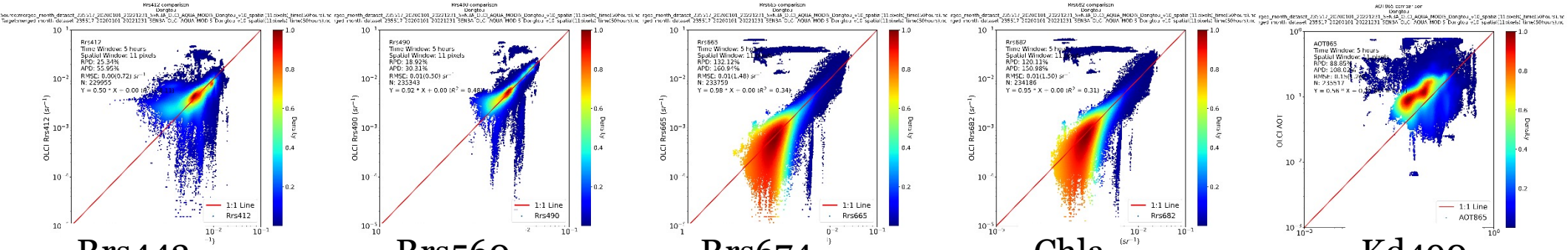
- Venise
- Section-7_Platform
- **Dongtou**
- Muping



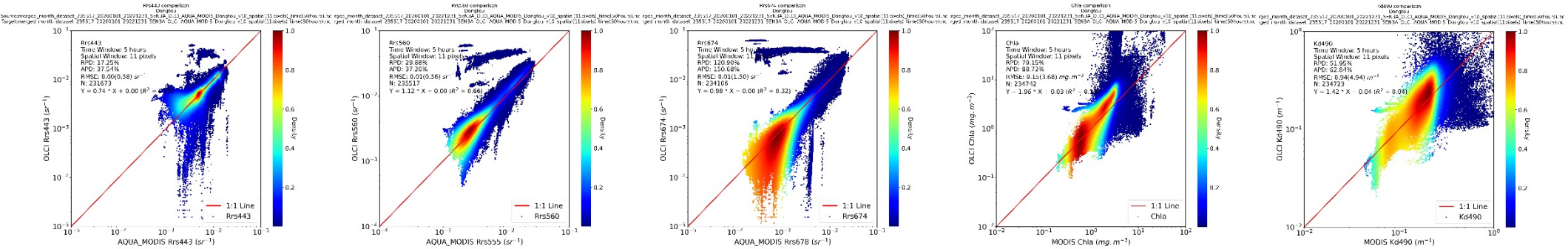
OLCI/Sentinel 3A vs MODIS/AQUA

Three-Year (Jan/2020 – Dec/2022)

Rrs412 Rrs490 Rrs665 Rrs682 AOT



Rrs443 Rrs560 Rrs674 Chla Kd490



Scatter Plot

3rd Year Results

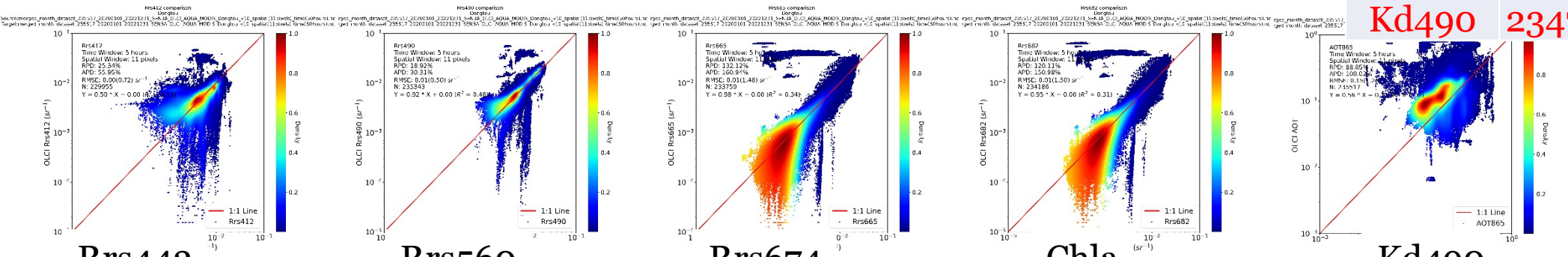
(2) Consistency Check – First Results

OLCI/Sentinel 3A vs MODIS/AQUA

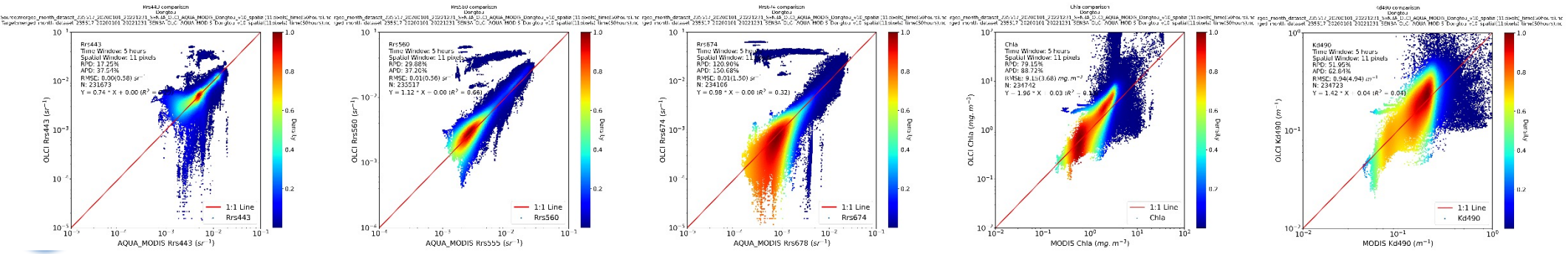
Three-Year (Jan/2020 – Dec/2022)

Product	N	RPD	APD
Rrs412	229955	25.34%	55.95%
Rrs490	235343	18.92%	30.31%
Rrs560	235517	29.88%	37.20%
AOT	235517	88.85%	108.02 %
Chla	234742	79.15%	88.72%
Kd490	234723	51.95%	62.84%

Rrs412 Rrs490 Rrs665 Rrs682



Rrs443 Rrs560 Rrs674 Chla Kd490



Scatter Plot

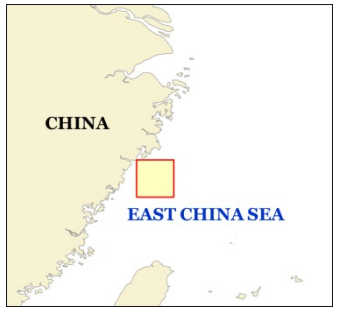
3rd Year Results

(2) Consistency Check – First Results

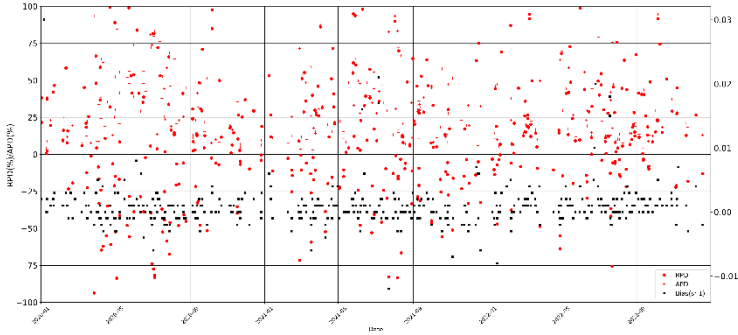
OLCI/Sentinel 3A vs MODIS/AQUA

Three-Year (Jan/2020 – Dec/2022)

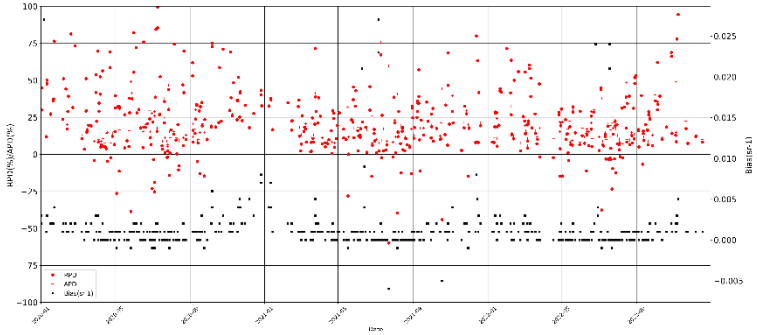
- Venise
- Section-7_Platform
- **Dongtou**
- Muping



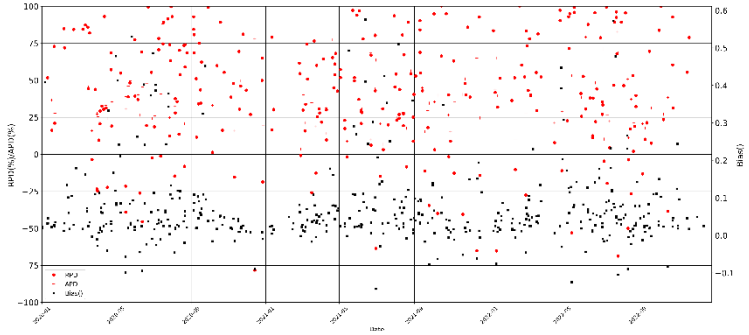
Rrs412



Rrs560



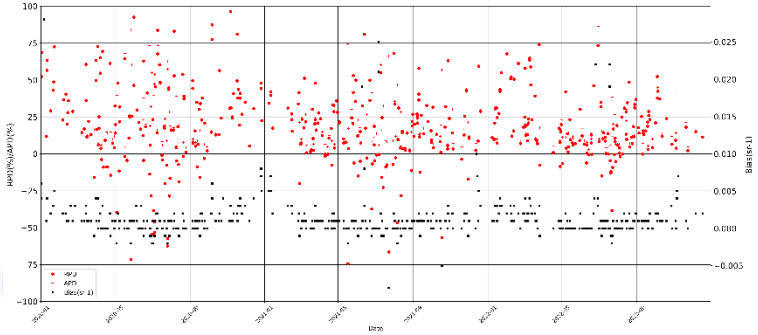
AOT



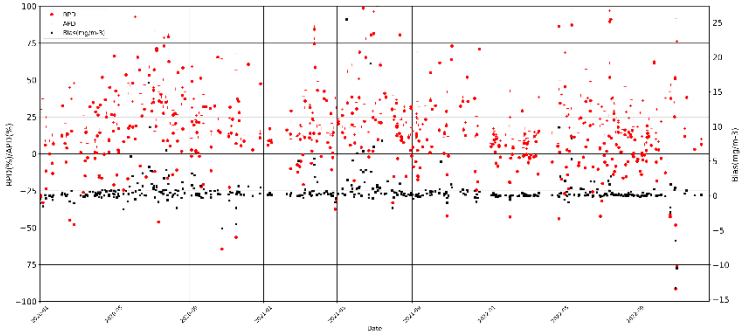
Error Tren

- RPD
- APD
- Bias

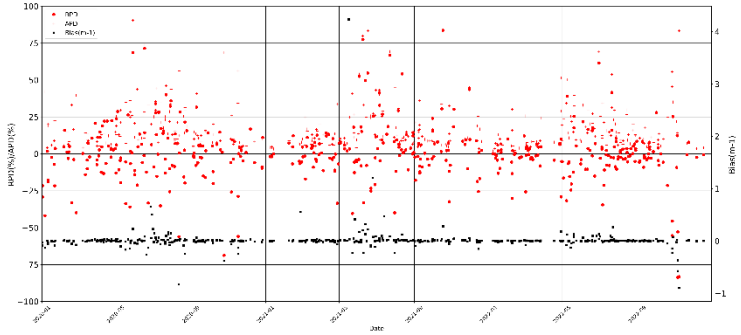
Rrs490



Chla



Kd490



3rd Year Results

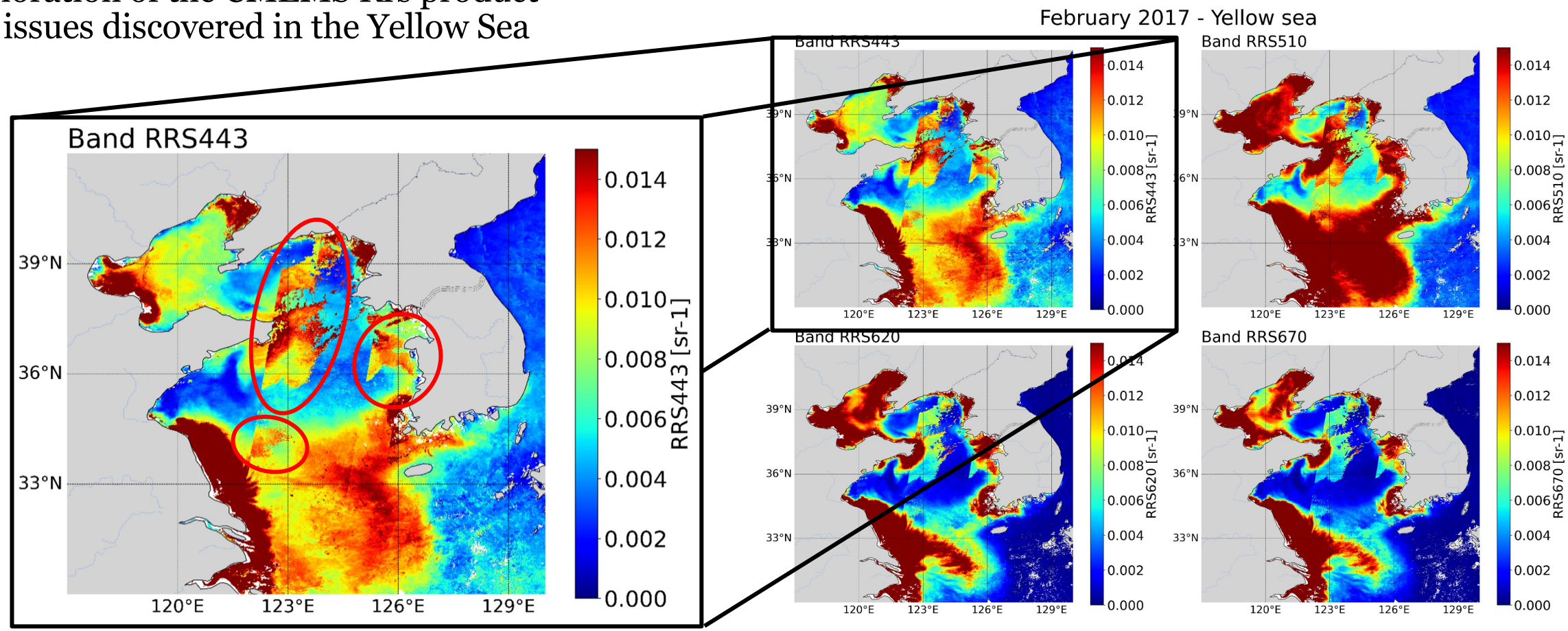
(2) Results by LOG : Corentin's Subirade PhD topic → Spatial and temporal variability of the water quality of the European and Chinese coastal waters using OLCI and COCTS data

POSTER ROOM #316

国家海洋技术中心
NATIONAL OCEAN TECHNOLOGY CENTER

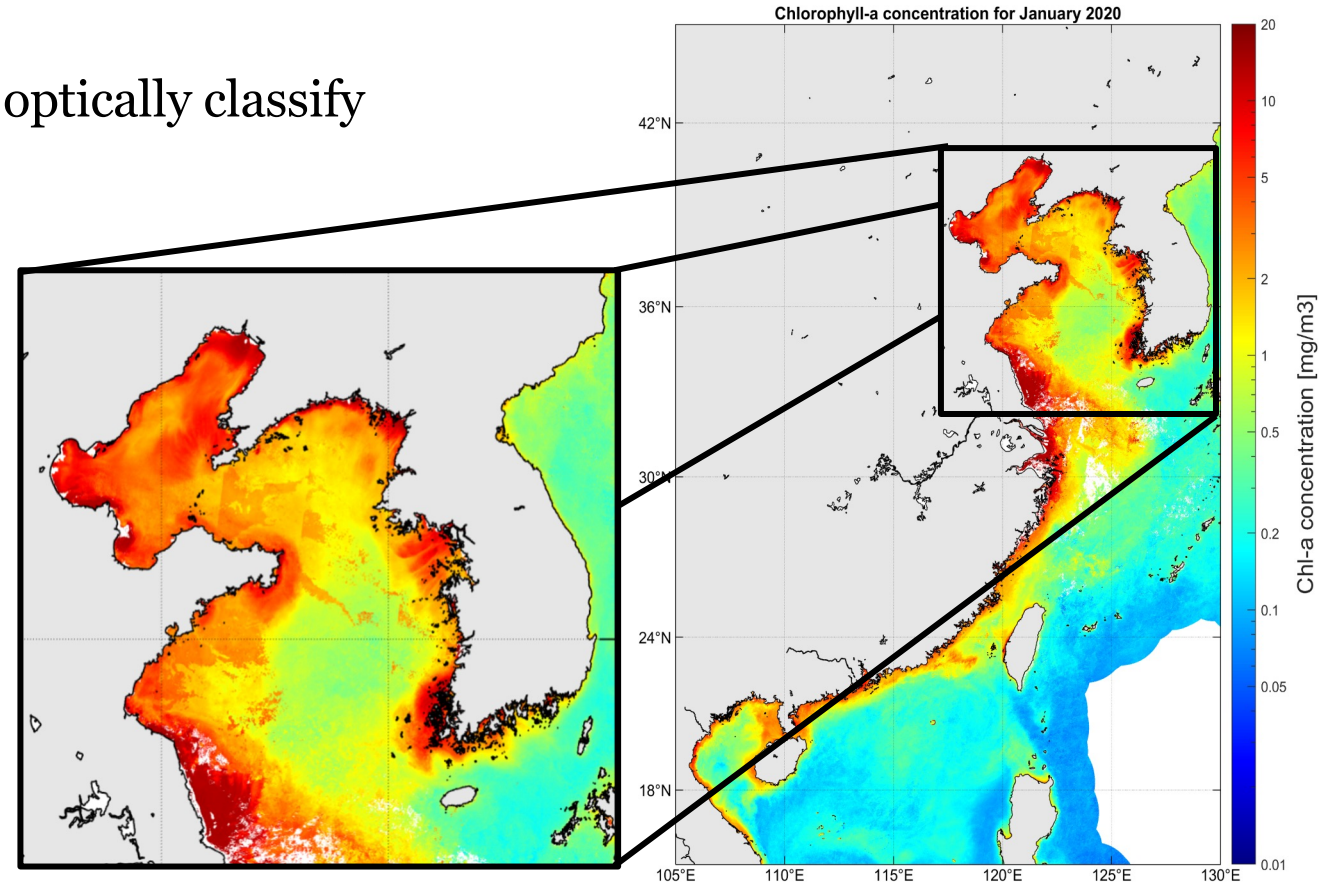
CMEMS OLCI Rrs coastal product HR - atmospheric corrections in the Yellow Sea

- Exploration of the CMEMS Rrs product
- Rrs issues discovered in the Yellow Sea



Chlorophyll-a concentration estimated from the CMEMS Rrs daily product

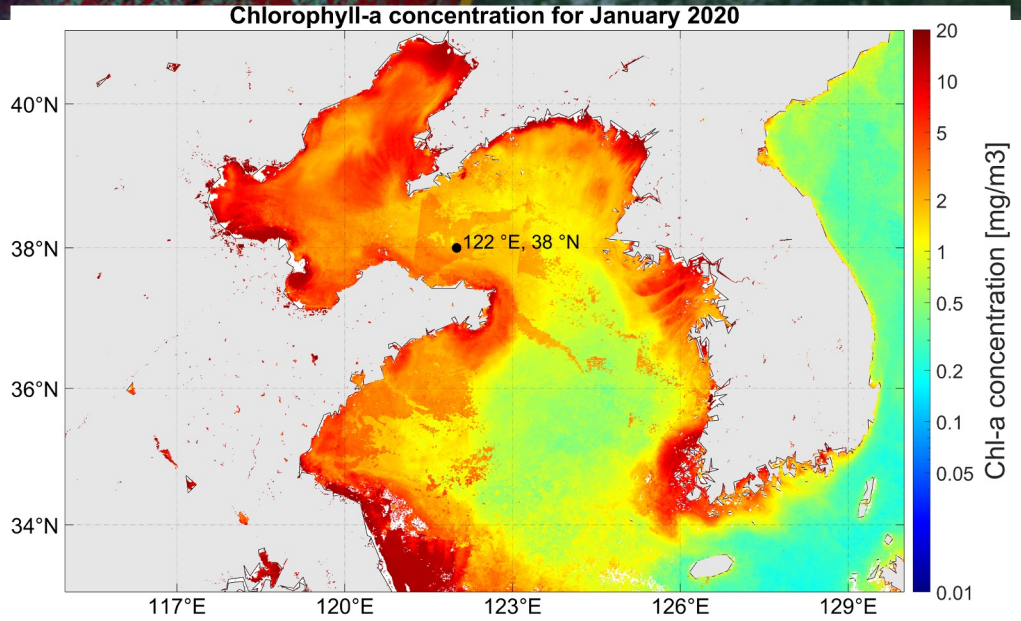
- Use of Tran et al. (2023) algorithm to optically classify waters and estimate Chla
- High sensibility to AC issues

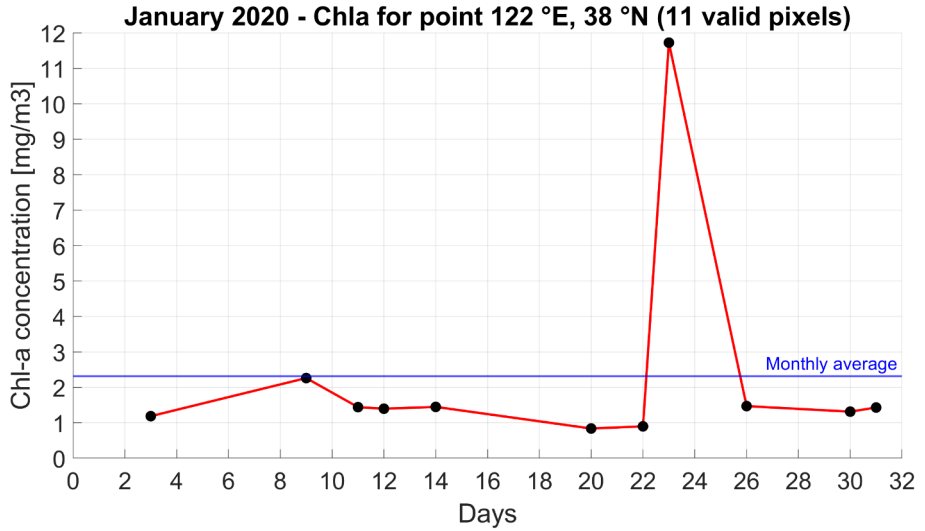


3rd Year Results

Exploration of Chlorophyll-a time series

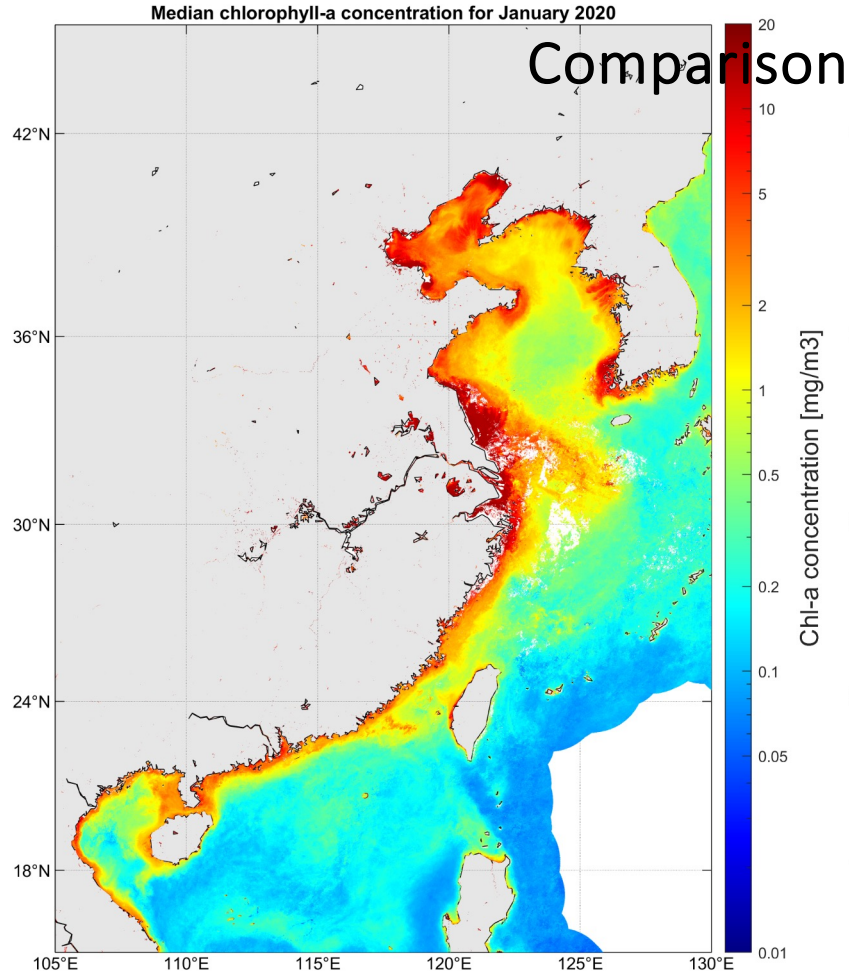
- Exploration of time series for different pixels during January 2020
- 3 days with AC issues in January 2020



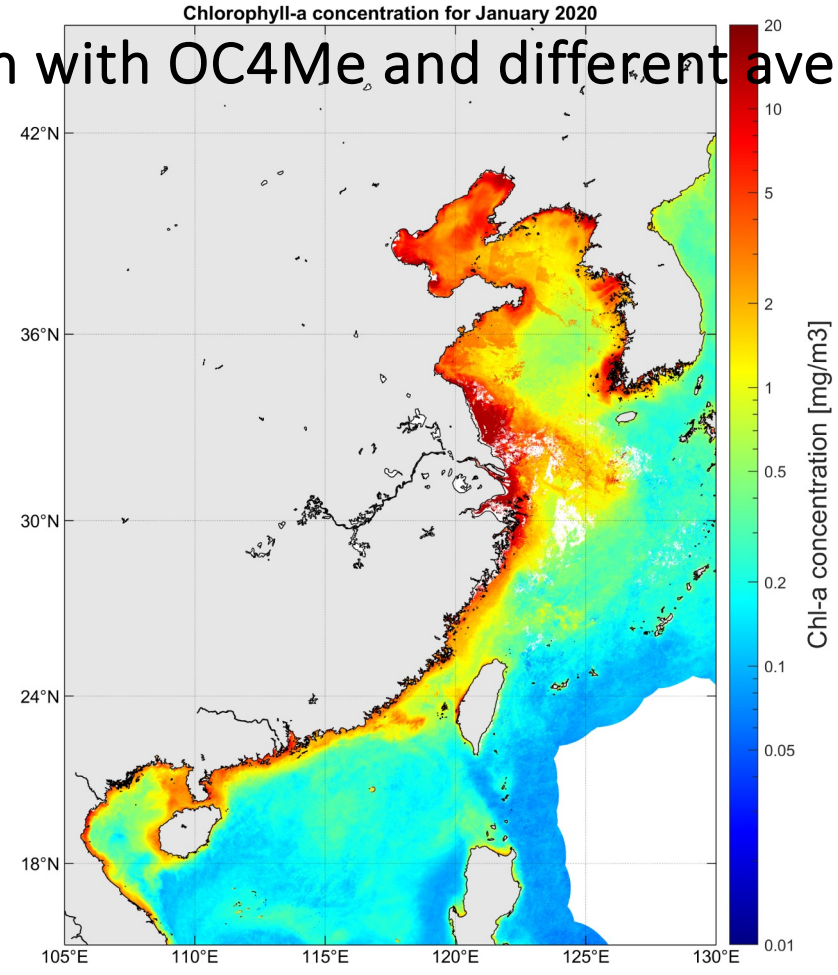


3rd Year Results

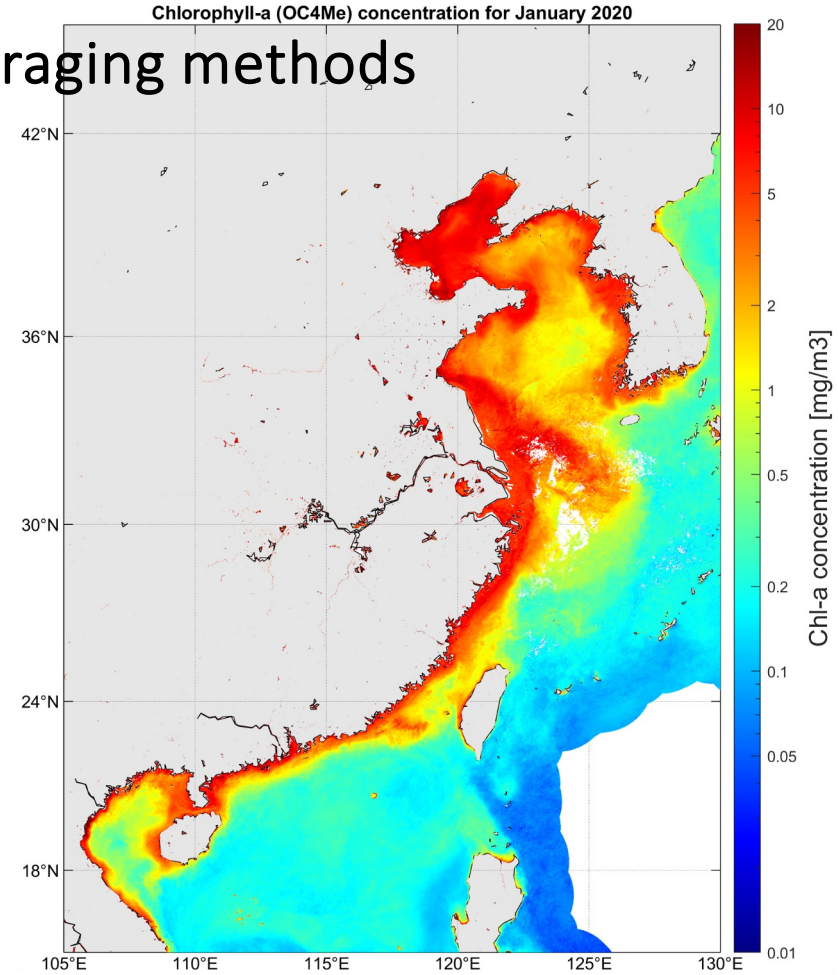
Comparison with OC4Me and different averaging methods



Median



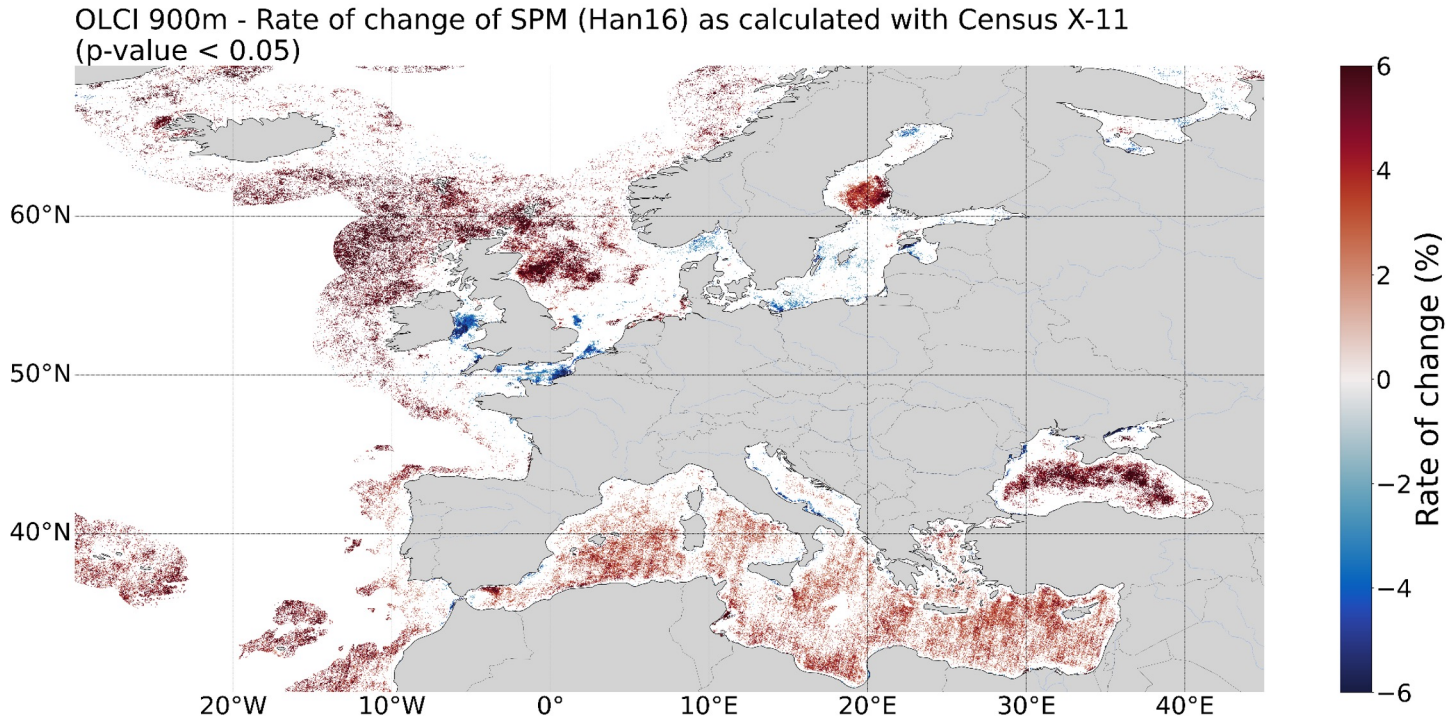
Mean



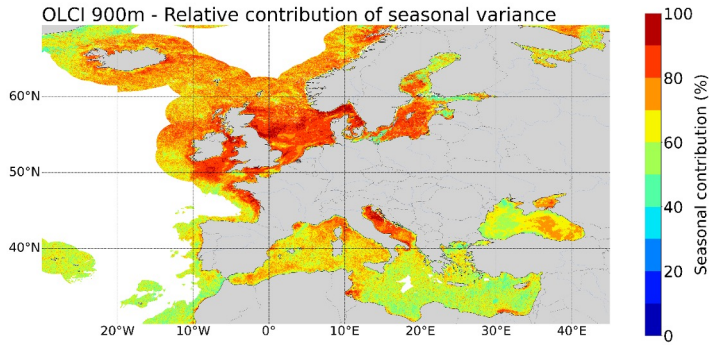
OC4Me

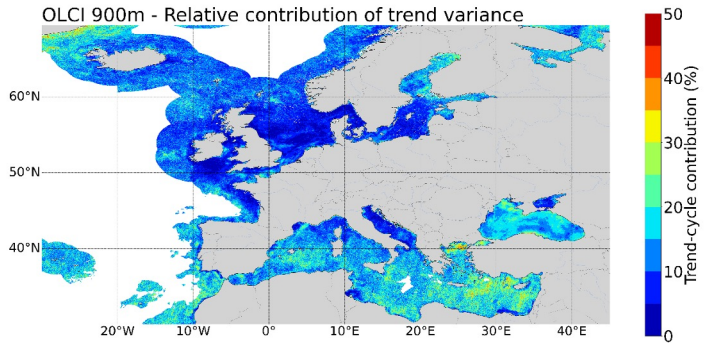
Europe OLCI SPM time series analysis with Census X11

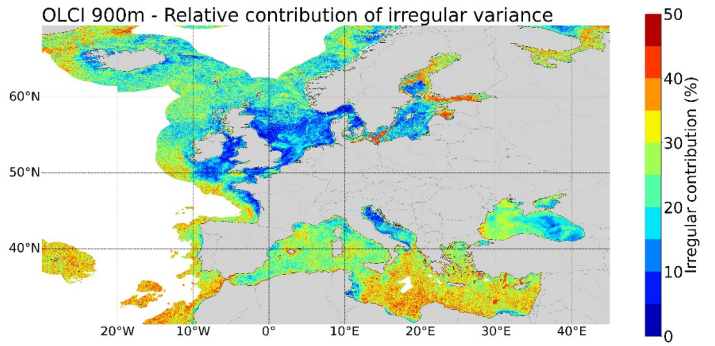
- **Relative contributions** of seasonal, trend and irregular variances to total SPM variance
- Rate of change of SPM can be significative



Relative contributions to total variance of SPM (Han16) as calculated with Census X-11







European Young scientists contributions in Dragon 5

Name	Institution	Poster title	Contribution including period of research
Corentin Subirade	LOG, Université du Littoral-Côte d'Opale	Validation of OLCI Suspended Matter and Chlorophyll-a Concentrations Products and Variability of European Coastal Waters Quality	PhD in frame of the Dragon-5 project (jointly funded by ESA and ULCO)

Chinese Young scientists contributions in Dragon 5

Name	Institution	Contribution including period of research
Shuang CAO (postgraduate)	Backscattering modelling	Graduated
Di JIA (associate researcher)	Processing and quality control of SeaPRISM	Promoted
Qiaoying YUAN (postgraduate)	Validation	To graduate in 2025

Future Plans

Schedule:

□July 2023-June 2024

(1)Continuously validating reflectance and other products(e.g., chlorophyll concentration) provided by OLCI and COCTS with in-situ data

(2)CZI and MSI data products needs to be considered, Mouping and other SeaPRISM data will be considered

(3)Consistency check will be extended

(4)Check difference among various atmospheric correction and bio-optical algorithms

(5)Collect in-situ coincident biological and optical measurements to develop novel bio-optical algorithms, and explore more accurate EO products

(6)Develop special products for COCTS/OLCI and/or CZI/MSI in special coastal waters

(7)Description of the dynamics and quality of Chinese and European coastal waters

Thanks for your attention

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谢谢

Merci

Dragon 5 3rd Year Results Reporting

- Inform on the project's objectives
- Detail the Copernicus Sentinels, ESA, Chinese and ESA Third Party Mission data utilised after 3 years (complete slide 4)
- Detail the in-situ data measurements and requirements
- Provide details on field data collection campaigns and periods in P.R. China or other study areas
- Inform on the results after 3 years of activity
- Inform on the project's schedule, planning & contribution of the partners for the following year
- Report on the level and training of young scientists on the project achievements, including plans for academic exchanges
- Report on the peer reviewed publications (nr. of papers, journal name and publication title) after 3 years of activity