Supplement of Ocean Sci., 22, 3567–3593, 2026
https://doi.org/10.5194/os-22-3567-2026-supplement
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Ocean Science Open Access EGU

Supplement of

Blue carbon development and ecosystem services in oligotrophic environments: the case for a shallow coastal installation on the shelf off Tenerife (Canary Islands)

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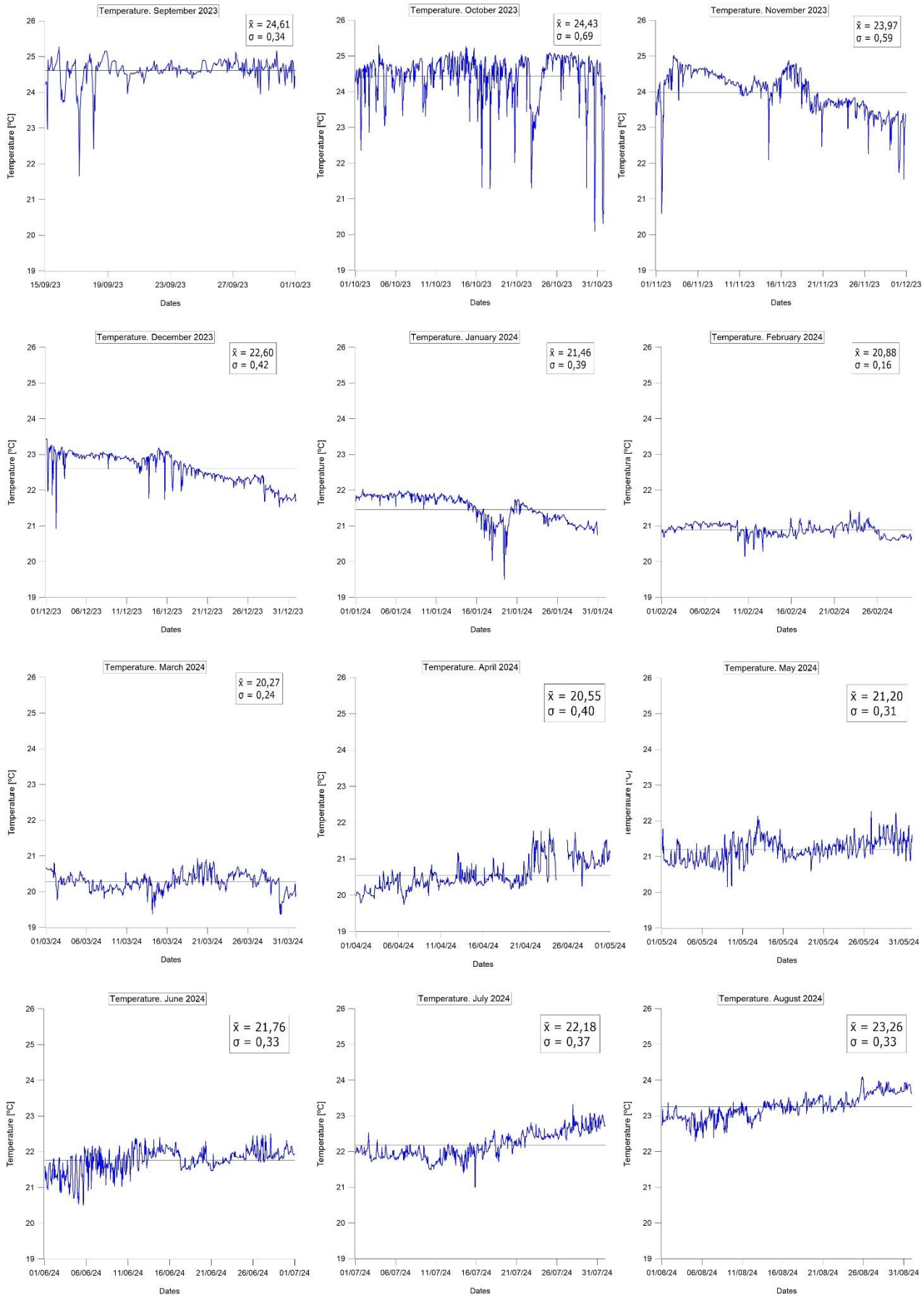


Figure S1a. Temperature measurements taken from 15 September 2023 to 10 March 2025. Each graph shows a monthly period, with a horizontal black line representing the monthly average value. Within the square, the average value and standard deviation are presented. Gaps in the line correspond to the data missing due to maintenance in April 2024 and September 2024.

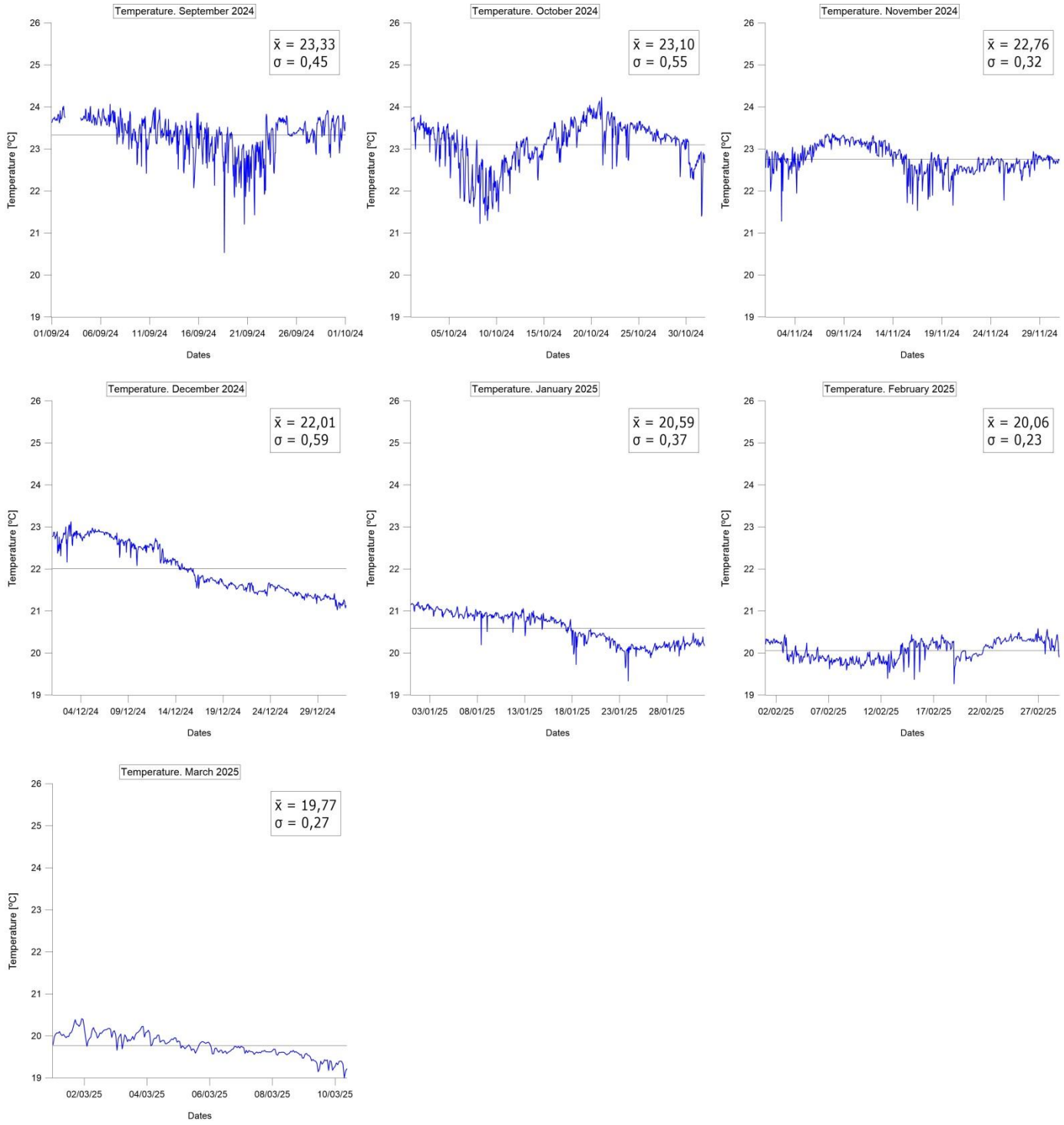


Figure S1b. Temperature measurements taken from 15 September 2023 to 10 March 2025. Each graph shows a monthly period, with a horizontal black line representing the monthly average value. Within the square, the average value and standard deviation are presented. Gaps in the line correspond to the data missing due to maintenance in April 2024 and September 2024.

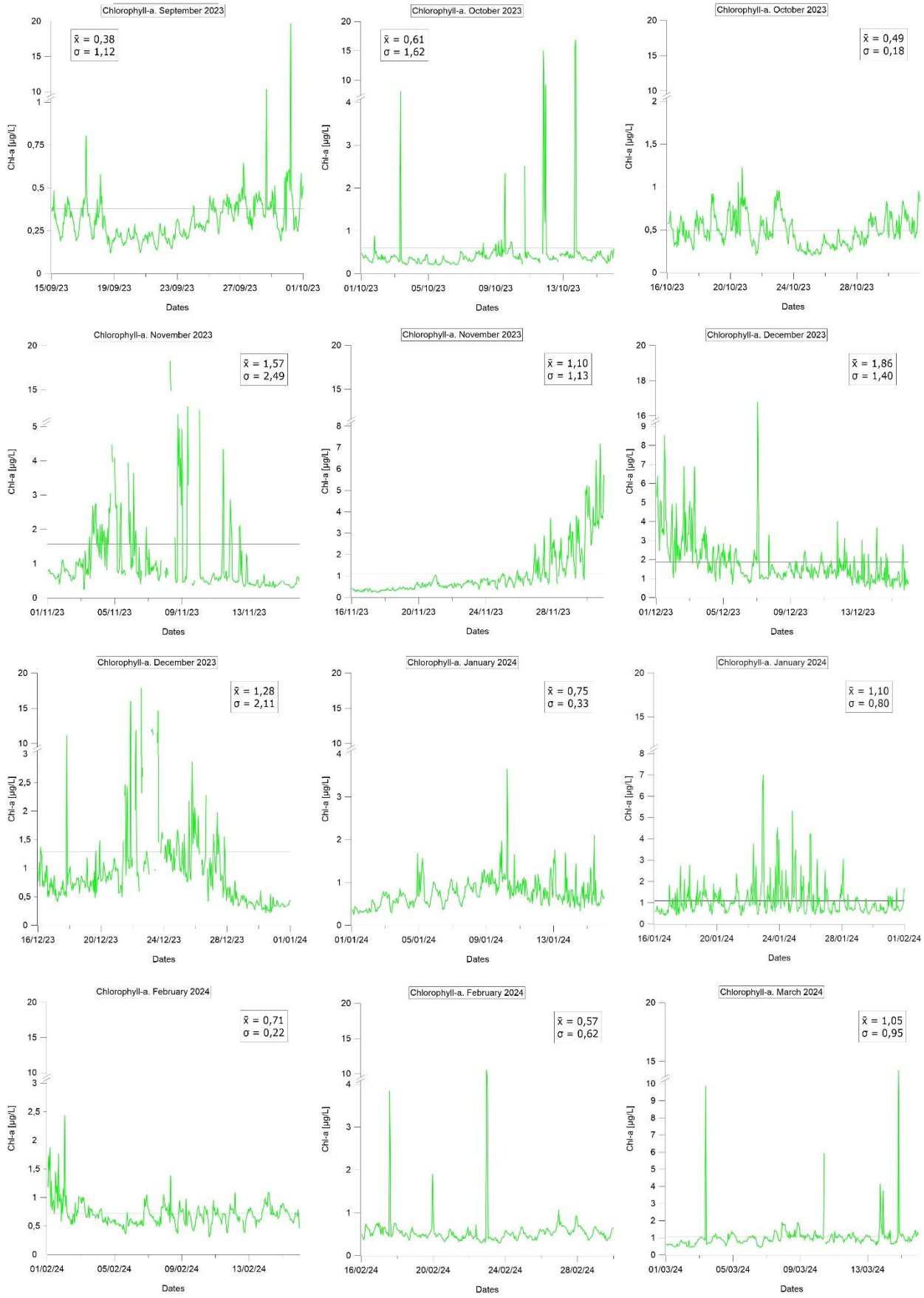


Figure S2a. Chlorophyll-a measurements taken from 15 September 2023 to 10 March 2025. Each graph shows a two-week period, with a horizontal black line representing the monthly average value. Within the square, the average value and standard deviation are presented. Gaps in the line correspond to the data removed or missing due to maintenance in April 2024 and September 2024.

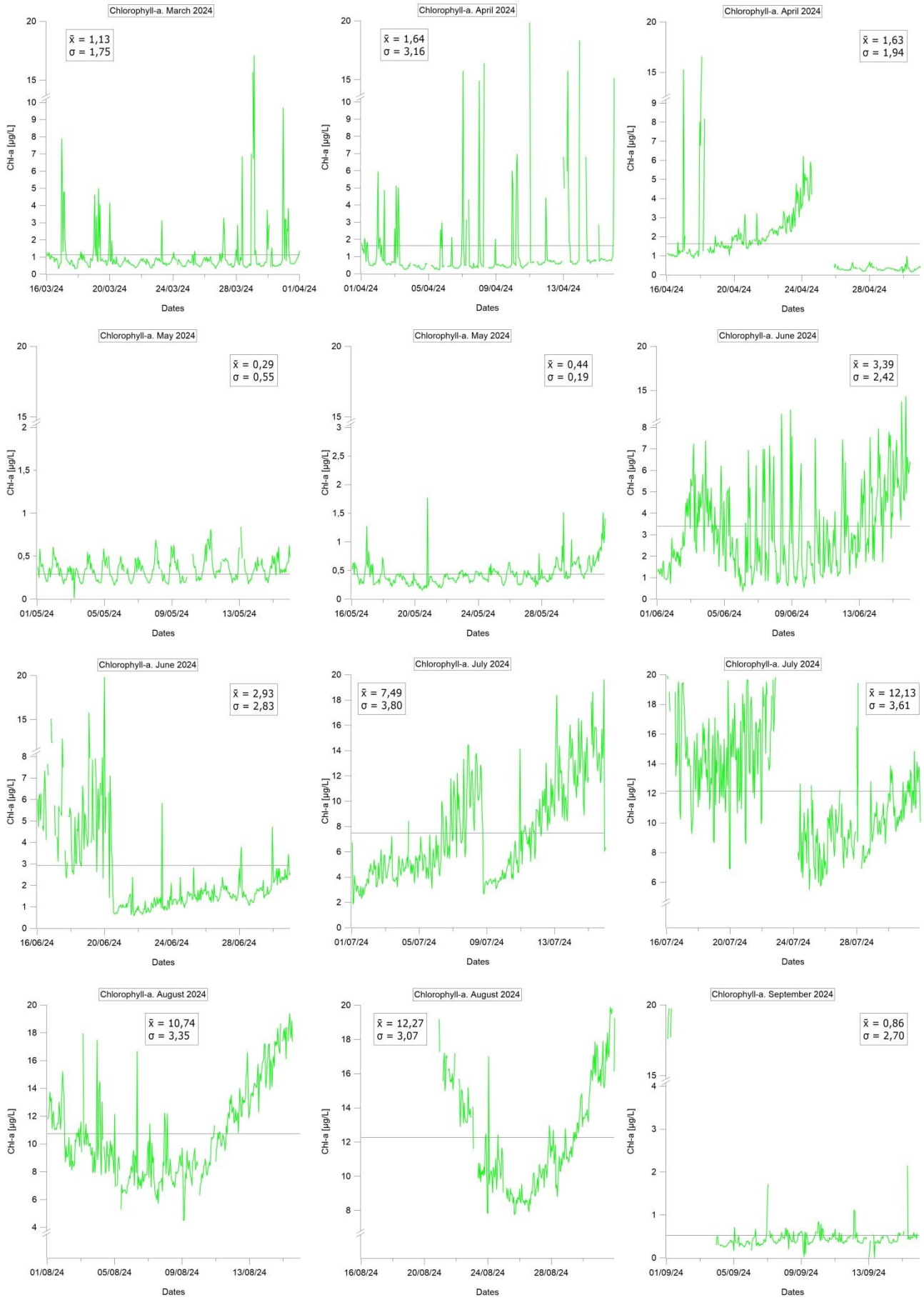


Figure S2b. Chlorophyll-a measurements taken from 15 September 2023 to 10 March 2025. Each graph shows a two-week period, with a horizontal black line representing the monthly average value. Within the square, the average value and standard deviation are presented. Gaps in the line correspond to the data removed or missing due to maintenance in April 2024 and September 2024.

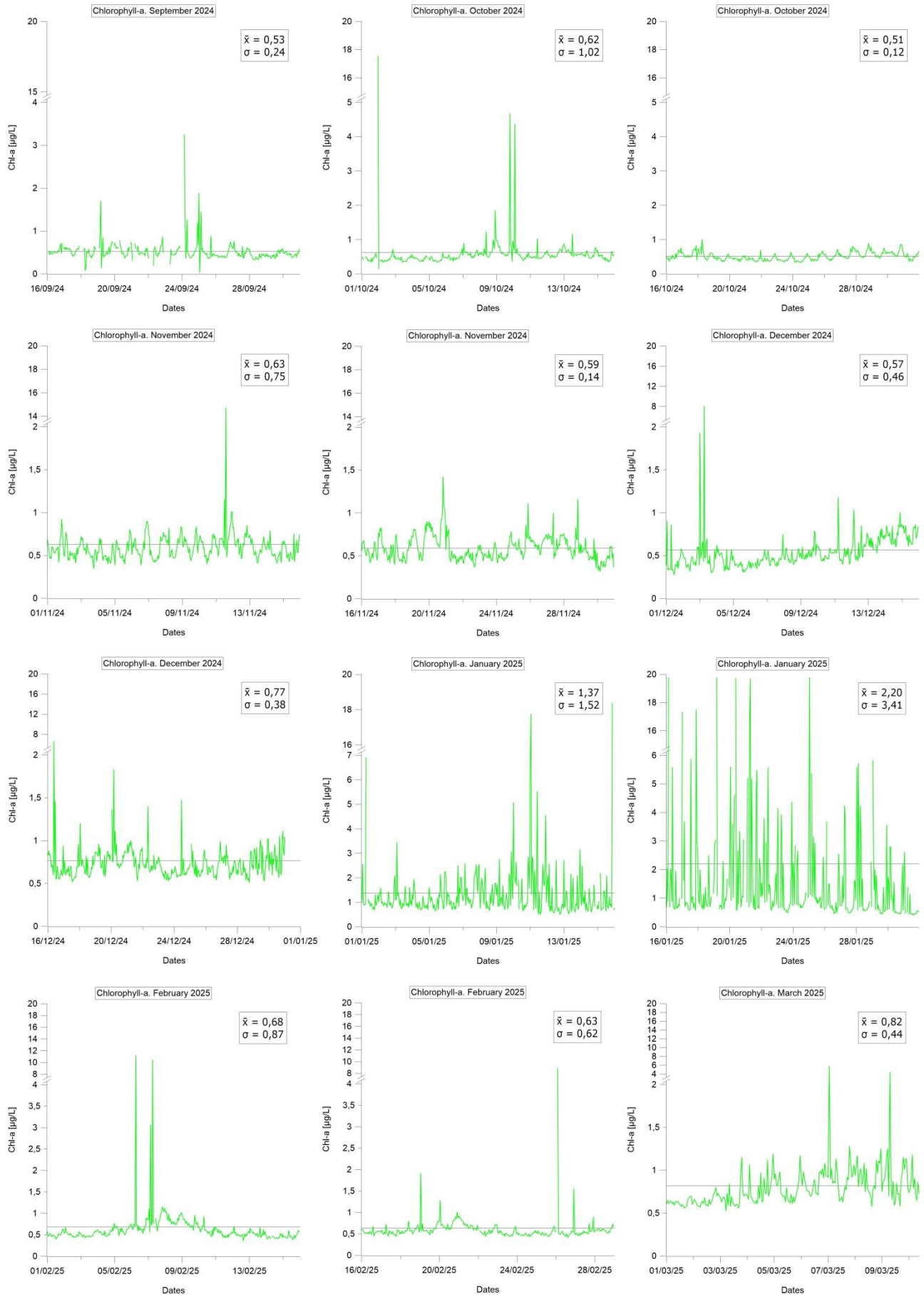


Figure S2c. Chlorophyll-a measurements taken from 15 September 2023 to 10 March 2025. Each graph shows a two-week period, with a horizontal black line representing the monthly average value. Within the square, the average value and standard deviation are presented. Gaps in the line correspond to the data removed or missing due to maintenance in April 2024 and September 2024.

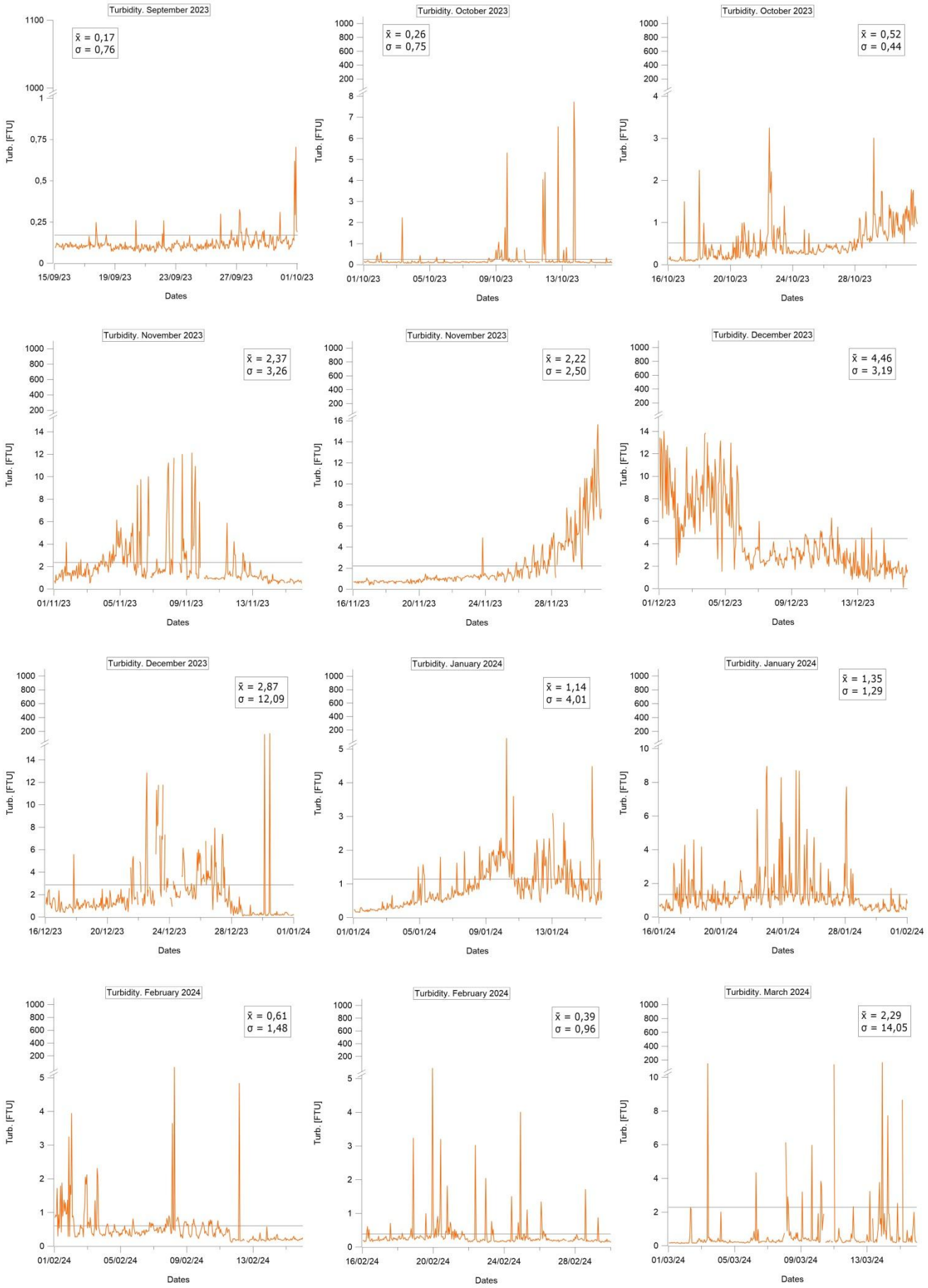


Figure S3a. Turbidity measurements taken from 15 September 2023 to 10 March 2025. Each graph shows a two-week period, with a horizontal black line representing the monthly average value. Within the square, the average value and standard deviation are presented. Gaps in the line correspond to the data removed or missing due to maintenance in April 2024 and September 2024.

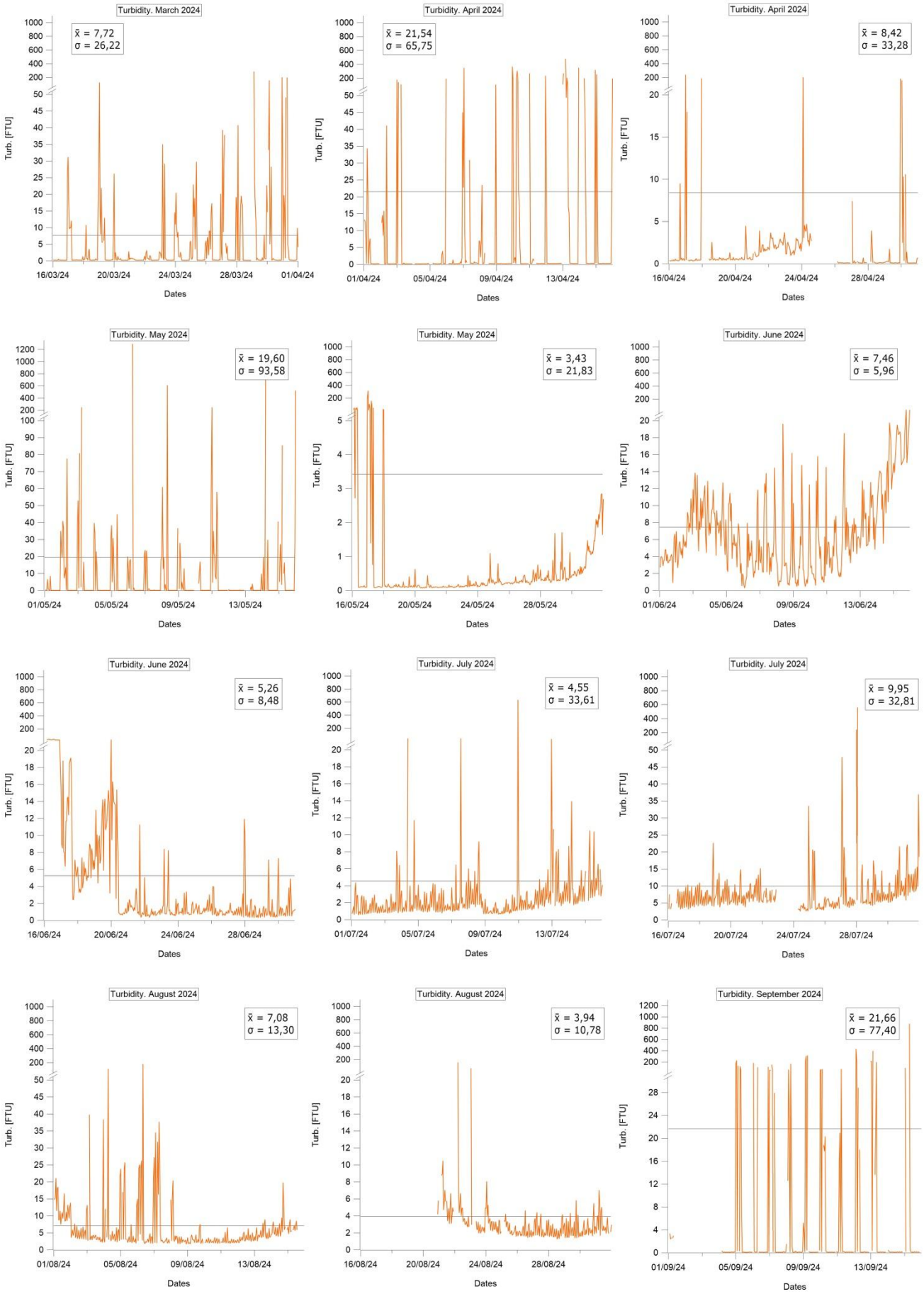


Figure S3b. Turbidity measurements taken from 15 September 2023 to 10 March 2025. Each graph shows a two-week period, with a horizontal black line representing the monthly average value. Within the square, the average value and standard deviation are presented. Gaps in the line correspond to the data removed or missing due to maintenance in April 2024 and September 2024.

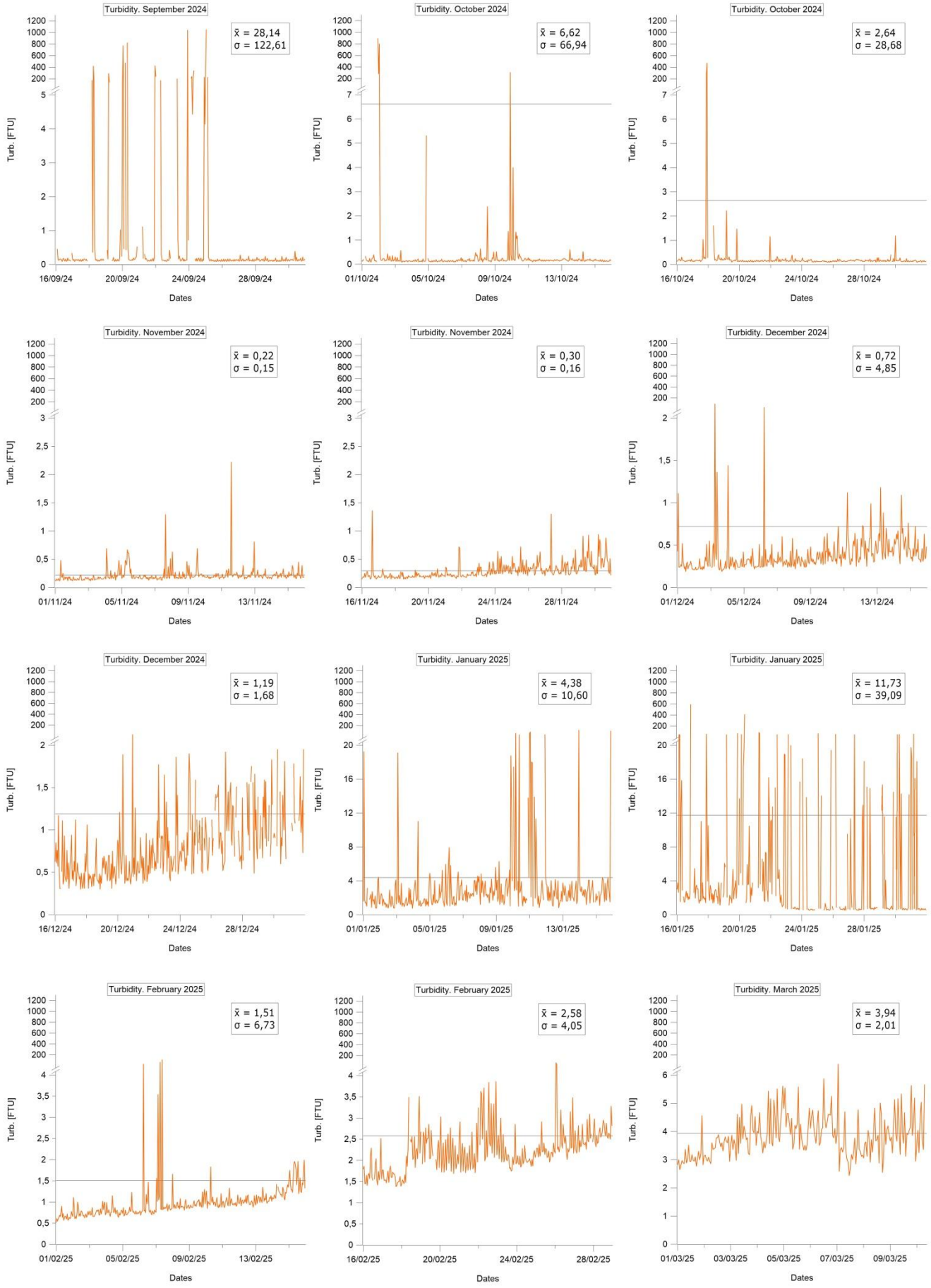


Figure S3c. Turbidity measurements taken from 15 September 2023 to 10 March 2025. Each graph shows a two-week period, with a horizontal black line representing the monthly average value. Within the square, the average value and standard deviation are presented. Gaps in the line correspond to the data removed or missing due to maintenance in April 2024 and September 2024.

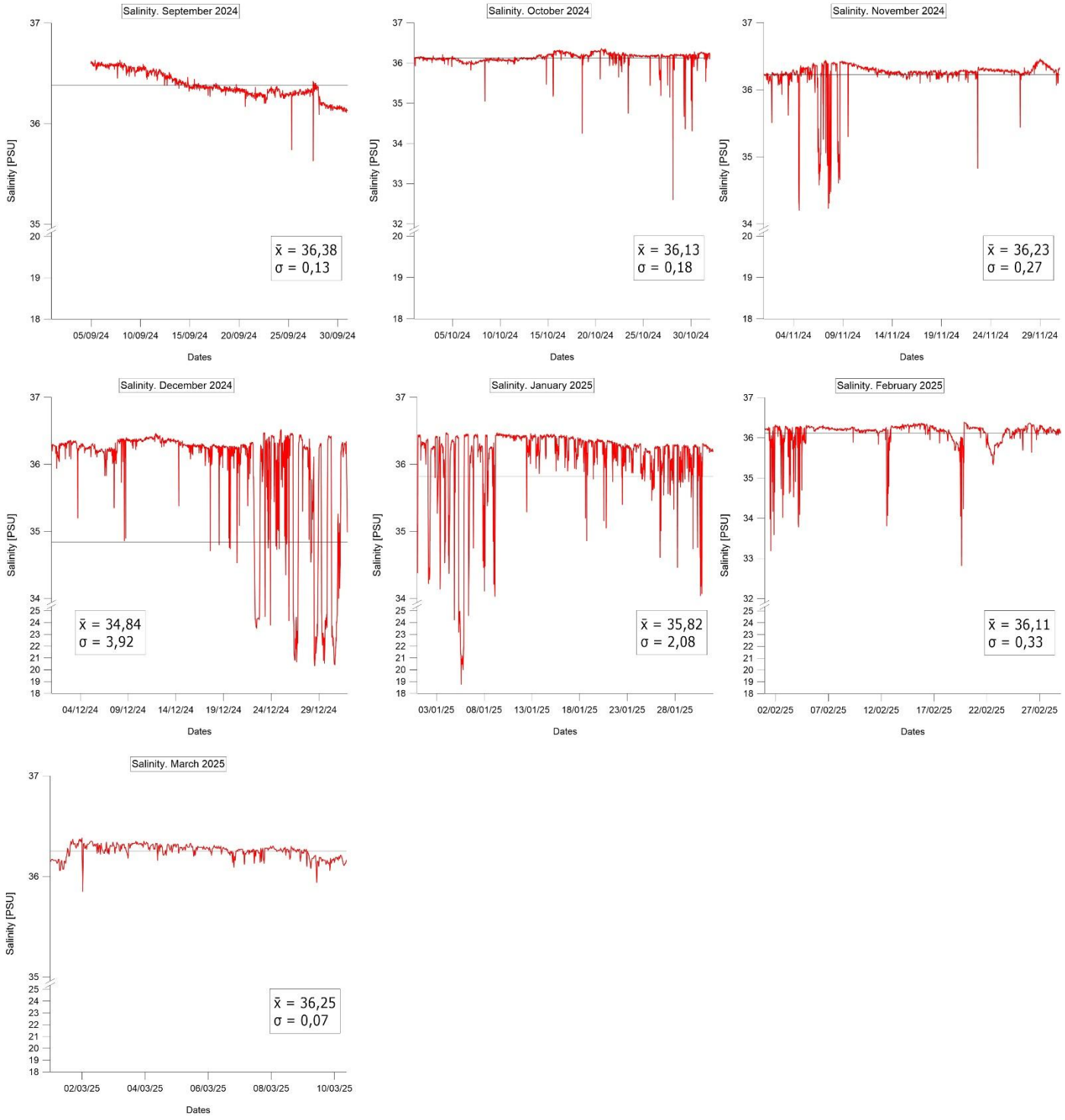


Figure S4. Salinity measurements taken from 3 September 2024 and 10 March 2025. Each graph shows a monthly period, with a horizontal black line representing the monthly average value. Within the square, the average value and standard deviation are presented.

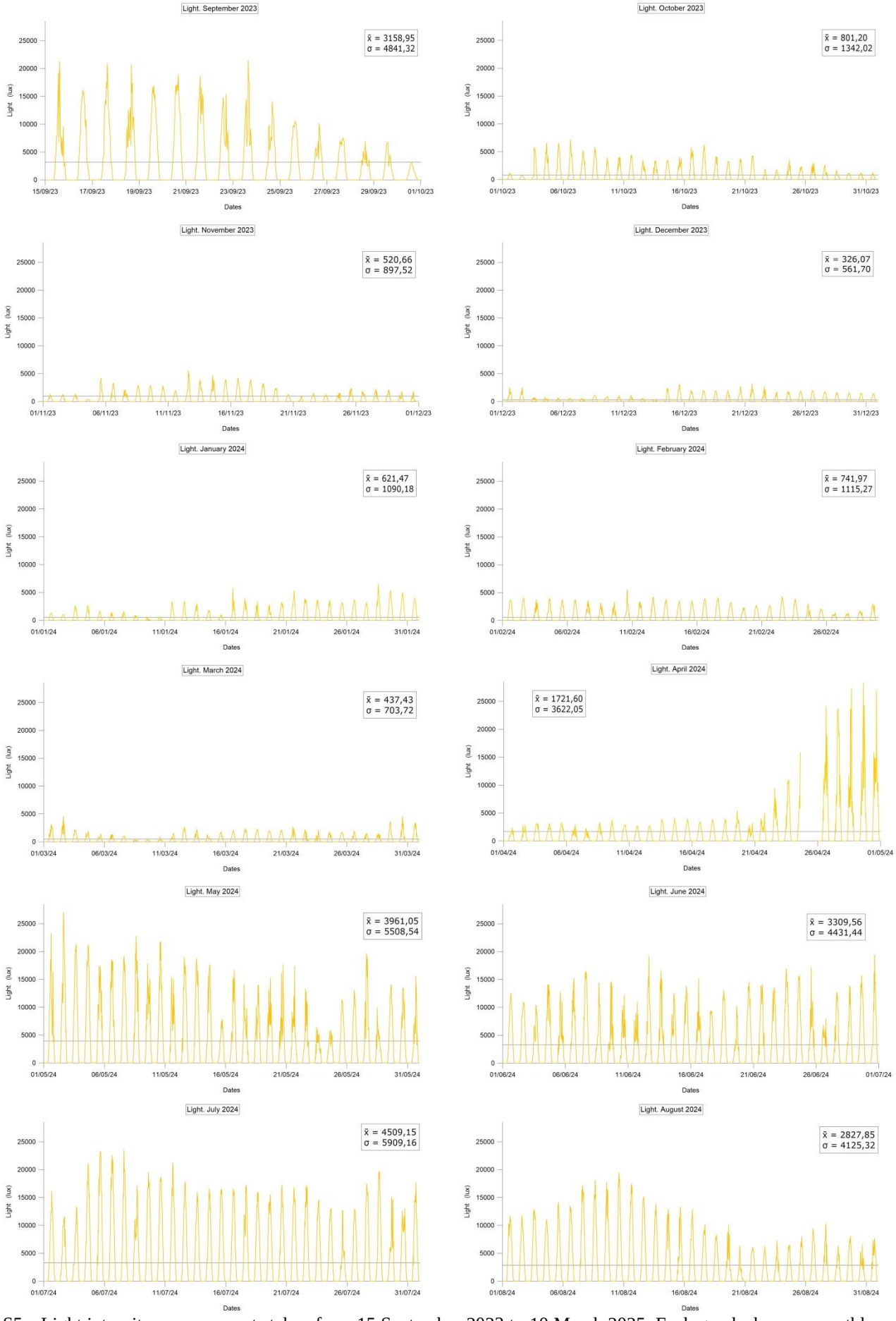


Figure S5a. Light intensity measurements taken from 15 September 2023 to 10 March 2025. Each graph shows a monthly period, with a horizontal black line representing the monthly average value. Within the square, the average value and standard deviation are presented. Gaps in the line correspond to the data removed or missing due to maintenance in April 2024 and September 2024.

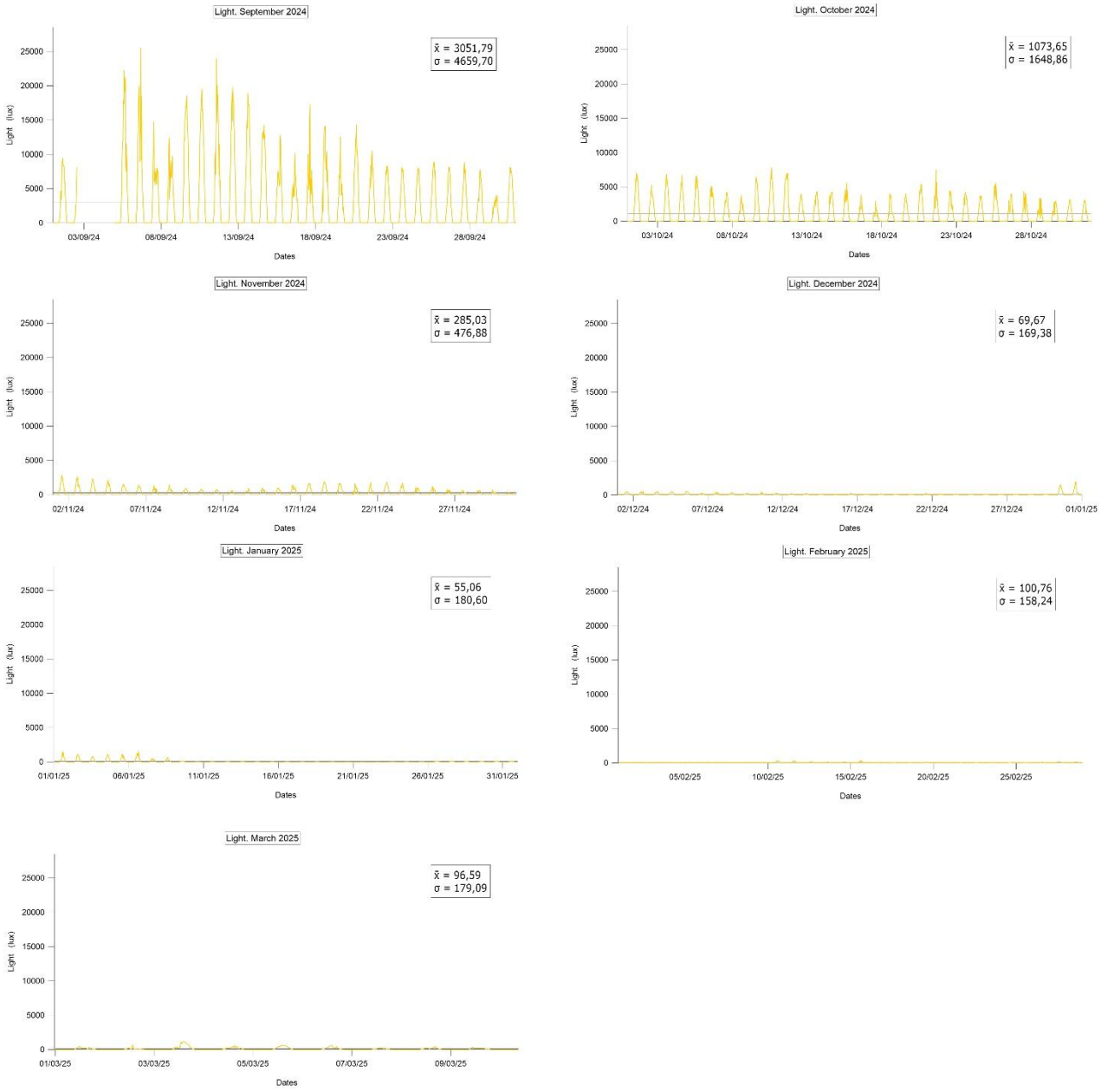


Figure S5b. Light intensity measurements taken from 15 September 2023 to 10 March 2025. Each graph shows a monthly period, with a horizontal black line representing the monthly average value. Within the square, the average value and standard deviation are presented. Gaps in the line correspond to the data removed or missing due to maintenance in April 2024 and September 2024.

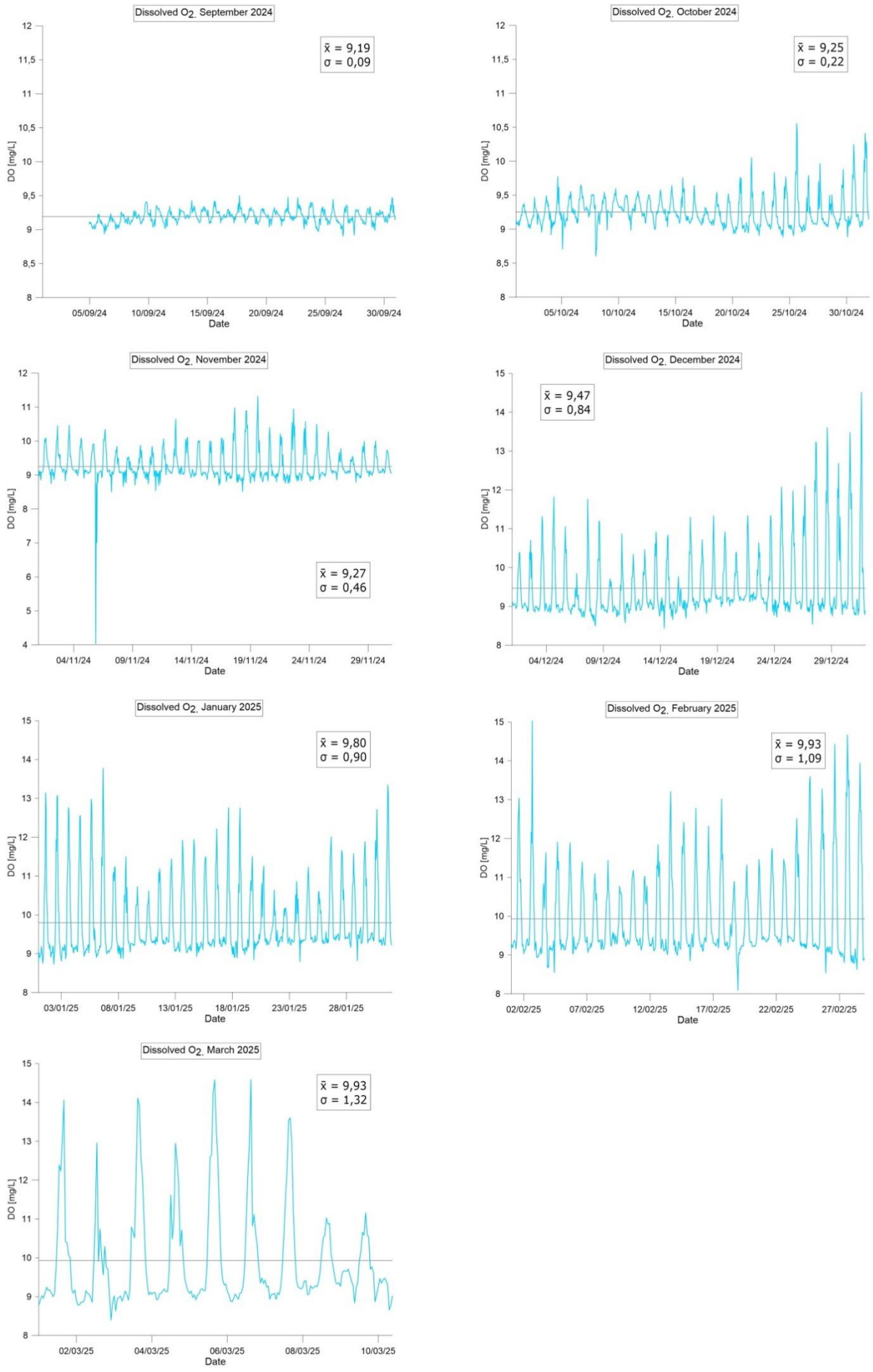


Figure S6. Dissolved O_2 measurements taken from 4 September 2024 to 10 March 2025. Each graph shows a monthly period, with a horizontal black line representing the monthly average value. Within the square, the average value and standard deviation are presented.

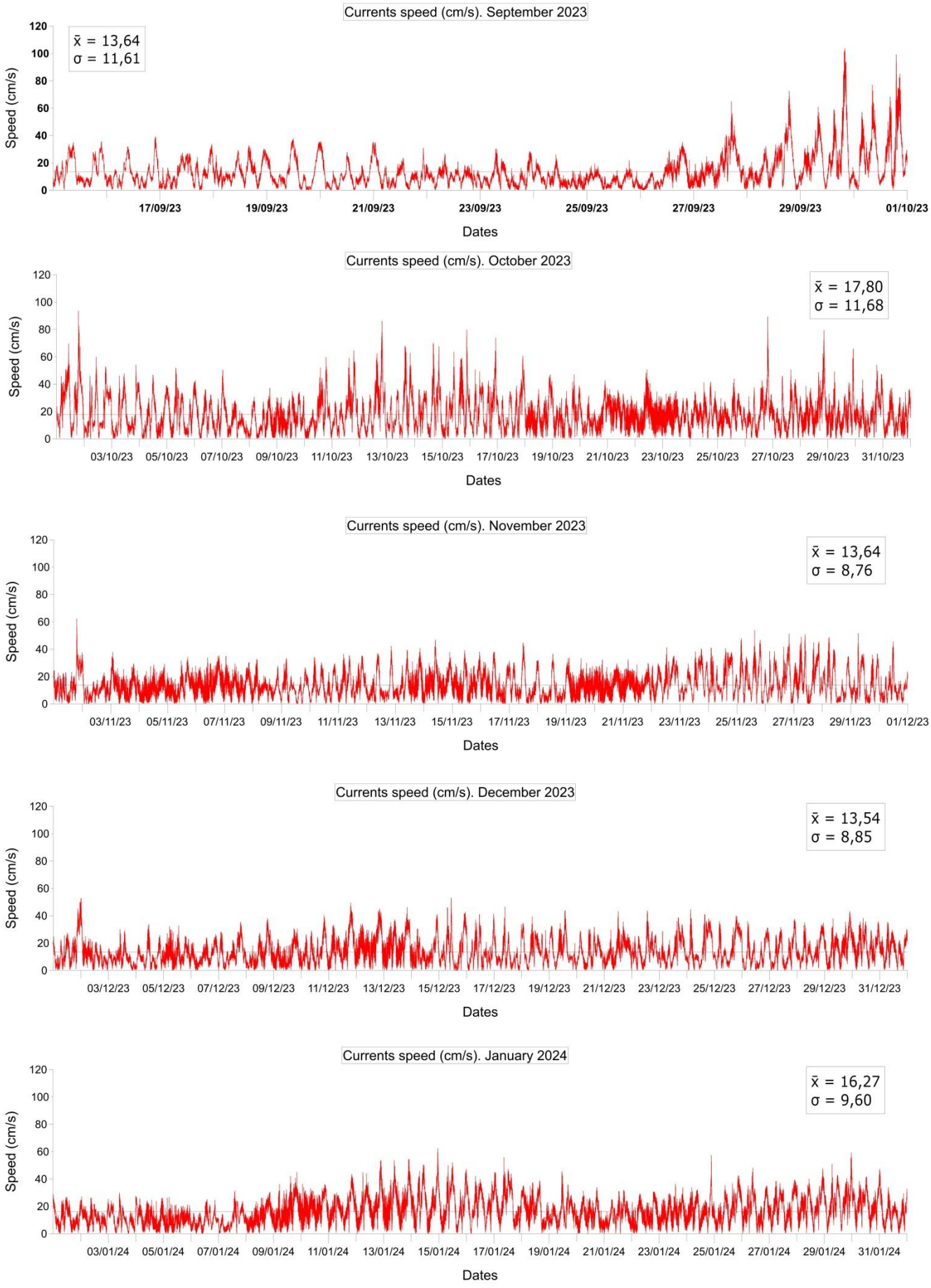


Figure S7a. Current speed measurements taken from 15 September 2023 to 31 August 2024. Each graph shows a monthly period, with a horizontal black line representing the monthly average value. Within the square, the average value and standard deviation are presented. Gaps in the line correspond to the data removed or missing due to maintenance in April 2024.

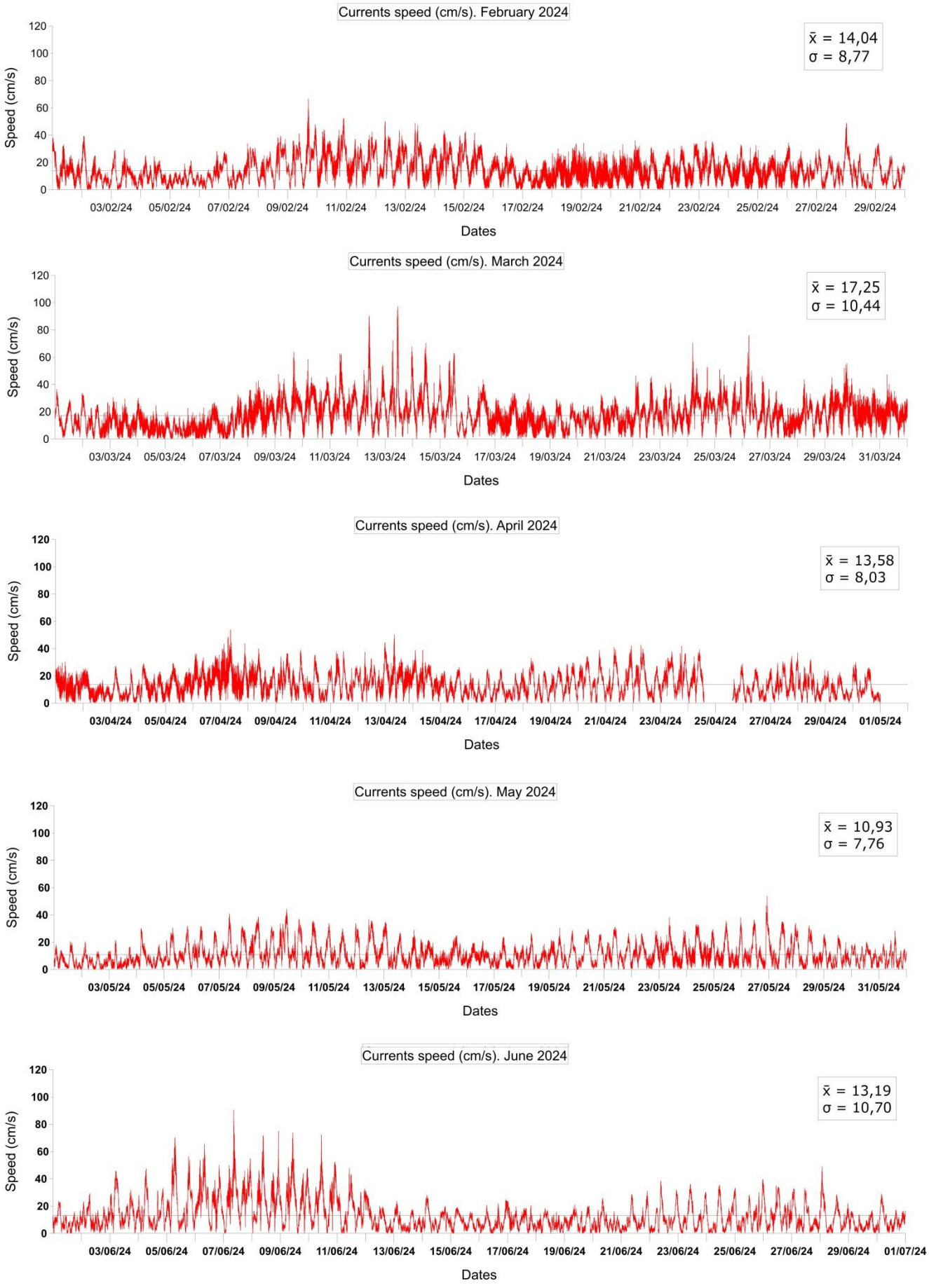


Figure S7b. Current speed measurements taken from 15 September 2023 to 31 August 2024. Each graph shows a monthly period, with a horizontal black line representing the monthly average value. Within the square, the average value and standard deviation are presented. Gaps in the line correspond to the data removed or missing due to maintenance in April 2024.

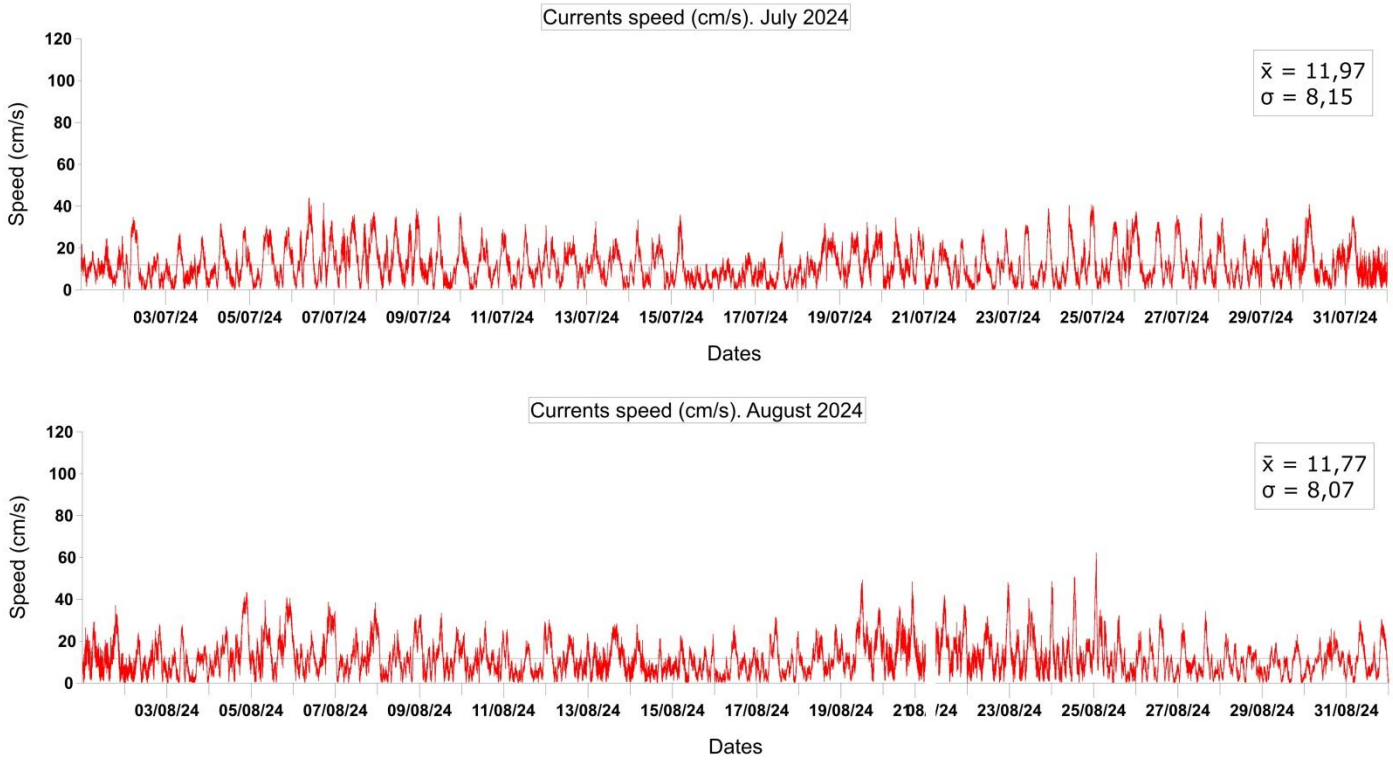


Figure S7c. Current speed measurements taken from 15 September 2023 to 31 August 2024. Each graph shows a monthly period, with a horizontal black line representing the monthly average value. Within the square, the average value and standard deviation are presented. Gaps in the line correspond to the data removed or missing due to maintenance in April 2024.

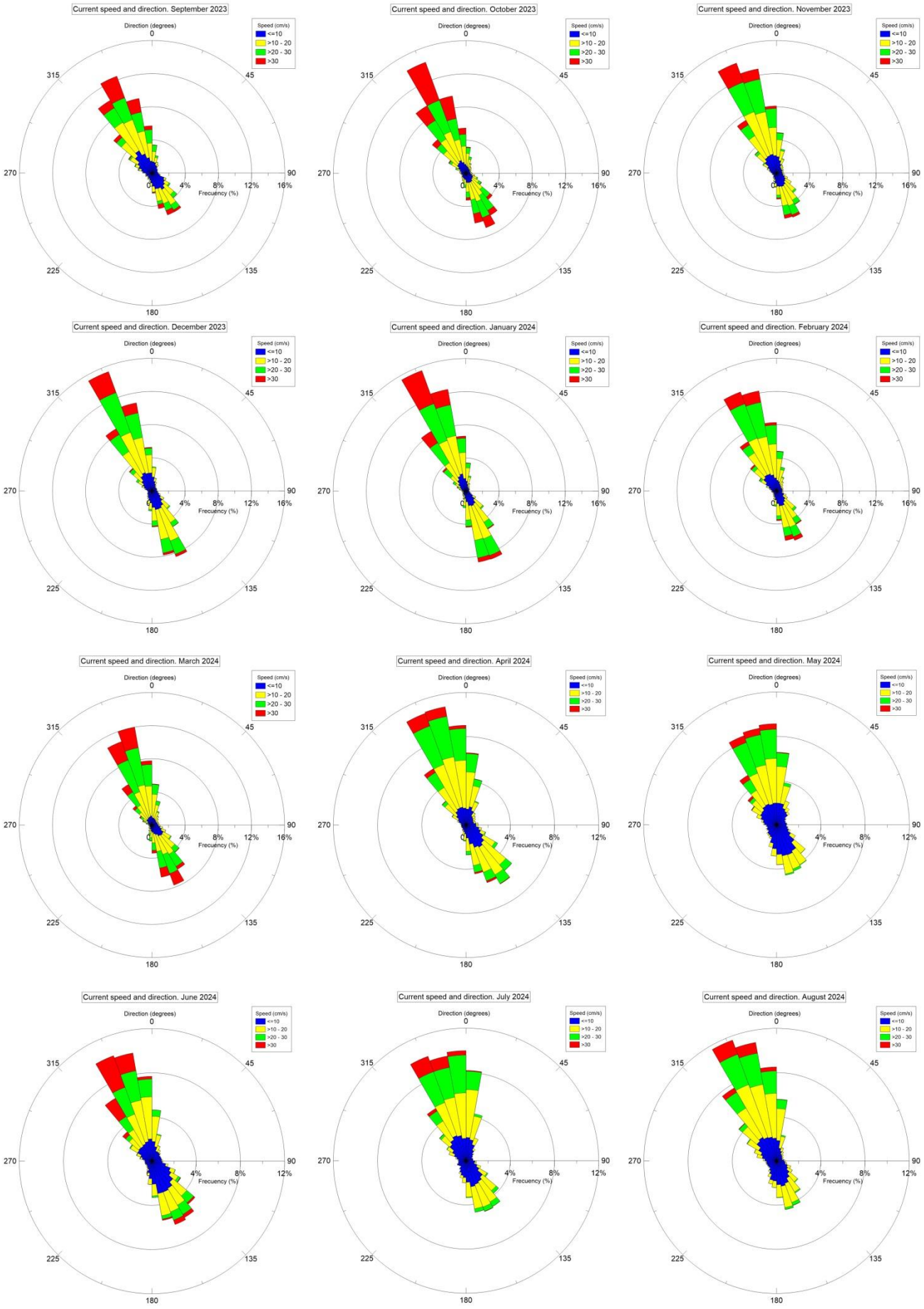


Figure S8. Current speed and direction measurements taken from 15 September 2023 to 31 August 2024. Each graph shows a monthly period.

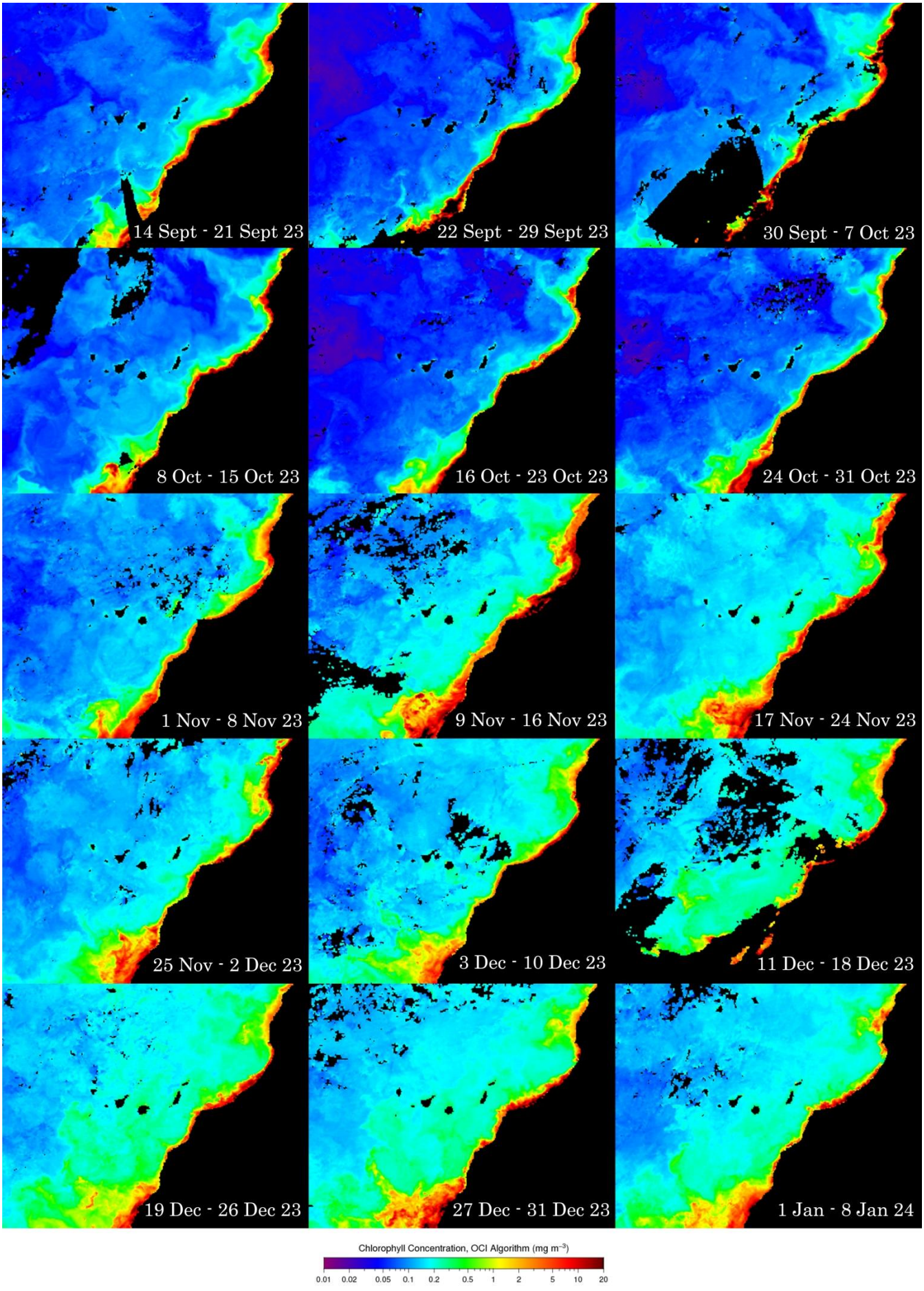


Figure S9a. Chlorophyll concentration (mg m^{-3}) in the study area. Each NASA Aqua MODIS satellite image shows the 8-day average chlorophyll concentration from 15 September 2023 to 13 March 2025. The days covered by each image are shown.

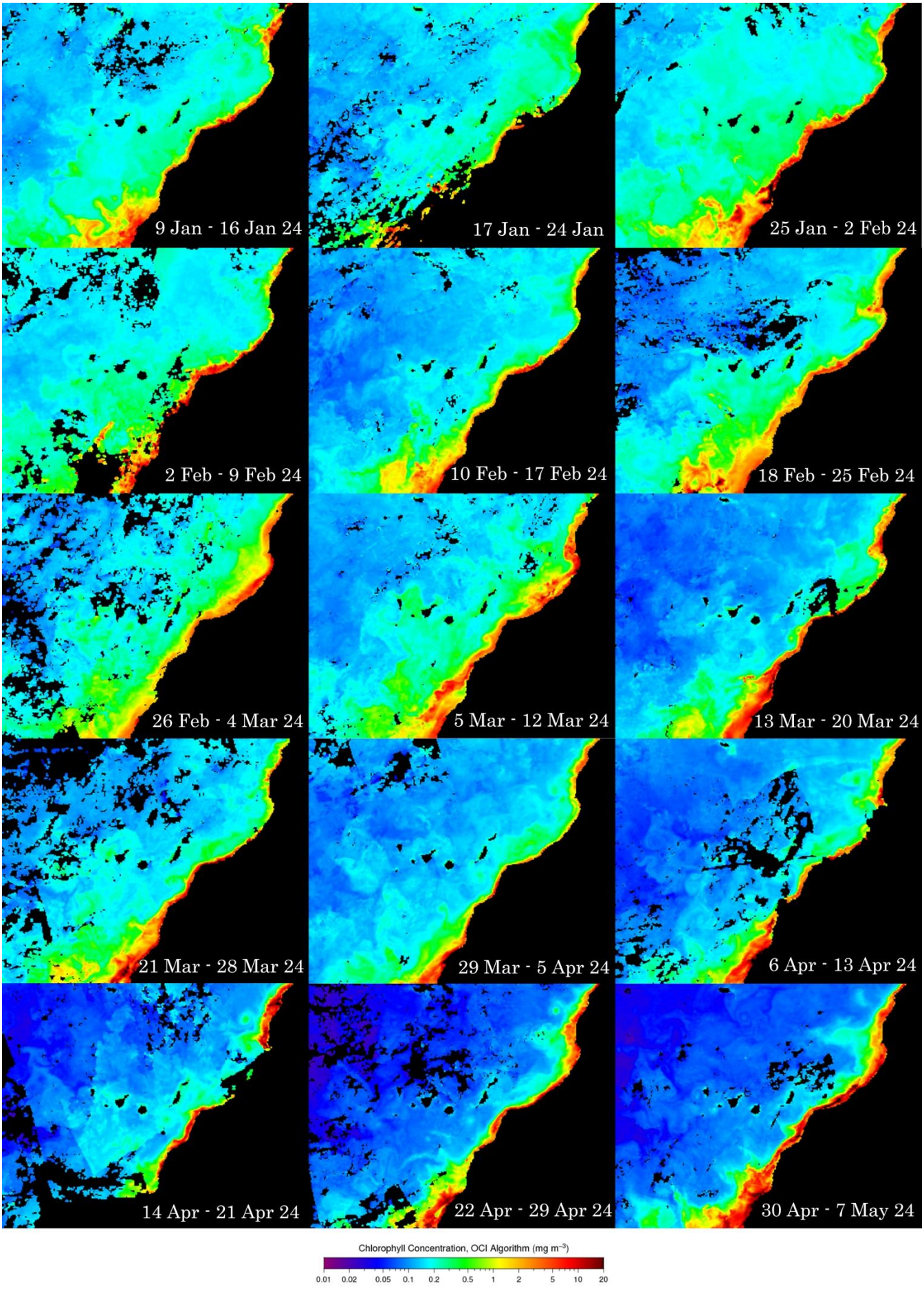


Figure S9b. Chlorophyll concentration (mg m^{-3}) in the study area. Each NASA Aqua MODIS satellite image shows the 8-day average chlorophyll concentration from 15 September 2023 to 13 March 2025. The days covered by each image are shown.

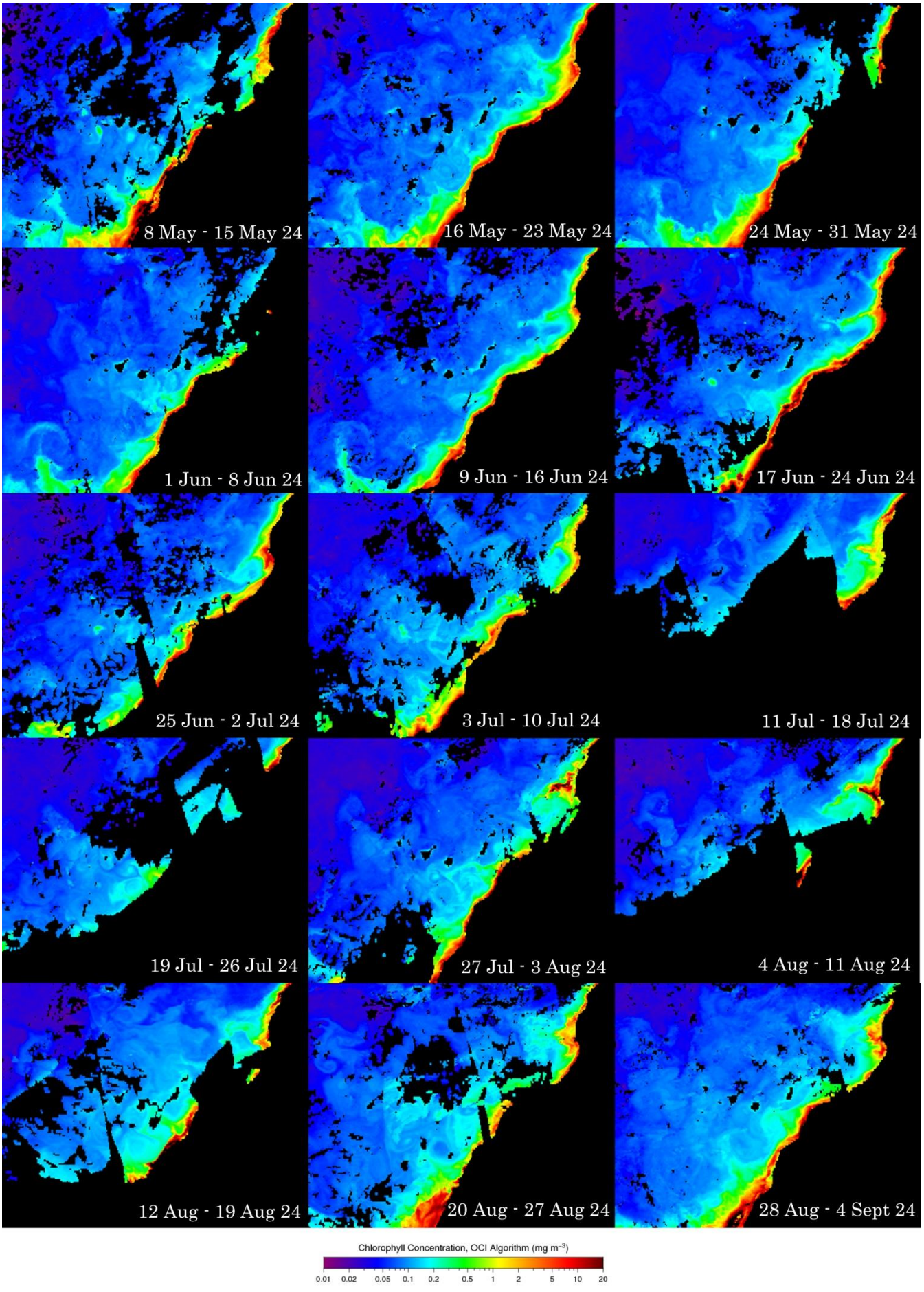


Figure S9c. Chlorophyll concentration (mg m^{-3}) in the study area. Each NASA Aqua MODIS satellite image shows the 8-day average chlorophyll concentration from 15 September 2023 to 13 March 2025. The days covered by each image are shown.

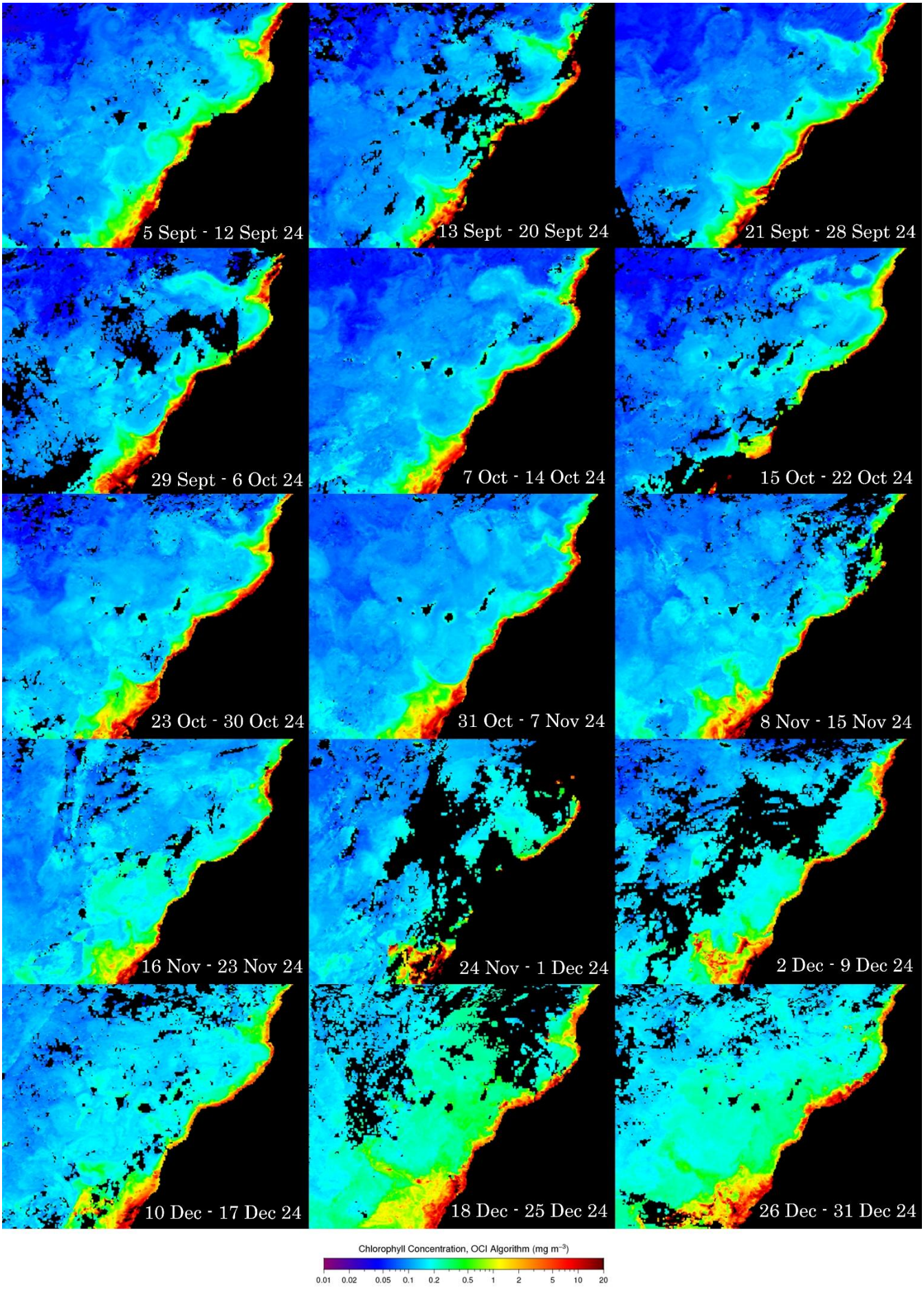


Figure S9d. Chlorophyll concentration (mg m^{-3}) in the study area. Each NASA Aqua MODIS satellite image shows the 8-day average chlorophyll concentration from 15 September 2023 to 13 March 2025. The days covered by each image are shown.

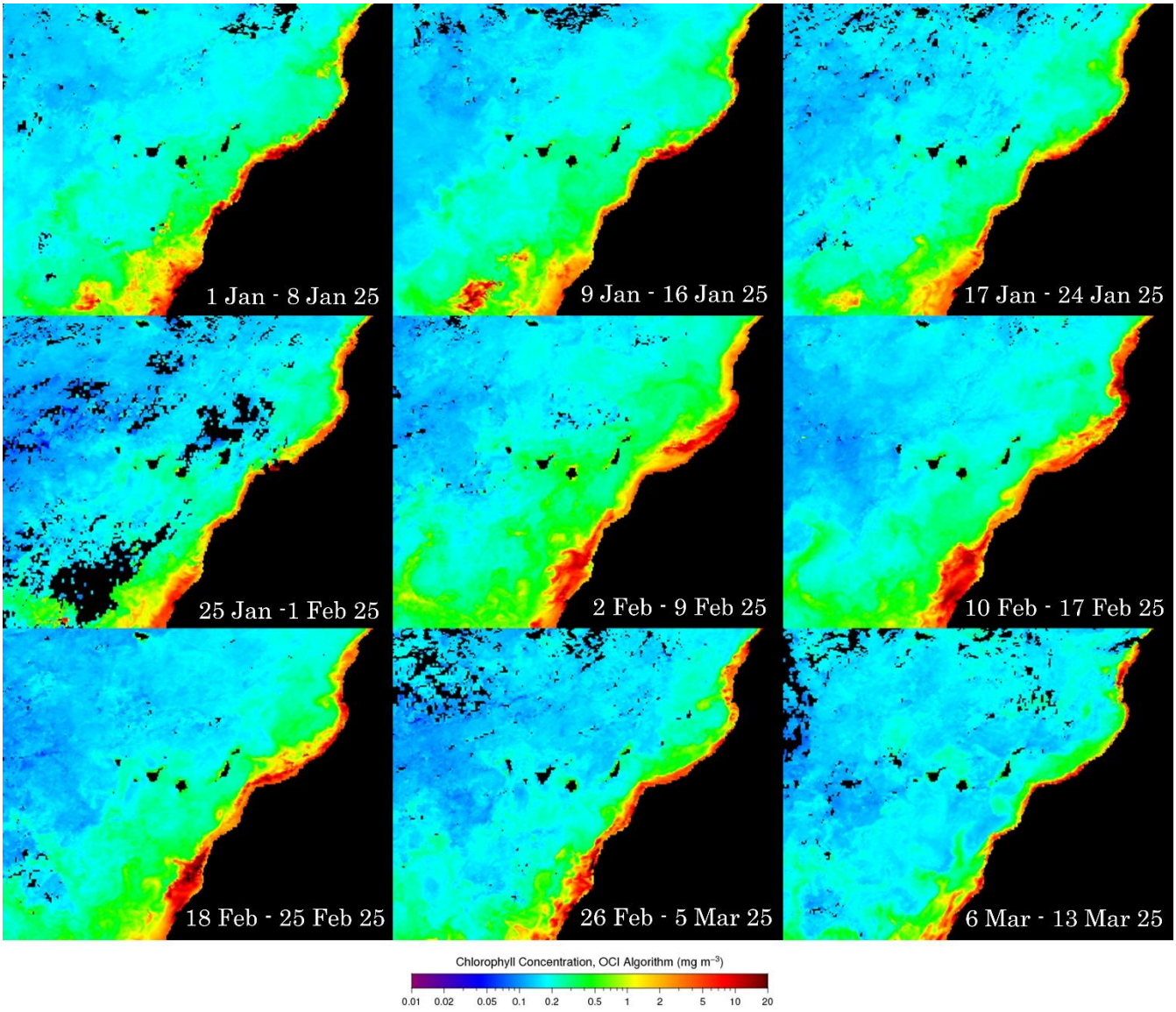


Figure S9e. Chlorophyll concentration (mg m^{-3}) in the study area. Each NASA Aqua MODIS satellite image shows the 8-day average chlorophyll concentration from 15 September 2023 to 13 March 2025. The days covered by each image are shown.

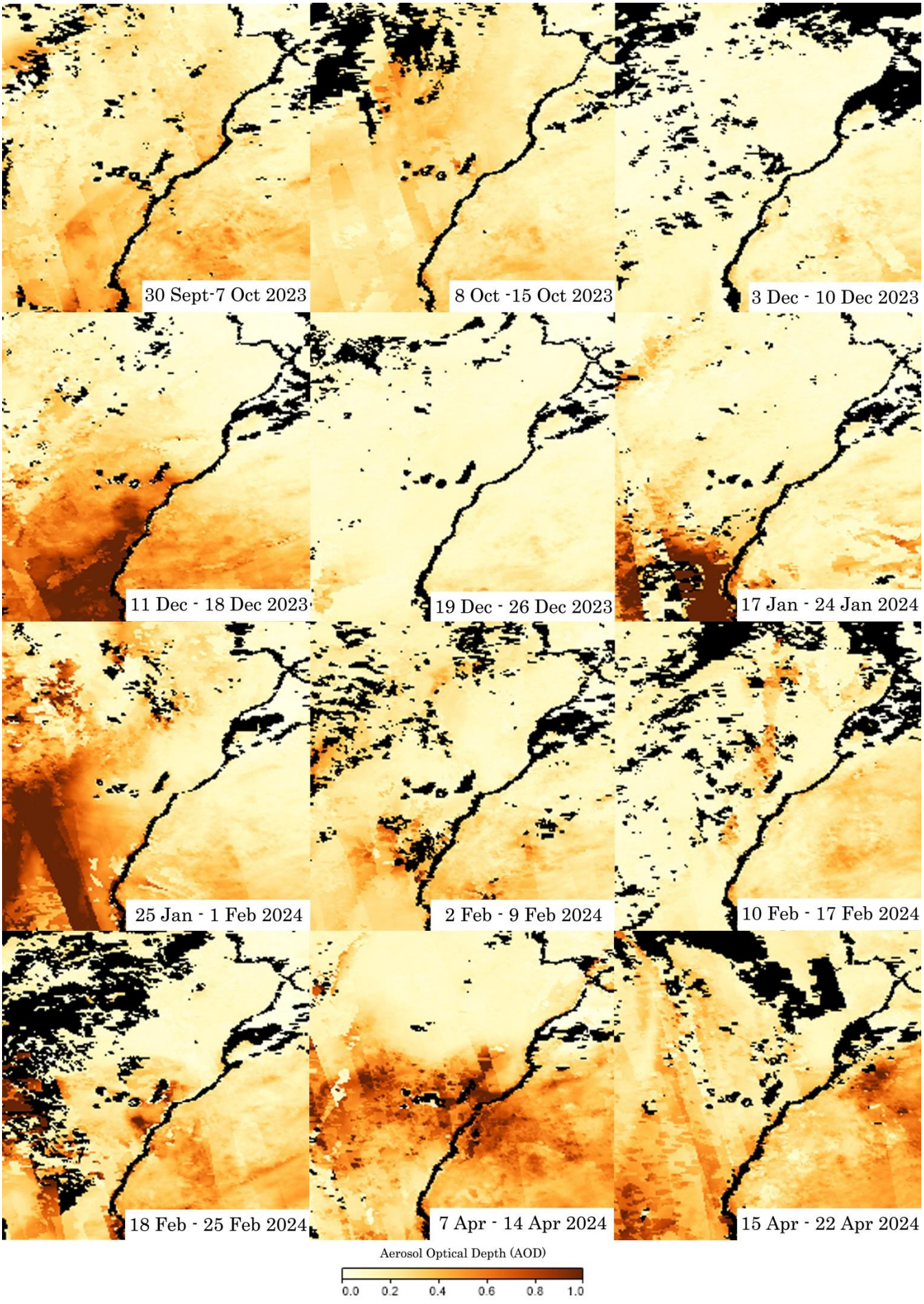


Figure S10a. Aerosol Optical Depth (AOD) in the study area. Each NASA Aqua MODIS satellite image shows the 8-day average AOD in selected episodes of calima from 15 September 2023 to 10 March 2025. The days covered by each image are shown.

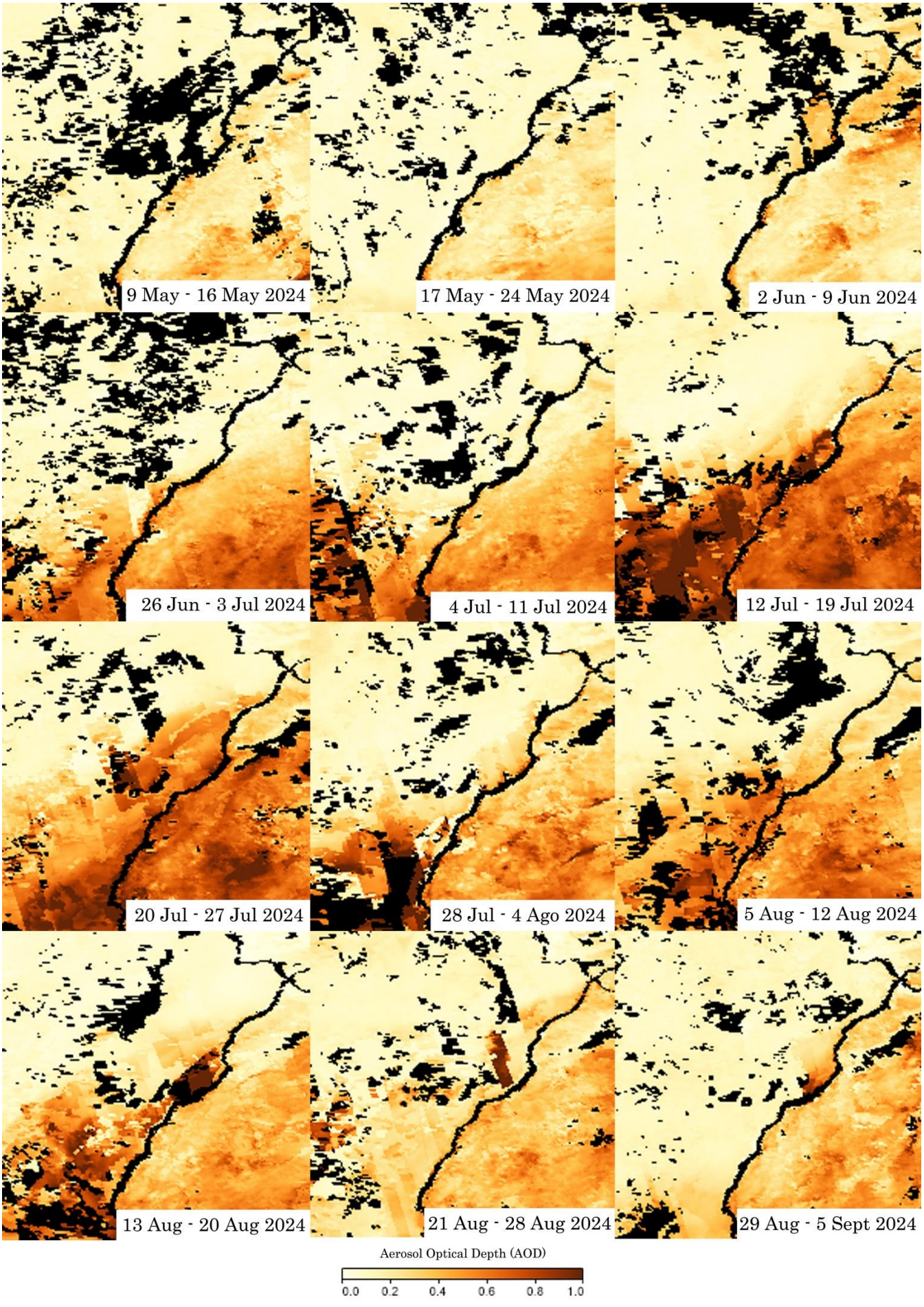


Figure S10b. Aerosol Optical Depth (AOD) in the study area. Each NASA Aqua MODIS satellite image shows the 8-day average AOD in selected episodes of calima from 15 September 2023 to 10 March 2025. The days covered by each image are shown.

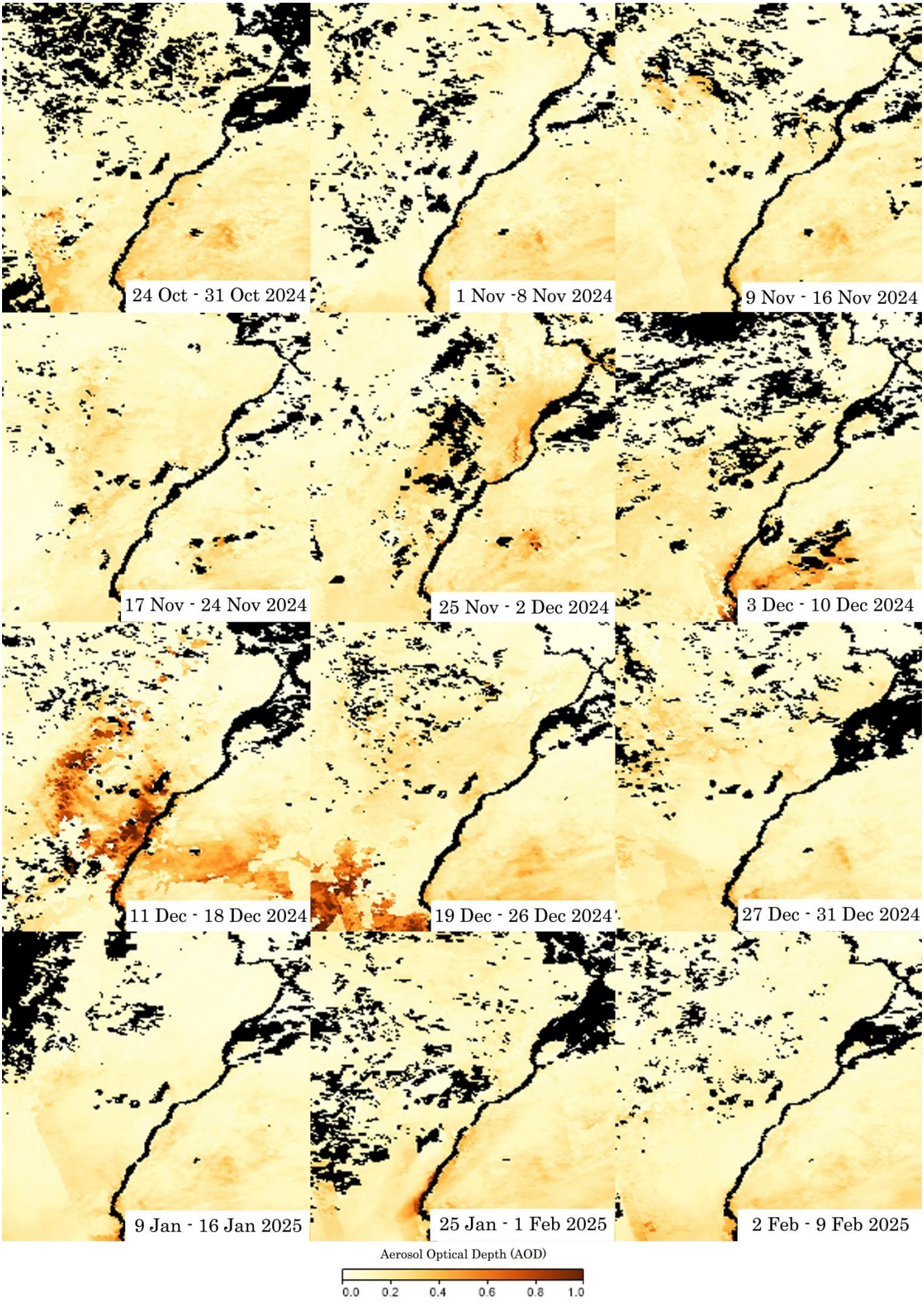


Figure S10c. Aerosol Optical Depth (AOD) in the study area. Each NASA Aqua MODIS satellite image shows the 8-day average AOD in selected episodes of calima from 15 September 2023 to 10 March 2025. The days covered by each image are shown.



Figure S11. Red dot marks the location of the two submarine unauthorized outfalls and the green dot, the location of the monitoring station. Satellite image provided by Google Earth (© 2025 Airbus).

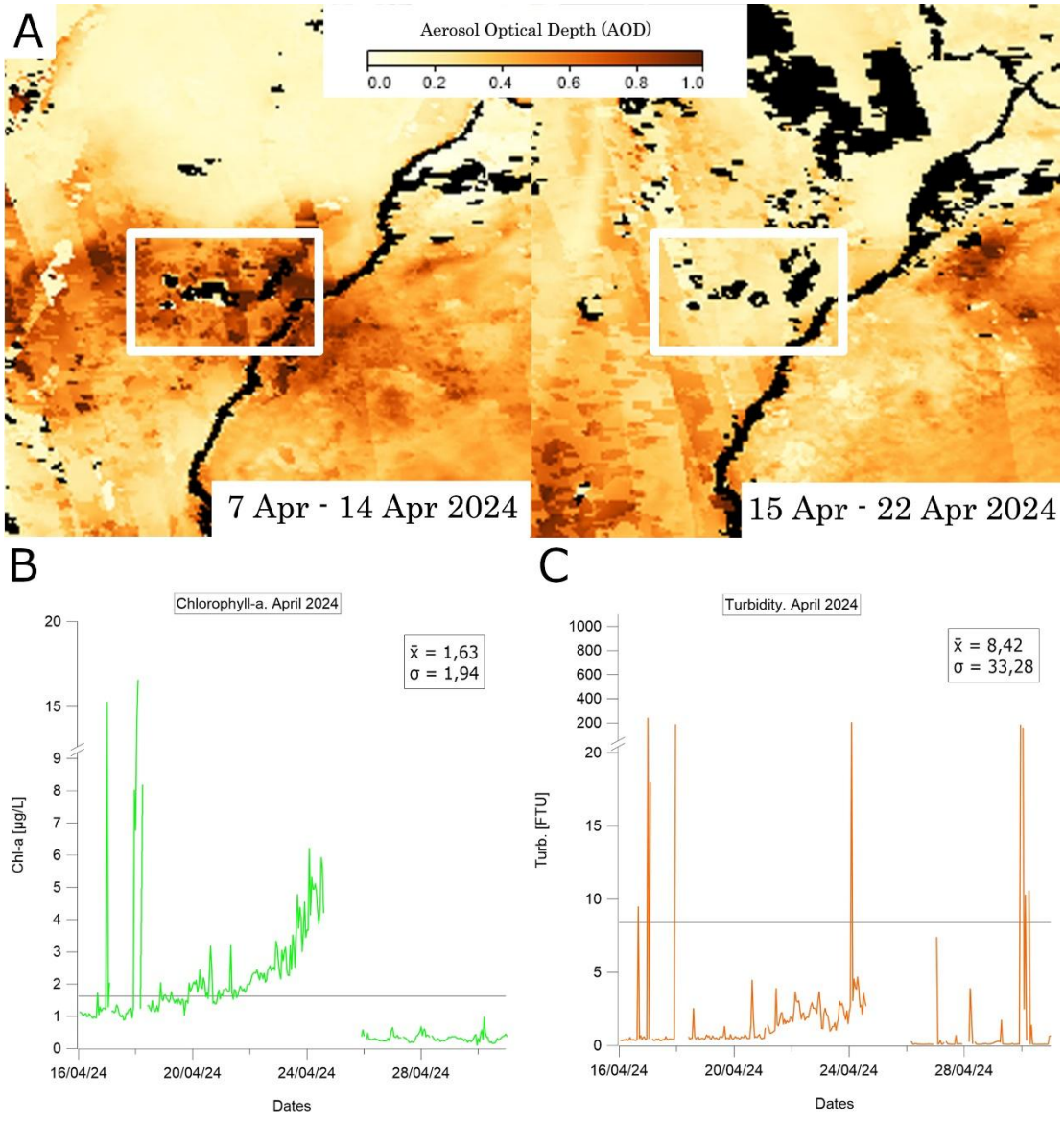


Figure S12. Comparative between AOD, chlorophyll-a concentration and turbidity measured by monitoring station in April 2024. (**A**) images of April's 2024 calima (images provided by NASA Aqua MODIS satellite) (**B**) chlorophyll-a and (**C**) turbidity, both corresponding to second 2-week of April 2024.

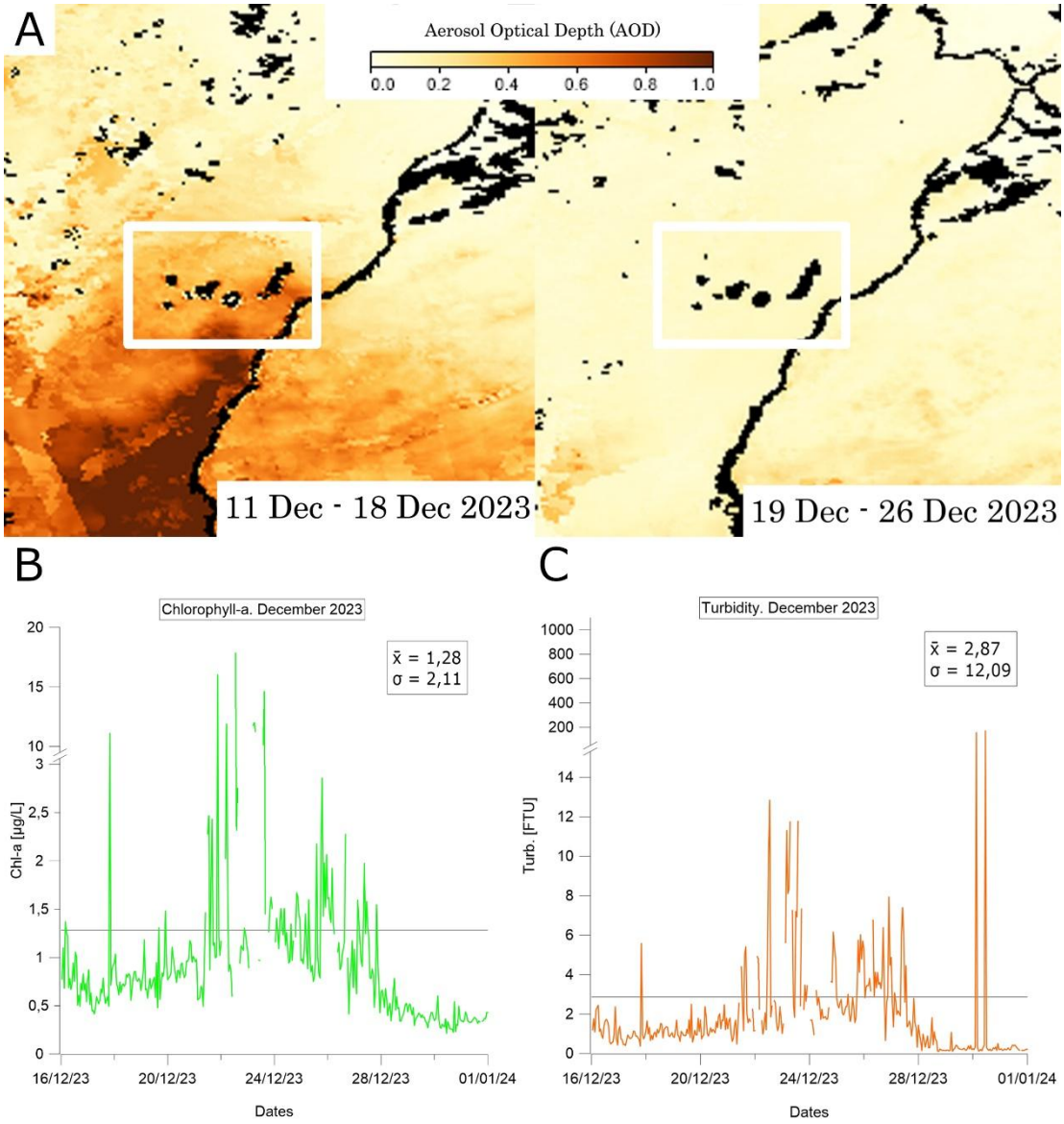


Figure S13. Comparative between AOD, chlorophyll-a concentration and turbidity measured by monitoring station in December 2023. (**A**) images of December's 2023 calima (images provided by NASA Aqua MODIS satellite), (**B**) chlorophyll-a. and (**C**) turbidity, both corresponding to the second 2-week of December 2023.

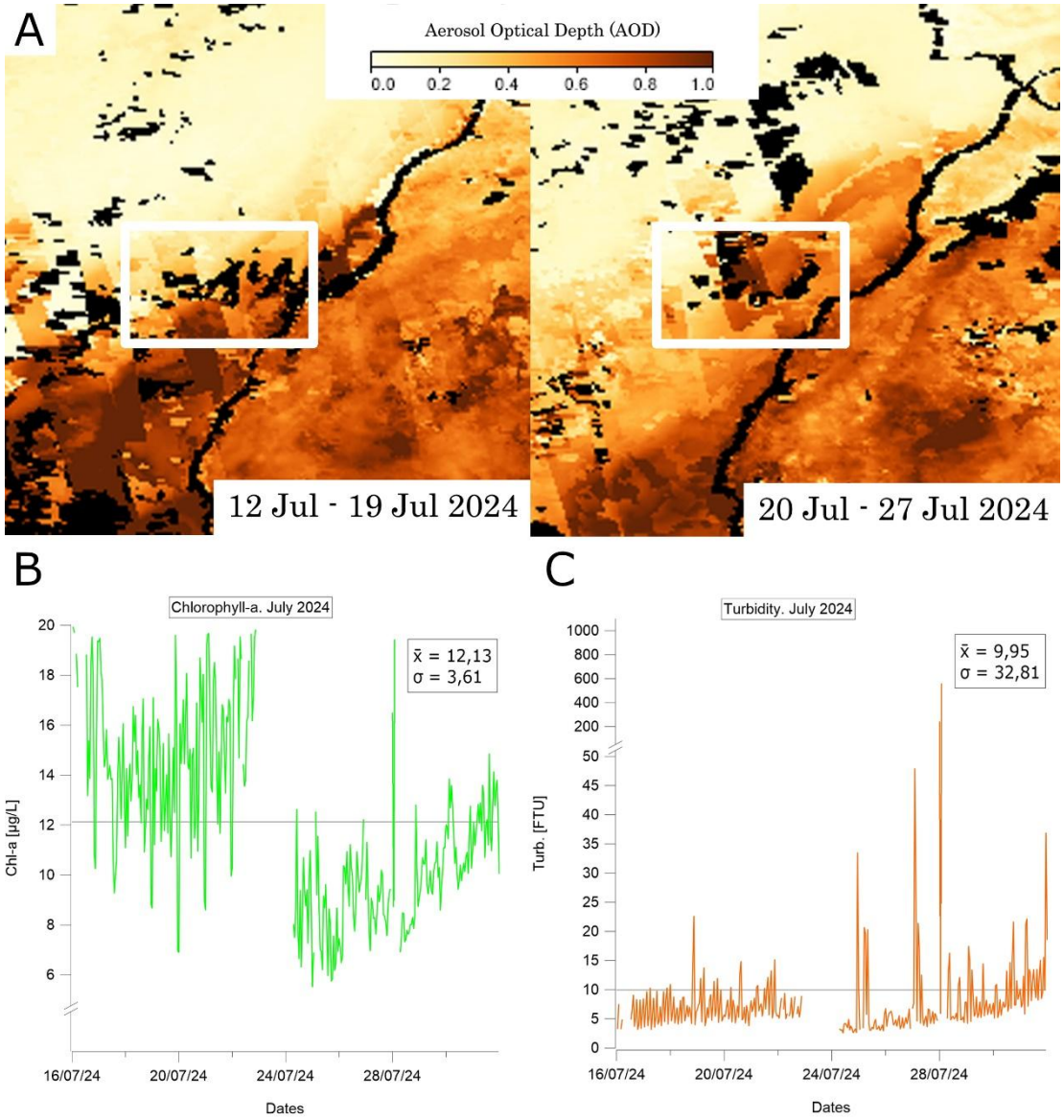


Figure S14. Comparative between AOD, chlorophyll-a concentration and turbidity measured by monitoring station in July 2024. (**A**) images of July's 2024 calima (images provided by NASA Aqua MODIS satellite), (**B**) chlorophyll-a, and (**C**) turbidity, both corresponding to second 2-week of July 2024.

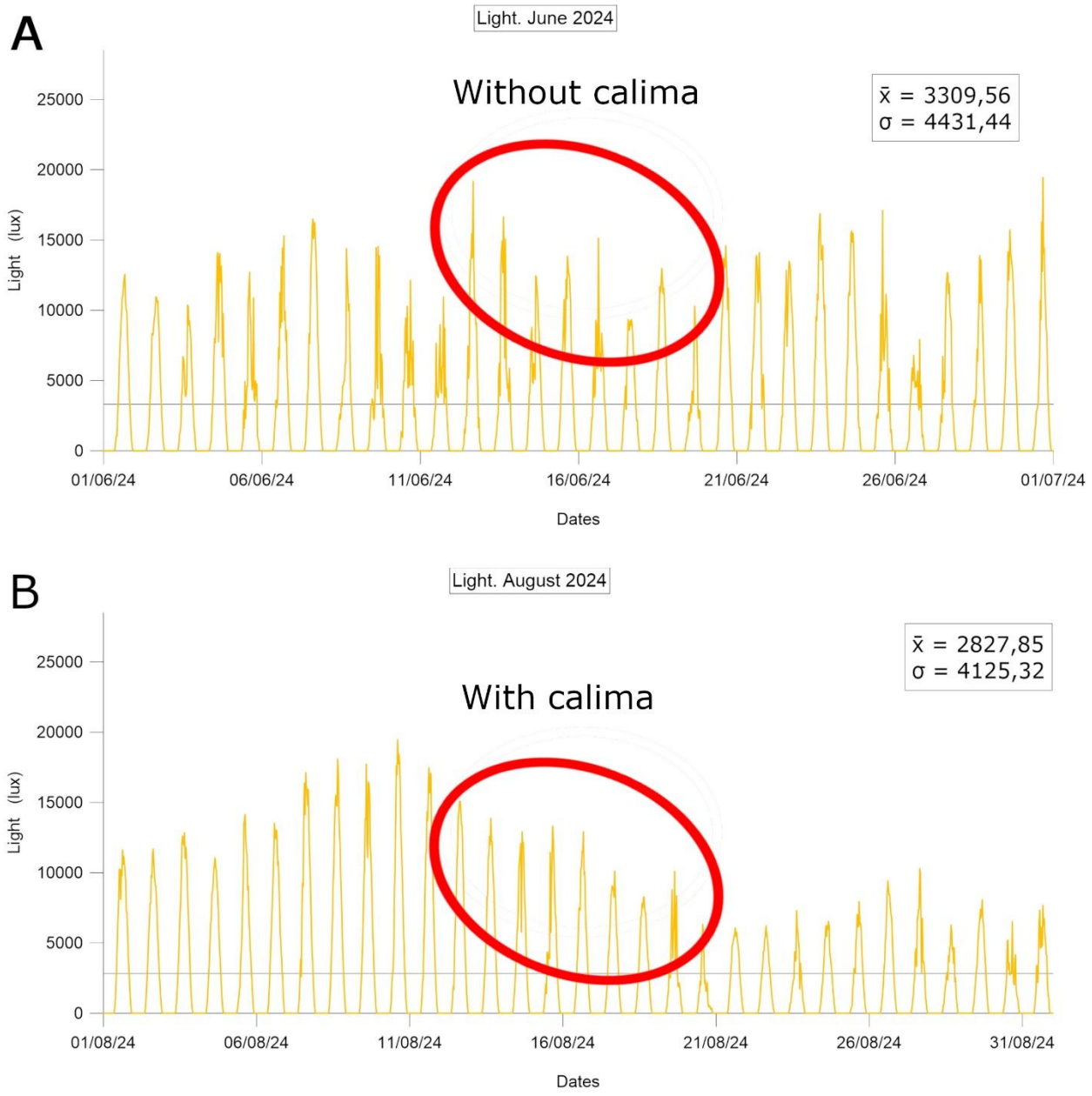


Figure S15. Light intensity recorded by the sensor between two periods without (**A**) /with calima (**B**). Light intensity recorded on compared week with calima, was about 19.68% lower than an 8-day period without calima.

Table S1a. In this table monthly statistics (mean, standard deviation, maximum and minimum) from temperature, salinity, light intensity, currents speed, current direction and dissolved O_2 of the whole studied period are presented.

	Temperature (ºC)				Salinity				Light (lux)			
	$\bar{x}$	σ	Máx	Mín	$\bar{x}$	σ	Máx	Mín	$\bar{x}$	σ	Máx	Mín
September 23	24.61	0.34	25.27	21.66	No data	No data	No data	No data	3158.95	4841.32	21381.12	0.00
October 23	24.43	0.69	25.29	20.09	No data	No data	No data	No data	801.20	1342.02	7157.76	0.00
November 23	23.97	0.59	25.02	20.59	No data	No data	No data	No data	520.66	897.52	5475.84	0.00
December 23	22.60	0.42	23.44	20.93	No data	No data	No data	No data	326.07	561.70	3198.72	0.00
January 24	21.46	0.39	22.03	19.50	No data	No data	No data	No data	621.47	1090.18	6497.28	0.00
February 24	20.88	0.16	21.44	20.14	No data	No data	No data	No data	741.97	1115.27	5501.44	0.00
March 24	20.27	0.24	20.93	19.35	No data	No data	No data	No data	443.12	706.77	4523.52	0.00
April 24	20.55	0.40	21.83	19.74	No data	No data	No data	No data	1721.60	3622.05	28323.84	0.00
May 24	21.20	0.31	22.26	20.15	No data	No data	No data	No data	3961.05	5508.54	27013.12	0.00
June 24	21.76	0.33	22.51	20.50	No data	No data	No data	No data	3309.56	4431.44	19450.88	0.00
July 24	22.18	0.37	23.31	21.00	No data	No data	No data	No data	4509.15	5909.16	23459.84	0.00
August 24	23.26	0.33	24.09	22.29	No data	No data	No data	No data	2827.85	4125.32	19445.76	0.00
September 24	23.33	0.45	24.06	20.54	36.38	0.13	36.63	35.63	3051.79	4659.70	25548.80	0.00
October 24	23.10	0.55	24.23	21.23	36.13	0.18	36.36	32.60	1073.65	1648.86	7815.68	0.00
November 24	22.76	0.32	23.37	21.28	36.23	0.27	36.46	34.20	285.03	476.88	2837.76	0.00
December 24	22.01	0.59	23.13	21.03	34.84	3.92	36.52	20.34	69.67	169.38	1884.16	0.00
January 25	20.59	0.37	21.22	19.34	35.82	2.08	36.47	18.78	55.06	180.60	1534.08	0.00
February 25	20.06	0.23	20.58	19.27	36.11	0.33	36.39	32.82	100.76	158.24	336.64	0.00
March 25	19.77	0.27	20.41	19.00	36.25	0.07	36.38	35.85	96.59	179.09	1158.08	0.00

Table S1b. In this table monthly statistics (mean, standard deviation, maximum and minimum) from temperature, salinity, light intensity, currents speed, current direction and dissolved O_2 of the whole studied period are presented.

	Current speed (cm/s)				Current direction (º)				Dissolved O_2 (mg/L)			
	$\bar{x}$	σ	Máx	Mín	$\bar{x}$	σ	Máx	Mín	$\bar{x}$	σ	Máx	Mín
September 23	13.64	11.61	103.71	0.03	232.76	110.47	360.00	0.00	8.89	0.09	9.27	8.53
October 23	17.80	11.68	93.43	0.02	230.32	109.39	360.00	0.01	9.00	0.13	9.57	8.70
November 23	13.64	8.76	62.21	0.02	228.01	118.44	360.00	0.00	No data	No data	No data	No data
December 23	13.54	8.85	53.09	0.03	232.99	106.33	360.00	0.00	No data	No data	No data	No data
January 24	16.27	9.60	62.22	0.03	236.88	108.02	359.98	0.00	No data	No data	No data	No data
February 24	14.04	8.77	66.48	0.05	226.90	117.27	360.00	0.00	No data	No data	No data	No data
March 24	17.25	10.44	97.09	0.08	214.14	116.71	360.00	0.00	No data	No data	No data	No data
April 24	13.58	8.03	53.82	0.01	207.13	123.11	359.99	0.01	9.58	0.09	9.96	9.36
May 24	10.93	7.76	53.67	0.02	209.82	120.12	360.00	0.00	9.62	0.10	9.93	9.39
June 24	13.19	10.70	90.39	0.04	215.63	114.48	360.00	0.00	No data	No data	No data	No data
July 24	11.97	8.15	44.01	0.02	210.72	123.32	360.00	0.00	No data	No data	No data	No data
August 24	11.77	8.07	62.18	0.02	233.13	114.13	360.00	0.00	No data	No data	No data	No data
September 24	No data	No data	No data	No data	No data	No data	No data	No data	9.19	0.09	9.50	8.90
October 24	No data	No data	No data	No data	No data	No data	No data	No data	9.25	0.22	10.55	8.60
November 24	No data	No data	No data	No data	No data	No data	No data	No data	9.27	0.46	11.32	4.04
December 24	No data	No data	No data	No data	No data	No data	No data	No data	9.47	0.84	14.51	8.44
January 25	No data	No data	No data	No data	No data	No data	No data	No data	9.80	0.90	13.77	8.73
February 25	No data	No data	No data	No data	No data	No data	No data	No data	9.93	1.09	15.03	8.09
March 25	No data	No data	No data	No data	No data	No data	No data	No data	9.93	1.32	14.59	8.40

Table S2a. In this table monthly and 2-weekly statistics (mean, standard deviation, maximum and minimum) from chlorophyll-a and turbidity are presented.

	Chlorophyll-a (ug/L)				Turbidity (FTU)			
	$\bar{x}$	σ	Máx	Mín	$\bar{x}$	σ	Máx	Mín
September 23	**0.38**	**1.12**	**19.68**	**0.12**	**0.17**	**0.76**	**13.30**	**0.07**
2nd 2-week	0.38	1.12	19.68	0.12	0.17	0.76	13.30	0.07
October 23	**0.54**	**1.13**	**16.85**	**0.20**	**0.39**	**0.62**	**7.72**	**0.07**
1st 2-week	0.61	1.62	16.85	0.20	0.26	0.75	7.72	0.07
2nd 2-week	0.49	0.18	1.23	0.21	0.52	0.44	3.25	0.08
November 23	**1.33**	**1.94**	**19.02**	**0.23**	**2.29**	**2.90**	**30.33**	**0.38**
1st 2-week	1.57	2.49	19.02	0.25	2.37	3.26	30.33	0.45
2nd 2-week	1.10	1.13	7.17	0.23	2.22	2.50	15.65	0.38
December 23	**1.57**	**1.82**	**17.86**	**0.22**	**3.65**	**8.95**	**169.94**	**0.11**
1st 2-week	1.86	1.40	16.78	0.40	4.46	3.19	15.03	0.11
2nd 2-week	1.28	2.11	17.86	0.22	2.87	12.09	169.94	0.11
January 24	**0.93**	**0.64**	**7.00**	**0.25**	**1.25**	**2.94**	**75.50**	**0.15**
1st 2-week	0.75	0.33	3.64	0.25	1.14	4.01	75.50	0.15
2nd 2-week	1.10	0.80	7.00	0.40	1.35	1.29	8.95	0.20
February 24	**0.64**	**0.46**	**10.49**	**0.29**	**0.50**	**1.26**	**22.35**	**0.12**
1st 2-week	0.71	0.22	2.43	0.31	0.61	1.48	22.35	0.12
2nd 2-week	0.57	0.62	10.49	0.29	0.39	0.96	14.81	0.14
March 24	**1.09**	**1.42**	**17.07**	**0.32**	**5.09**	**21.38**	**281.48**	**0.13**
1st 2-week	1.05	0.95	14.26	0.44	2.29	14.05	163.58	0.13
2nd 2-week	1.13	1.75	17.07	0.32	7.72	26.22	281.48	0.16
April 24	**1.63**	**2.64**	**19.83**	**0.10**	**15.12**	**52.81**	**477.01**	**0.08**
1st 2-week	1.64	3.16	19.83	0.23	21.54	65.75	477.01	0.15
2nd 2-week	1.63	1.94	16.56	0.10	8.42	33.28	315.51	0.08
May 24	**0.41**	**0.26**	**4.12**	**0.01**	**11.12**	**66.87**	**1288.52**	**0.07**
1st 2-week	0.37	0.31	4.12	0.01	19.60	93.58	1288.52	0.07
2nd 2-week	0.44	0.20	1.77	0.15	3.43	21.83	312.23	0.08
June 24	**3.16**	**2.64**	**19.80**	**0.38**	**6.36**	**7.41**	**41.56**	**0.32**
1st 2-week	3.39	2.42	14.31	0.38	7.46	5.96	35.54	0.32
2nd 2-week	2.93	2.83	19.80	0.58	5.26	8.48	41.56	0.32

Table S2b. In this table monthly and 2-weekly statistics (mean, standard deviation, maximum and minimum) from chlorophyll-a and turbidity are presented.

	Chlorophyll-a (ug/L)				Turbidity (FTU)			
	x̄	**σ**	**Máx**	**Mín**	**x̄**	**σ**	**Máx**	**Mín**
July 24	**9.75**	**4.37**	**19.92**	**1.90**	**7.19**	**33.31**	**632.29**	**0.56**
1st 2-week	7.49	3.80	19.61	1.90	4.55	33.61	632.29	0.56
2nd 2-week	12.13	3.61	19.92	4.86	9.95	32.81	557.45	2.34
August 24	**11.38**	**3.32**	**19.97**	**4.50**	**5.77**	**12.39**	**176.75**	**1.29**
1st 2-week	10.74	3.35	19.97	4.50	7.08	13.30	176.75	1.74
2nd 2-week	12.27	3.07	19.88	7.76	3.94	10.78	154.75	1.29
September 24	**0.68**	**1.84**	**19.74**	**0.01**	**25.19**	**104.44**	**1047.38**	**0.06**
1st 2-week	0.86	2.70	19.74	0.01	21.66	77.40	873.97	0.06
2nd 2-week	0.53	0.24	3.25	0.03	28.14	122.61	1047.38	0.09
October 24	**0.57**	**0.71**	**17.53**	**0.15**	**4.56**	**50.84**	**890.50**	**0.09**
1st 2-week	0.62	1.02	17.53	0.15	6.62	66.94	890.50	0.09
2nd 2-week	0.51	0.12	1.01	0.34	2.64	28.68	472.94	0.09
November 24	**0.61**	**0.54**	**14.72**	**0.32**	**0.26**	**0.16**	**2.22**	**0.12**
1st 2-week	0.63	0.75	14.72	0.35	0.22	0.15	2.22	0.12
2nd 2-week	0.59	0.14	1.42	0.32	0.30	0.16	1.36	0.15
December 24	**0.67**	**0.43**	**8.02**	**0.28**	**0.96**	**3.59**	**88.74**	**0.19**
1st 2-week	0.57	0.46	8.02	0.28	0.72	4.85	88.74	0.19
2nd 2-week	0.77	0.38	6.62	0.51	1.19	1.68	26.02	0.30
January 25	**1.79**	**2.68**	**19.77**	**0.41**	**8.13**	**29.11**	**588.83**	**0.51**
1st 2-week	1.37	1.52	18.36	0.50	4.38	10.60	114.65	0.75
2nd 2-week	2.20	3.41	19.77	0.41	11.73	39.09	588.83	0.51
February 25	**0.66**	**0.77**	**11.16**	**0.36**	**2.01**	**5.67**	**109.41**	**0.52**
1st 2-week	0.68	0.87	11.16	0.36	1.51	6.73	109.41	0.52
2nd 2-week	0.63	0.62	8.82	0.42	2.58	4.05	65.61	1.38
March 25	**0.82**	**0.44**	**5.75**	**0.53**	**3.94**	**2.01**	**31.95**	**2.44**
1st 2-week	0.82	0.44	5.75	0.53	3.94	2.01	31.95	2.44

Table S3. Spearman correlation results. Above: seasonal correlation between chlorophyll-a and turbidity (September 2023 to March 2025). Below: correlation between current speed and turbidity (September 2023 to September 2024).

Spearman test. Chlorophyll-a vs turbidity

Season	**ρ (rho)**
Autumn 2023	0.875
Winter 2024	0.546
Spring 2024	0.815
Summer 2024	0.761
Autumn 2024	0.416
Winter 2025	0.561
Overall (Sep 2023 – Mar 2025)	0.761

Spearman test. Current speed vs Turbidity

Variables	Current Speed	Turbidity
Current speed	**1**	-0.014
Turbidity	-0.014	**1**

ρ= -0.014

Table S4. Spearman correlation results in three examples of calima effects delay on chlorophyll-a and turbidity measurements.

Spearman test. Chlorophyll-a vs turbidity after calima events

Calima events	**ρ (rho)**
9-28 Apr 2024	0.892
13-31 Dec 2024	0.884
14 Jul -2 Aug 2024	0.368