

Phytoplankton-Macrophyte Interaction in the Lagoon of Venice (Northern Adriatic Sea, Italy)

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Supplementary Materials

Table S1_1. Yearly averages of hydrochemical parameters in the three sampling stations for the whole study period. Lower and upper bound on means (95%) are shown.

St.	Year	Transp. (m)	Temp. (°C)	Sal.	Oxygen (%)	N-NH ₃ (μM)	N-NO ₂ (μM)	N-NO ₃ (μM)	DIN (μM)	P-PO ₄ (μM)	N/P ratio	Chl. <i>a</i> (μg L ⁻¹)
1	1998	0.5±0.1	17.5±3.7	21.17±2.80	98±8	19.46±6.85	2.12±0.49	38.13±14.71	59.70±18.27	1.48±0.49	49±13	18.99±9.16
3	1998	0.7±.01	22.8±2.7	27.19±2.13	105±4	10.83±2.79	1.55±0.33	42.85±11.75	55.23±12.94	1.12±0.27	68±32	6.49±4.10
5	1998	-	17.1±4.0	24.72±1.79	110±11	7.52±2.36	1.46±0.40	37.51±14.94	46.49±15.62	0.31±0.13	169±34	5.55±2.51
1	1999	0.5±0.2	17.5±5.7	21.73±3.77	90±13	26.40±9.53	3.51±1.20	36.48±15.59	66.40±22.88	1.65±0.52	46±16	14.73±12.10
3	1999	0.7±0.2	22.7±3.6	28.81±1.11	101±10	17.53±4.33	2.31±0.61	34.76±10.37	54.61±11.58	1.02±0.29	64±25	4.11±3.40
5	1999	-	15.1±5.0	23.80±3.54	103±12	14.16±3.25	2.40±0.43	51.91±33.58	68.47±33.66	0.50±0.30	234±104	2.61±1.19
1	2000	0.4±0.1	17.8±4.8	24.86±2.49	94±11	22.21±7.51	2.69±1.06	46.35±21.93	71.25±26.86	1.95±0.75	42±16	16.51±18.01
3	2000	1.2±0.7	23.7±3.2	29.86±0.72	104±5	16.80±3.73	1.95±0.54	38.20±8.98	56.96±10.18	0.96±0.25	71±27	1.76±1.04
5	2000	0.9±0.3	17.2±5.1	25.98±2.45	102±13	15.81±4.75	1.95±0.53	40.11±19.25	57.87±19.86	0.36±0.16	188±52	1.94±1.03
1	2001	0.4±0.1	16.6±5.5	24.20±2.99	105±15	17.90±8.04	1.68±0.78	39.20±24.34	58.77±30.26	1.33±0.83	172±281	34.52±28.06
3	2001	0.8±0.1	22.4±3.9	29.15±1.30	104±7	16.84±3.36	1.56±0.41	40.00±18.13	58.40±19.31	0.90±0.21	75±29	4.98±3.32
5	2001	0.9±0.4	16.1±5.6	27.52±2.06	117±12	10.65±7.03	1.13±0.55	30.21±13.74	41.99±18.59	0.28±0.20	239±126	16.33±16.24
1	2002	0.5±0.1	14.2±5.1	23.32±2.78	87±9	21.25±8.58	2.42±0.81	50.76±15.47	74.43±17.24	1.64±0.60	58±22	10.01±6.86
3	2002	0.8±0.2	22.3±3.5	28.89±2.76	106±9	17.60±9.94	1.54±0.54	43.93±13.53	63.08±19.57	1.10±0.48	67±18	2.85±1.57
5	2002	1.1±0.3	13.5±5.4	25.17±2.49	102±10	10.15±3.02	1.62±0.45	52.86±17.44	64.64±19.26	0.37±0.24	283±130	3.71±1.86
1	2003	0.5±0.2	16.1±5.9	24.93±4.27	104±10	11.23±5.72	1.17±0.62	41.48±26.69	53.88±31.69	0.97±0.42	50±19	10.27±6.66

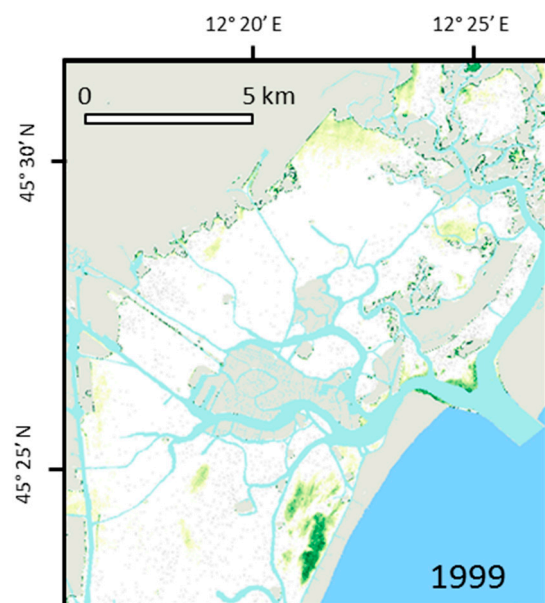
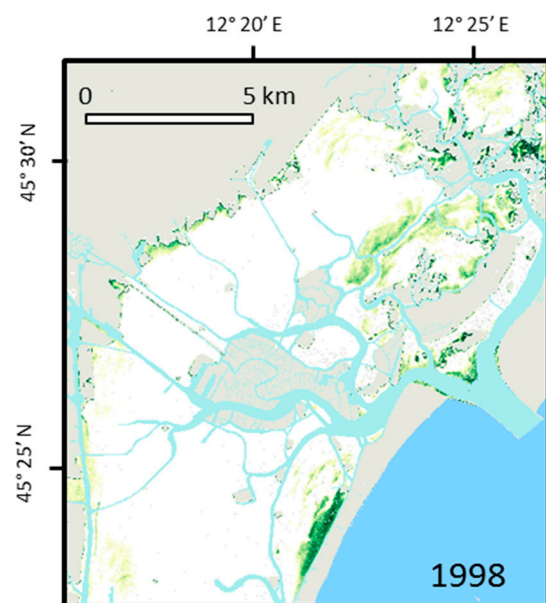
3	2003	0.8±0.2	22.3±3.7	31.05±1.54	105±7	12.06±3.03	0.91±0.21	34.30±15.07	47.26±15.17	0.77±0.21	66±20	2.90±1.49
5	2003	1.3±0.3	14.7±5.9	28.18±2.36	108±9	6.12±2.76	0.81±0.31	39.44±19.89	46.37±21.03	0.27±0.10	171±42	3.38±2.58
1	2004	0.8±0.3	17.2±5.2	23.89±4.23	96±14	20.14±8.39	2.47±1.39	55.88±41.90	78.48±49.34	1.22±0.52	59±17	11.02±10.12
3	2004	0.8±0.1	23.3±3.7	29.41±1.70	106±6	14.82±2.16	1.41±0.26	44.81±17.35	61.04±18.11	0.99±0.21	63±14	3.45±2.62
5	2004	1.5±0.6	16.2±5.1	26.48±3.35	102±5	11.63±3.38	1.67±0.80	55.91±37.06	69.21±40.26	0.36±0.17	231±101	1.79±1.21
1	2005	0.6±0.2	16.4±4.7	24.47±3.61	94±9	19.81±8.15	2.23±0.91	41.59±21.94	63.62±26.84	1.29±0.61	63±28	7.08±4.08
3	2005	0.9±0.2	22.2±4.0	29.90±1.44	97±7	17.05±6.17	1.41±0.25	36.12±10.45	54.59±11.96	1.12±0.39	60±19	2.56±1.37
5	2005	1.1±0.4	15.3±4.8	26.95±4.76	98±12	10.51±3.82	1.56±0.61	46.67±35.29	58.74±38.90	0.65±0.78	254±125	2.88±2.34
1	2006	0.9±0.3	14.9±5.4	24.67±4.16	100±11	17.80±11.15	2.01±1.03	41.55±19.85	61.35±29.23	1.76±0.75	47±25	3.96±3.17
3	2006	1.0±0.2	22.3±3.7	31.12±0.91	103±5	11.02±2.66	1.18±0.23	30.97±11.75	43.17±11.35	1.05±0.25	48±19	1.36±0.69
5	2006	1.7±0.5	14.5±5.4	30.36±2.04	100±6	6.94±1.59	1.03±0.38	25.76±14.47	33.73±14.83	0.24±0.06	167±95	1.18±0.54
1	2007	0.6±0.2	16.2±5.2	25.12±2.52	94±10	8.23±3.97	1.84±0.70	30.73±8.81	40.80±10.49	1.91±0.63	29±13	5.01±3.70
3	2007	1.0±0.2	22.4±2.9	31.20±1.06	102±6	4.95±1.24	1.18±0.18	26.71±9.12	32.84±9.23	1.17±0.35	35±14	1.44±0.58
5	2007	1.1±0.4	16.2±5.0	29.27±1.76	114±20	3.24±1.76	1.04±0.32	20.91±7.87	25.20±8.57	0.27±0.11	118±52	2.89±1.74
1	2008	0.5±0.1	15.8±4.4	22.76±3.09	93±10	13.06±5.44	3.43±1.58	41.76±18.57	58.26±20.28	2.01±0.54	30±9	6.07±4.91
3	2008	1.2±1.0	22.8±2.2	30.43±1.40	101±6	5.90±1.97	1.48±0.43	28.92±9.34	36.29±9.20	0.92±0.17	43±12	1.46±1.08
5	2008	1.4±0.3	15.1±4.7	25.85±3.17	97±10	4.37±1.83	1.38±0.55	40.34±22.87	46.10±23.63	0.38±0.38	238±137	2.28±1.67
1	2009	0.6±0.2	16.7±4.7	22.22±3.88	105±17	6.97±4.24	2.09±0.56	54.85±33.89	63.91±37.49	1.40±0.84	51±20	12.38±9.68
3	2009	0.8±0.1	22.2±3.1	30.04±0.73	101±8	4.18±2.23	1.43±0.29	32.31±12.38	37.93±11.78	0.79±0.23	52±17	2.81±2.19
5	2009	1.1±0.3	16.2±4.9	25.63±2.82	104±9	2.71±1.23	1.26±0.48	45.53±29.01	49.49±30.32	0.43±0.33	188±93	5.71±3.58
1	2010	0.7±0.2	17.0±4.9	22.46±2.64	104±15	10.59±4.42	2.97±0.84	58.45±16.98	72.02±16.58	1.19±0.41	105±76	9.66±8.25
3	2010	0.9±0.2	20.1±4.1	26.92±1.35	100±7	5.56±1.96	2.11±0.73	58.19±16.09	65.86±16.45	1.04±0.22	68±17	1.92±0.98
5	2010	1.1±0.3	17.4±5.2	24.45±2.34	109±12	4.19±1.83	1.60±0.89	58.11±28.16	63.89±28.66	0.25±0.09	323±200	2.88±1.50
1	2011	0.6±0.2	19.1±4.9	24.69±2.81	93±15	10.17±2.88	1.72±0.41	30.85±24.93	42.74±27.10	1.43±0.51	31±14	4.09±1.83
3	2011	0.8±0.2	22.1±4.9	28.48±2.38	104±6	5.25±1.75	1.18±0.26	45.91±27.38	52.34±27.51	0.73±0.23	91±63	2.25±0.95
5	2011	1.3±0.5	17.5±5.4	27.82±2.20	109±11	2.93±1.27	0.94±0.25	23.62±15.31	27.49±15.44	0.24±0.10	153±100	1.88±1.00
1	2012	0.9±0.3	17.8±5.3	24.27±3.60	108±14	7.17±2.87	1.91±0.98	43.54±21.12	52.62±23.44	1.67±0.64	41±22	11.65±17.87
3	2012	1.2±0.3	23.9±4.5	31.76±0.74	106±6	3.98±1.03	1.04±0.21	26.67±9.69	31.69±9.69	0.65±0.17	64±31	1.89±0.93
5	2012	1.6±0.3	17.4±5.4	28.72±2.17	108±12	2.45±1.13	1.01±0.46	27.82±19.45	31.28±20.53	0.19±0.07	167±74	1.27±0.62
1	2013	1.0±0.3	17.9±5.8	20.91±2.54	104±13	12.05±5.63	3.08±1.91	57.99±25.15	73.12±28.14	2.07±1.02	57±30	12.98±12.92
3	2013	1.5±0.4	23.0±4.4	30.48±0.91	111±7	3.93±1.26	1.14±0.25	34.35±11.19	39.41±11.21	0.55±0.21	120±75	2.39±1.60
5	2013	1.9±0.4	17.9±6.1	23.76±2.51	125±13	3.55±1.70	1.63±0.84	57.54±36.02	62.72±37.18	0.22±0.08	353±270	2.52±1.94
1	2014	0.9±0.3	18.6±3.8	21.60±3.02	107±18	13.54±8.72	2.75±0.79	49.37±16.40	65.66±22.24	3.03±2.94	48±24	6.11±5.72
3	2014	1.2±0.2	24.2±3.3	28.52±1.46	110±9	4.65±2.11	1.44±0.45	29.37±9.35	35.46±10.65	0.65±0.25	72±30	0.72±0.32

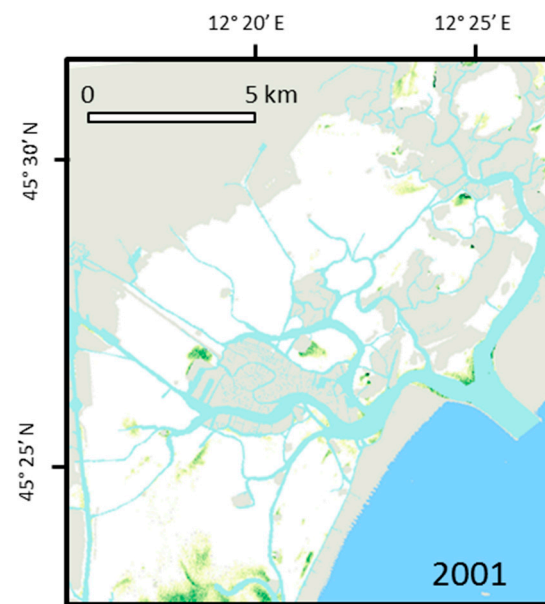
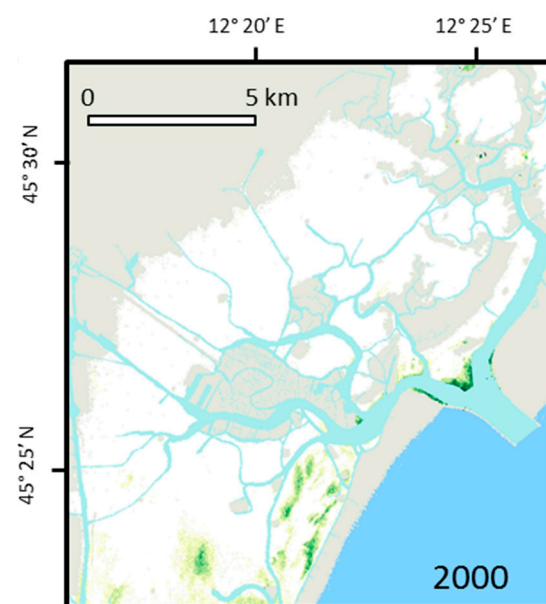
5	2014	1.6 $\pm$ 0.3	18.2 $\pm$ 4.0	21.24 $\pm$ 2.28	118 $\pm$ 15	3.12 $\pm$ 1.56	1.48 $\pm$ 0.56	37.62 $\pm$ 28.09	42.22 $\pm$ 29.46	0.28 $\pm$ 0.13	146 $\pm$ 58	2.31 $\pm$ 1.80
1	2015	0.8 $\pm$ 0.1	17.2 $\pm$ 5.1	26.96 $\pm$ 2.38	106 $\pm$ 10	9.57 $\pm$ 6.43	1.53 $\pm$ 0.69	25.09 $\pm$ 11.11	36.19 $\pm$ 12.06	1.75 $\pm$ 1.17	42 $\pm$ 20	3.46 $\pm$ 2.26
3	2015	1.2 $\pm$ 0.2	24.9 $\pm$ 4.3	31.17 $\pm$ 1.06	113 $\pm$ 6	4.70 $\pm$ 1.70	0.96 $\pm$ 0.20	17.72 $\pm$ 6.29	23.38 $\pm$ 5.76	0.46 $\pm$ 0.12	61 $\pm$ 25	1.14 $\pm$ 0.62
5	2015	1.7 $\pm$ 0.4	16.3 $\pm$ 5.3	28.57 $\pm$ 2.38	118 $\pm$ 17	1.50 $\pm$ 0.59	0.64 $\pm$ 0.34	15.09 $\pm$ 11.09	17.23 $\pm$ 11.71	0.24 $\pm$ 0.07	68 $\pm$ 38	2.47 $\pm$ 1.98
1	2016	0.7 $\pm$ 0.2	17.5 $\pm$ 4.7	27.16 $\pm$ 1.44	105 $\pm$ 6	11.03 $\pm$ 3.32	2.23 $\pm$ 0.49	38.09 $\pm$ 18.79	51.35 $\pm$ 20.26	1.55 $\pm$ 0.39	38 $\pm$ 15	2.44 $\pm$ 2.14
3	2016	1.2 $\pm$ 0.3	24.9 $\pm$ 3.3	30.30 $\pm$ 1.74	113 $\pm$ 8	5.24 $\pm$ 2.52	1.25 $\pm$ 0.25	25.92 $\pm$ 9.15	32.40 $\pm$ 9.14	0.70 $\pm$ 0.21	57 $\pm$ 22	1.00 $\pm$ 0.77
5	2016	1.6 $\pm$ 0.4	16.8 $\pm$ 5.0	28.52 $\pm$ 1.25	118 $\pm$ 12	3.51 $\pm$ 2.40	1.18 $\pm$ 0.30	23.40 $\pm$ 13.31	28.09 $\pm$ 13.65	0.32 $\pm$ 0.10	104 $\pm$ 54	2.10 $\pm$ 1.92
1	2017	0.6 $\pm$ 0.1	17.2 $\pm$ 5.7	25.73 $\pm$ 2.32	106 $\pm$ 10	7.75 $\pm$ 2.19	2.05 $\pm$ 0.61	27.53 $\pm$ 12.45	37.34 $\pm$ 13.59	2.21 $\pm$ 1.07	31 $\pm$ 25	6.60 $\pm$ 7.49
3	2017	1.1 $\pm$ 0.2	21.9 $\pm$ 4.4	31.12 $\pm$ 0.94	110 $\pm$ 4	4.05 $\pm$ 1.60	1.39 $\pm$ 0.52	24.27 $\pm$ 9.45	29.71 $\pm$ 10.70	0.74 $\pm$ 0.23	46 $\pm$ 18	1.31 $\pm$ 0.86
5	2017	1.3 $\pm$ 0.5	17.1 $\pm$ 5.7	28.37 $\pm$ 1.95	129 $\pm$ 28	2.31 $\pm$ 0.64	1.29 $\pm$ 0.45	18.73 $\pm$ 14.78	22.32 $\pm$ 15.17	0.49 $\pm$ 0.24	63 $\pm$ 37	1.54 $\pm$ 0.81

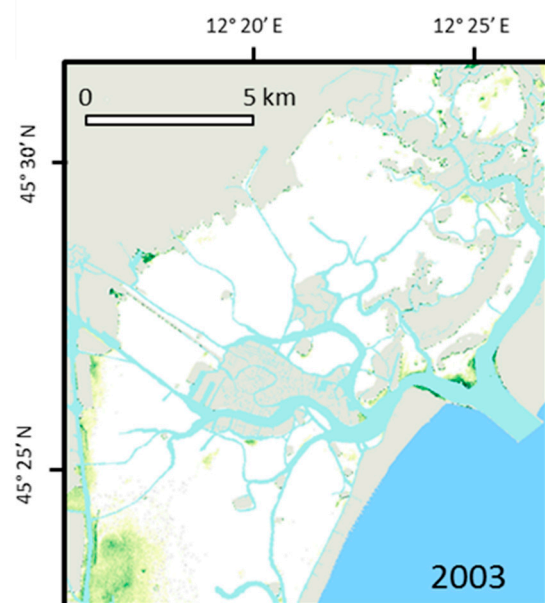
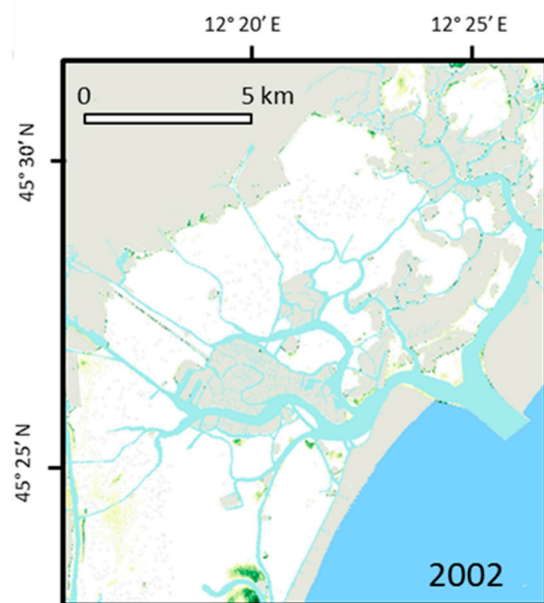
Supplementary Materials: Maps of satellite-derived macrophyte coverage retrieved by BOMBER.

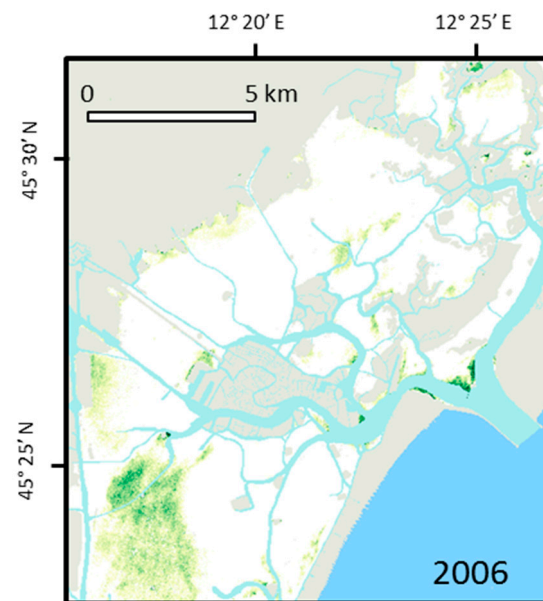
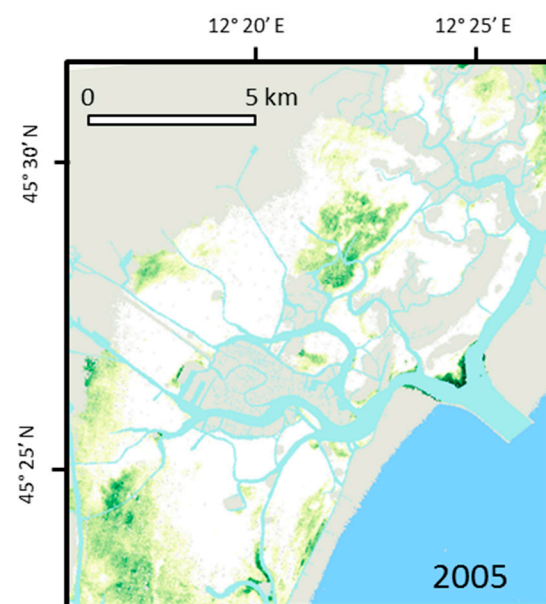
Table S2_1. Landsat images used for the retrieval of macrophyte coverage.

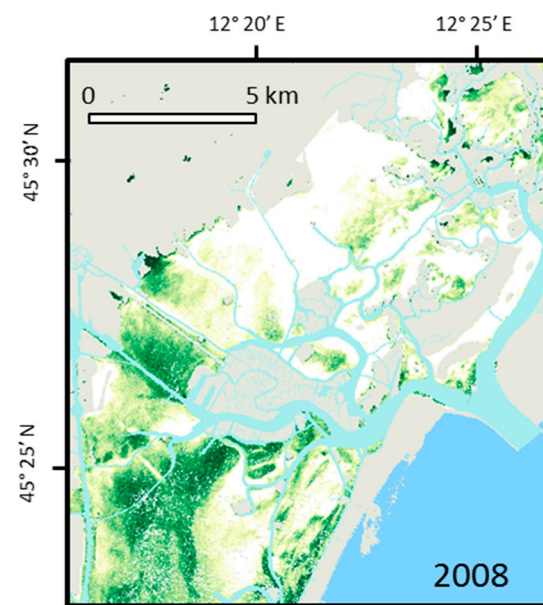
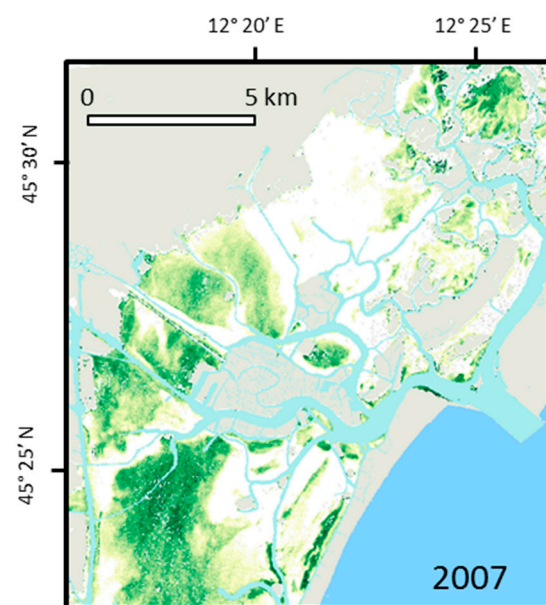
date	sensor
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04 May 2000	TM
29 April 2001	ETM+
18 May 2002	ETM+
05 May 2003	ETM+
03 June 2005	TM
12 May 2006	TM
24 May 2007	TM
01 May 2008	TM
20 May 2009	TM
30 April 2010	TM
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04 May 2012	ETM+
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18 May 2014	OLI
14 May 2015	OLI
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26 May 2017	OLI

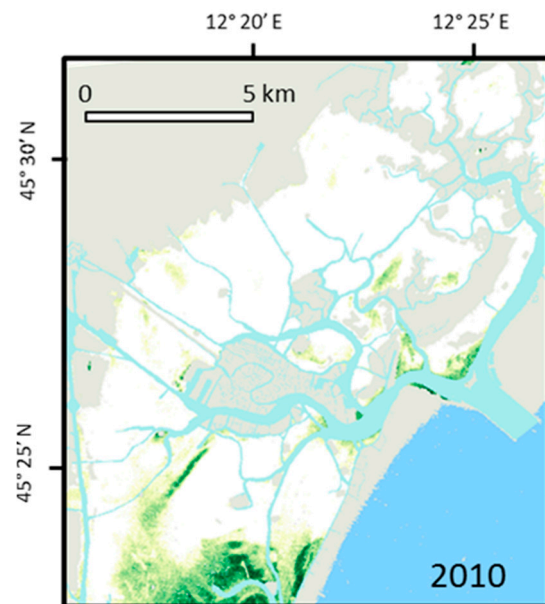
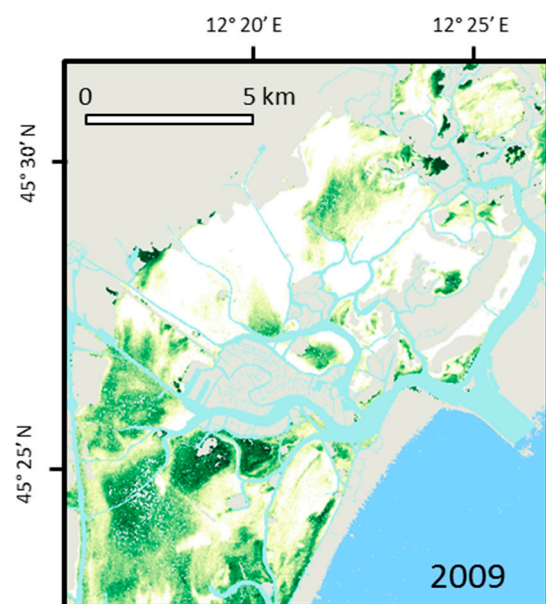


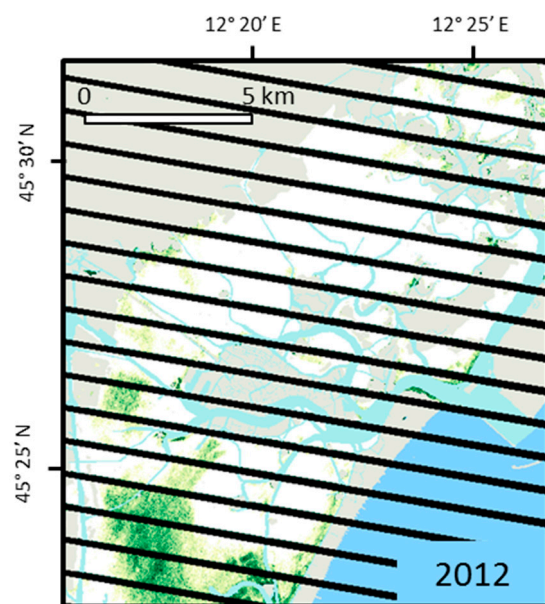
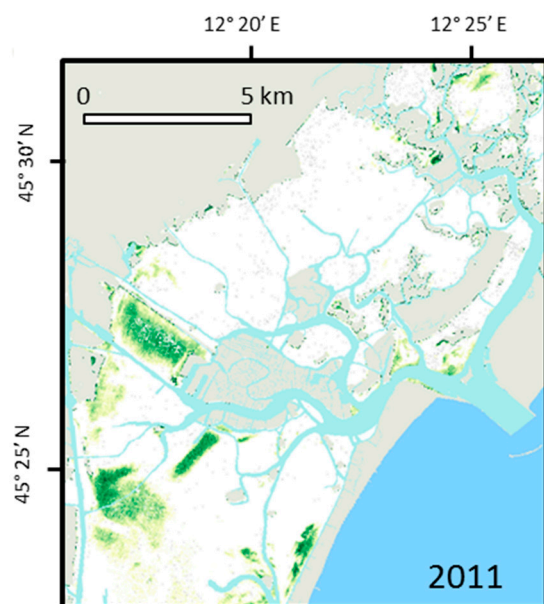


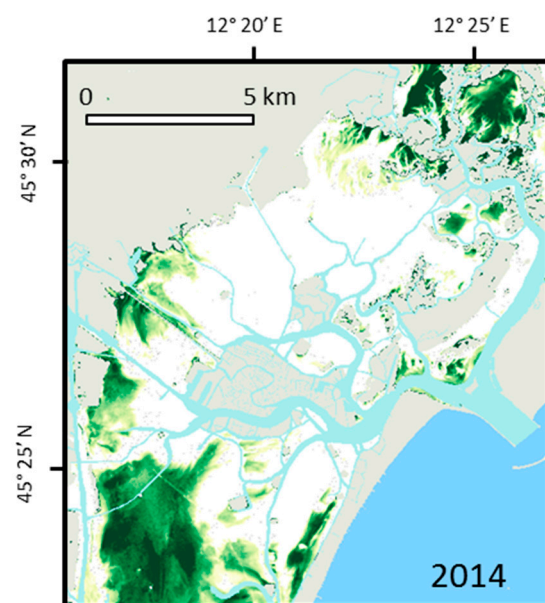
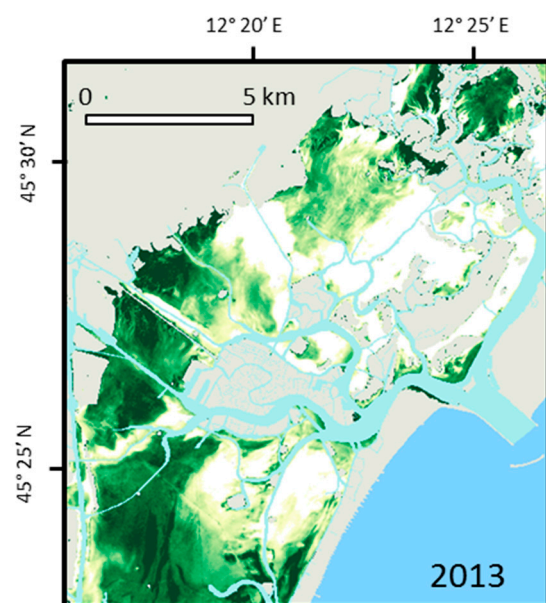


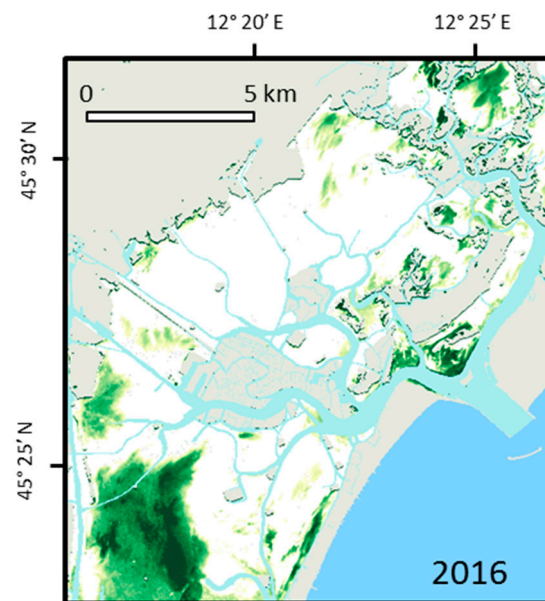
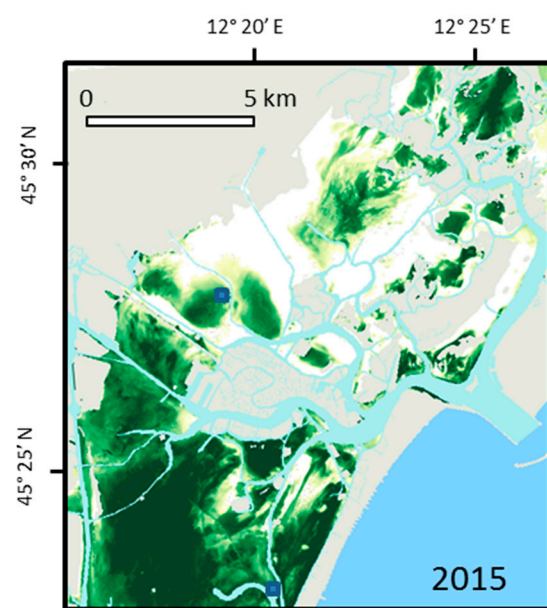












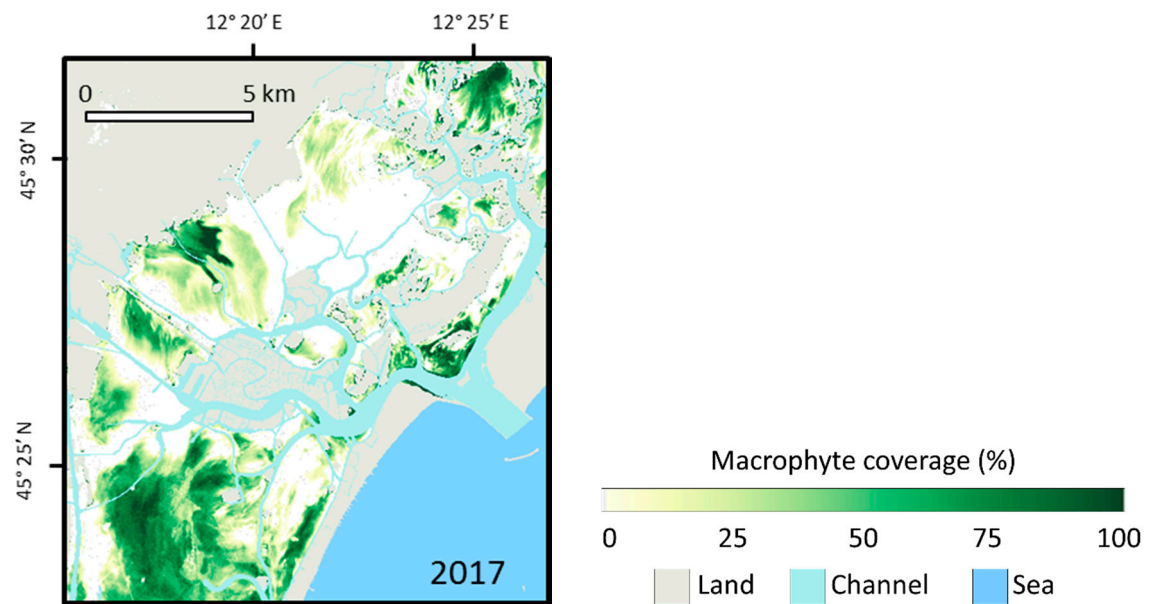


Figure S2_1. Maps of satellite-derived macrophyte coverage retrieved by BOMBER.