Electronic Supplementary Material (ESI) for Environmental Science: Atmospheres.

SUPPLEMENTARY DATA

Table S1: The amplitude of SST cooling. Cyclones occurred during the pre-monsoon season for the study period (1982–2020). The superscript symbols represent the region of landfall/track progress, such as ¶ *for NE,* ᵠ *- NW,* ᵉ *- SE, and* ¥ *- SW*. The bold ink indicates the cyclones that are mentioned in the results and discussion section.

Sl. No	Name of the Cyclone	Category	Selected 1°x1° box with maximum cooling	SST before cyclone (°C)			Minimum SST observed (°C)			SST Difference (°C)	
				Date	AVHRR	OISST	Date	AVHRR	OISST	AVHRR	OISST
1	BoB01 (1982) ¶	4	89.2-90.2°E 16.8-17.8°N	27 Apr	27.69	-	5 May	25.79	-	1.9	-
2	BoB02 (1982) ᵠ	2	87.8-88.8 °E 18.2-19.2°N	27 May	31.44	-	4 Jun	26.63	-	4.81	-
3	BoB01 (1985) ¶	TS	88-90°E 18.8-19.8°N	19 May	29.19	-	29 May	27.48	-	1.71	-
4	BoB02 (1987) ¶	TS	89.3-90.3°E 15.4-16.4°N	27 May	29.35	-	9 Jun	28.35	-	1	-
5	BoB01 (1989) ᵠ	TS	91.7-92.7°E 13.2-14.2°N	20 May	30.58	-	28 May	29.17	-	1.41	-
6	BoB02 (1990) ᵠ	4	81.3-82.3°E 10.6-11.6°N	30 Apr	29.85	-	13 May	27.58	-	2.27	-
7	BoB02 (1991) ¶	5	88.2-89.2°E 13.8-14.8°N	19 Apr	29.57	-	1 May	26.19	-	3.38	-
8	BoB03 (1991) ¶	TS	88.8-89.8°E 15-16°N	27 May	30.17	-	4 Jun	29.35	-	0.82	-
9	BoB01 (1992) ¶	1	87.9-88.9°E 10.8-11.8°N	12 May	30.37	-	23 May	27.61	-	2.76	-
10	BoB01 (1994) ¥	TS	89-90°E 10.5-11.5°N	15 Mar	28.20	-	24 Mar	26.53		1.67	-
11	BoB02 (1994) ¶	4	90.6-91.6°E 17.2-18.2°N	23 Apr	28.96	-	4 May	27.15	-	1.81	-
12	BoB01 (1996) ¶	TS	87.1-88.1°E 19.5-20.5°N	28 Apr	28.02	-	8 May	26.89	-	1.13	-
13	BoB01(1997) ¶	4	88.8-89.8°E 17.2-18.2°N	12 May	29.29	-	20 May	26.98	-	2.30	-
14	BoB01(1998) ¶	1	88.7-89.7°E	14 May	30.34	30.12	19 May	29.30	29.19	1.03	0.93

			13-14°N								
15	BoB01(2000) ¶	TS	89.2-90.2°E 13.3-14.3°N	24 Apr	28.68	29.63	30 Apr	26.93	28.64	1.75	0.99
16	BoB01(2003) ¶	1	87-88°E 8.5-9.5°N	7 May	30.16	30.77	19 May	27.33	27.68	2.82	3.09
17	BoB01(2004) ¶	1	91-92°E 17.8-18.8°N	13 May	28.27	30.41	21 May	27.48	27.13	0.79	3.28
18	Mala (2006) ¶	2	86-87°E 7.8-8.8°N	22 Apr	29.41	30.88	29 Apr	27.85	29.54	1.55	1.34
19	Akash (2007) ¶	1	89.8-90.8°E 15.7-16.7°N	10 May	29.70	30.19	14 May	27.53	28.00	2.16	2.19
20	**Nargis (2008) ¶**	**4**	**85.8-86.8°E 14.2-15.2°N**	**24 Apr**	**30.38**	**30.17**	**1 May**	**28.04**	**27.66**	**2.33**	**2.51**
21	Bijli (2009) ¶	TS	90.5-91.5°E 19.5-20.5°N	11 Apr	29.17	29.75	17 Apr	27.73	28.60	1.43	1.15
22	**Aila (2009) ϕ**	**1**	**86.7-88.7°E 19.6-20.6°N**	**20 May**	**30.1**	**30.21**	**25 May**	**28.06**	**27.88**	**2.03**	**2.33**
23	**Laila (2010) ¥**	**1**	**83-84°E 12.8-13.8°N**	**14 May**	**30.90**	**31.03**	**21 May**	**29.55**	**29.09**	**1.35**	**1.94**
24	Roanu(2016) ¶	TS	83.4-84.4°E 11.2-12.2°N	14 May	31.92	31.87	23 May	28.94	30.29	2.98	1.58
25	Viyaru (2013) ¶	TS	86.3-87.3°E 13.5-14.5°N	7 May	30.51	30.75	16 May	28.98	28.48	1.53	2.27
26	Maarutha (2017) ¶	TS	91.6-92.6°E 16-17°N	12 Apr	29.11	29.83	18 Apr	27.69	27.86	1.41	1.97
27	Mora (2017)¶	1	89.5-90.5°E 18.5-19.5°N	25 May	30.92	31.64	31 May	29.12	28.61	1.79	3.03
28	Fani (2019) ¶	5	83.8-84.8°E 12.4-13.4°N	22 Apr	30.40	30.30	3 May	27.22	27.60	3.18	2.7
29	Amphan(2020) ¶	5	86.8-87.8°E 14-15°N	12 May	31.50	31.26	20 May	27.13	26.60	4.37	4.66

Table S2: The SST cooling by post-monsoon cyclones in the bay. Cyclones during the post–monsoon season for the study period (1982–2020). The superscript symbols represent the region of landfall or track progress, such as ¶ for NE , ᵠ - NW, ᵋ- SE , and ¥ - SW . The bold red colour indicates the cyclones showing cooling less than 0.5 ^{O}C.

Sl No	Name of the Cyclone	Category	Selected 1°x1° box with maximum cooling	SST before cyclone (°C)			SST after Cyclone (°C)			SST Difference (°C)	
				Date	AVHRR	OISST	Date	AVHRR	OISST	AVHRR	OISST
1	BoB03(1982) ᵠ	TS	85.8-86.8°E 12.4-13.4°N	10 Oct	29.33	-	15 Oct	27.66	-	1.67	-
2	BoB04 (1982) ¥	TS	87.1-88.1°E 10.4-11.4°N	14 Oct	29.02	-	21 Oct	27.47	-	1.55	-
3	BoB02(1983) ᵠ	TS	85-86°E 15-16°N	29 Sep	28.27	-	3 Oct	26.9	-	1.36	-
4	BoB04 (1983) ¶	TS	87.6-88.6°E 15.6-16.6°N	2 Nov	29.23	-	10 Nov	25.77	-	3.46	-
5	BoB02 (1984) ᵠ	TS	88-89°E 18.6-19.6°N	7 Oct	29.95	-	13 Oct	28.11	-	1.84	-
6	BoB03 (1984) ¥	2	83-84°E 9.2-10.2°N	6 Nov	28.99	-	13 Nov	26.92	-	2.09	-
7	BoB04 (1984) ¥	1	85.2-86.2°E 9.2-10.2°N	24 Nov	28.75	-	3 Dec	25.81	-	2.94	-
8	BoB03 (1985) ᵠ	TS	88.4-89.4°E 14-15°N	5 Oct	28.29	-	13 Oct	27.86	-	**0.43**	-
9	BoB04 (1985) ᵠ	TS	88-89°E 19-20°N	12 Oct	28.53	-	17 Oct	28.08	-	**0.45**	-
10	BoB05 (1985) ¥	TS	83.6-84.6°E 12.2-13.2°N	10 Nov	27.64	-	16 Nov	26.47	-	1.17	-
11	BoB06 (1985) ¥	TS	80.8-81.8°E 12.4-13.4°N	6 Dec	26.69	-	13 Dec	25.01	-	1.68	-
12	BoB02 (1986) ¶	TS	87-88°E 15-16°N	3 Nov	28.28	-	11 Nov	26.80	-	1.48	-
13	BoB04 (1987) ¥	TS	87.2-88.2°E 11.4-12.4°N	11 Oct	28.76	-	15 Oct	27.24	-	1.52	-
14	BoB05 (1987) ¥	TS	87-88°E 8-9°N	27 Oct	28.80	-	1 Nov	28.44	-	**0.36**	-
15	BoB06 (1987) ¥	TS	93.6-94.6°E 11.6-12.6	5 Nov	29.01	-	13 Nov	27.59	-	1.42	-
16	BoB07 (1987) ¥	TS	82.8-83.8°E 10.8-11.8	29 Nov	28.88	-	4 Dec	27.37	-	1.51	-
17	BoB08 (1987) ¥	TS	81.8-82.8°E 13.8-14.8°N	14 Dec	27.95	-	23 Dec	26.59	-	1.36	-
18	BoB02 (1988) ᵠ	TS	92.2-93.2°E 15.4-16.4	14 Oct	28.11	-	20 Oct	27.50	-	0.61	-
19	BoB03 (1988) ¶	TS	89.5-90.5°E 17.4-18.4°N	11 Nov	28.56	-	17 Nov	27.11	-	1.45	-

20	BoB04 (1988) ¶	3	88.5-89.5°E 12.4-13.4°N	18 Nov	28.25	-	30 Nov	25.97	-	2.28	-
21	BoB05(1988) ₴	TS	90-91°E 11.4-12.4°N	3 Dec	26.42	-	8 Dec	25.63	-	0.79	-
22	BoB04 (1990) ¶	TS	85.2-86.2°E 9.7-10.7°N	10 Dec	28.22	-	17 Dec	26.83	-	1.39	-
23	BoB04 (1991) ¥	TS	85-86°E 12-13°N	6 Nov	29.24	-	16 Nov	27.87	-	1.37	-
24	BoB07 (1992) ϕ	TS	89.9-90.9°E 9.7-10.7°N	3 Oct	29.09	-	9 Oct	26.64	-	1.45	-
25	BoB09 (1992) ¥	TS	86-87°E 15.6-16.6°N	29 Oct	28.66	-	6 Nov	26.86	-	1.8	-
26	BoB10 (1992) ¥	1	87-88°E 6.2-7.2°N	3 Nov	27.65	-	9 Nov	27.23	-	**0.42**	-
27	BoB02 (1993) ¥	1	83.8-84.8°E 8.4-9.4°N	24 Nov	27.88	-	1 Dec	27.35	-	0.53	-
28	BoB04 (1994) ¥	TS	83.4-84.4°E 12.2-13.2°N	25 Oct	28.82	-	31 Oct	27.50	-	1.32	-
29	BoB03 (1995) ϕ	1	93-94°E 10.6-11.6°N	2 Nov	28.80	-	12 Nov	27.05	-	1.75	-
30	BoB04 (1995) ¶	3	84.9-85.9°E 11.6-12.6°N	15 Nov	29.24	-	25 Nov	27.09	-	2.15	-
31	BoB06 (1996) ¶	TS	86.4-87.4°E 13.5-14.5°N	18 Oct	27.72	-	29 Oct	27.30	-	**0.42**	-
32	BoB07 (1996) ϕ	4	87.2-88.2°E 15.2-16.2°N	28 Oct	27.75	-	5 Nov	26.88	-	0.87	-
33	BoB08 (1996) ¥	1	82.6-83.6°E 14.2-15.2°N	23 Nov	27.72	-	5 Dec	25.92	-	1.8	-
34	BoB08 (1997) ₴	1	93-94°E 15.4-16.4°N	1 Nov	28.91	-	11 Nov	27.35	-	1.55	-
35	BoB05 (1998) ¥	2	85.2-86.2°E 12.2-13.2°N	10 Nov	28.78	28.16	15 Nov	27.90	27.95	0.87	**0.21**
36	BoB06 (1998) ϕ	1	87-88°E 15.4-16.4°N	16 Nov	29.44	28.01	22 Nov	27.24	27.88	2.20	**0.13**
37	BoB05 (1999) ϕ	4	85.5-86.5°E 17.5-18.5°N	12 Oct	29.99	29.25	18 Oct	28.61	27.07	1.37	2.18
38	BoB06 (1999) ϕ	5	88.2-89.2°E 18-19°N	22 Oct	28.25	28.80	31 Oct	27.02	27.16	1.23	1.64
39	BoB03 (2000) ¥	TS	83-84°E 14-15°N	12 Oct	29.63	29.14	20 Oct	28.65	27.99	0.98	1.16
40	BoB04 (2000) ϕ	TS	88-89°E 20-21°N	22 Oct	29.28	29.36	29 Oct	27.54	28.51	1.74	0.84
41	BoB05 (2000) ¥	1	81.4-82.4°E 11.6-12.6°N	23 Nov	28.02	28.31	30 Nov	27.16	27.40	0.85	0.91

42	BoB06 (2000) ¥	1	84-85°E 8-9°N	20 Dec	27.70	27.10	30 Dec	26.72	26.55	0.98	0.56
43	BoB01(2001) ¥	TS	82.5-83.5°E 15-16°N	1 Oct	29.25	27.81	16 Oct	28.34	27.58	0.90	**0.23**
44	BoB03 (2002) ¥	TS	87-88°E 19.6-20.6°N	6 Nov	28.00	28.14	12 Nov	27.28	27.89	0.71	**0.25**
45	BoB04 (2002) ₴	TS	88-89°E 14.5-15.5°N	20 Nov	27.65	28.74	27 Nov	26.79	27.88	0.85	0.87
46	BoB05 (2002) ¥	TS	82.2-83.2°E 5-6°N	18 Dec	27.76	28.70	24 Dec	27.38	28.49	**0.38**	**0.21**
47	BoB07 (2003) ¥	TS	80.7-81.7°E 12.5-13.5°N	11 Dec	27.17	28.02	15 Dec	25.92	27.20	1.25	0.82
48	Baaz (2005) ¥	TS	84-85°E 11.7-12.7°N	25 Nov	28.21	27.82	1 Dec	26.49	27.02	1.71	0.80
49	Fanoos (2005) ¥	TS	79.7-80.7°E 9.5-10.5°N	3 Dec	27.32	28.24	11 Dec	26.35	26.67	0.96	1.57
50	Ogni (2006) ¥	TS	80-81°E 10-11°N	26 Oct	27.98	29.28	30 Oct	26.79	28.99	**0.19**	**0.29**
51	Sidr (2007) ¶	4	89.6-90.6°E 11.7-12.7°N	8 Nov	28.91	28.70	16 Nov	27.45	26.46	1.45	2.23
52	Rashmi (2008) ϕp	TS	86.8-87.8°E 16.8-17.8°N	22 Oct	29.39	29.34	28 Oct	28.22	27.42	1.16	1.92
53	Khaimukh (2008) ¥	TS	84.5-85.5°E 14.4-15.4°N	10 Nov	28.40	29.02	17 Nov	28.10	27.61	**0.29**	1.40
54	Nisha (2008) ¥	TS	79-80°E 9.2-10.2°N	22 Nov	28.21	28.79	27 Nov	27.10	28.03	1.10	0.76
55	Ward (2009) ¥	TS	81.6-82.6°E 6.6-7.6°N	7 Dec	28.02	28.67	12 Dec	27.13	27.65	0.89	1.02
56	Giri (2010) ¶	4	90-91°E 18.5-19.5°N	17 Oct	29.54	28.52	22 Oct	28.72	28.15	0.82	0.37
57	Jal (2010) ¥	1	84-85°E 12-13°N	1 Nov	29.17	29.11	7 Nov	28.08	27.12	1.09	1.99
58	Thane (2010) ¥	1	83-84°E 11.5-12.5°N	22 Dec	28.53	27.62	29 Dec	27.07	26.16	1.45	1.47
59	Nilam (2010) ¥	TS	82.3-83.3°E 12-13°N	25 Oct	28.90	28.85	3 Nov	28.46	26.58	**0.44**	2.26
60	Phailin (2013) ϕp	5	86-87°E 17.6-18.6°N	5 Oct	29.17	29.52	12 Oct	26.91	24.63	2.25	4.89
61	Helen (2013) ϕp	1	83.4-84.4°E 15.6-16.6°N	16 Nov	27.14	27.11	24 Nov	26.64	26.33	0.50	0.79
62	Lehar (2013) ¥	1	92.5-93.5°E 13.4-14.4°N	16 Nov	28.58	28.78	26 Nov	27.91	27.96	0.67	0.82
63	Madi (2013) ¥	2	84.6-85.6°E 13.5-14.5°N	3 Dec	27.81	27.76	13 Dec	25.23	25.64	2.57	2.12

64	Hudhud (2013) ϕ	4	85-86°E 15.8-16.8°N	4 Oct	29.51	30.08	10 Oct	26.52	23.56	2.99	6.52
65	Kyant (2016) ϕ	TS	85.6-86.6°E 14.5-15.5°N	18 Oct	28.61	29.41	24 Oct	28.18	28.61	**0.43**	0.8
66	Nada (2016) ¥	TS	81.5-82.5°E 10-11°N	26 Nov	28.04	28.13	2 Dec	27.34	27.70	0.70	**0.43**
67	Vardah (2016) ¥	1	81.6-82.6°E 12.8-13.8°N	3 Dec	28.07	28.37	11 Dec	26.59	26.73	1.48	1.64
68	Titli (2018) ϕ	3	86.6-87.6°E 16-17°N	5 Oct	30.70	30.33	10 Oct	27.42	24.71	3.28	5.62
69	Gaja (2018) ¥	1	80.8-81.8°E 10.5-11.5°N	7 Nov	28.58	29.02	16 Nov	27.42	27.93	1.15	1.09
70	Phethai (2018) ϕ	TS	82.5-83.5°E 10.8-11.8°N	10 Dec	28.25	27.18	19 Dec	27.52	26.70	0.72	**0.48**
71	Bulbul(2019) ¶	1	87.5-88.5°E 18-19°N	2 Nov	29.16	29.62	11 Nov	26.52	26.60	2.64	3.02
72	Nivar(2020) ¥	1	83-84°E 10.6-11.6°N	19 Nov	29.18	29.39	27 Nov	27.62	27.55	1.56	1.84
73	Burevi (2020) ¥	TS	86-87°E 6.5-75°N	26 Nov	29.27	28.98	3 Dec	28.30	28.75	0.97	0.23

Table S3: The parameters that influence SST cooling. Cyclones during the pre-monsoon and post–monsoon season for the study period (1982-2020). The cyclones that occurred in El Nino years are shown in red, La Nina in Blue and Normal years in black ink.

Sl.No	Name of cyclone	SST Cooling AVHRR	T-speed (m/s)	EPV (10^{-4}m/s)	MLD (m)	Heat Flux (W/m2)	Tau (N/m2)	Maximum Sustained wind speed (m/s)	Lifetime (days)	Recovery time of SST (days)
1	BoB01 (1982)	1.9	4.33	0.97	-	-41.4	0.15	61.72	6	6
2	BoB02 (1982)	4.81	2.52	1.17	-	-87.4	0.20	28.29	6	8
3	BoB01 (1985)	1.71	3.59	0.81	-	22.0	0.44	30.86	4	6
4	BoB02 (1987)	1	5.77	0.50	-	-4.9	0.19	28.29	9	11
5	BoB01 (1989)	1.41	5.03	3.63	-	33.7	0.37	28.29	5	7
6	BoB02 (1990)	2.27	5.65	3.18	-	11.9	0.67	64.3	9	10
7	BoB02 (1991)	3.38	7.46	3.36	-	-5.4	0.39	72.01	9	12
8	BoB03 (1991)	0.82	3.43	0.35	-	-180.5	0.29	25.72	5	5
9	BoB01 (1992)	2.76	7.6	0.70		-187.8	0.26	33.43	6	7
10	BoB01 (1994)	1.67	2.79	1.34	11.13	-82.2	0.11	20.57	8	8
11	BoB02 (1994)	1.81	4.28	1.20	14.1	191.6	0.33	64.3	8	10
12	BoB01 (1996)	1.13	5.43	0.75	17.72	43.0	0.10	20.57	8	13
13	BoB01 (1997)	2.3	3.54	4.00	11.11	-451.3	0.54	51.4	5	7
14	BoB01 (1998)	1.04	5.82	1.47	20.66	-227.4	0.41	31.29	4	8
15	BoB01 (2000)	1.75	6.48	0.24	22.3	-146.2	0.19	18	4	7
16	BoB01 (2003)	2.83	3.09	2.27	19.71	-372.1	0.53	29.05	6	15
17	BoB01 (2004)	0.79	6.24	1.16	10.49	-219.3	0.23	29.05	6	9
18	Mala (2006)	1.5595	4.34	2.89	10.64	-280.1	0.32	51.4	5	12
19	Akash (2007)	2.1696	5.99	1.10	10.54	-249.6	0.49	29.05	3	11
20	Nargis (2008)	2.3365	1.77	3.08	10.57	-250.0	0.34	51.4	7	13
21	Bijli (2009)	1.4325	4.39	0.72	12.36	-99.7	0.18	22.35	4	8
22	Aila (2009)	2.0346	3.43	2.08	11.91	-256.4	0.53	29.05	4	6

23	Laila (2010)	1.3508	3.63	3.49	31.3	-219.6	0.40	29.05	7	14
24	Viyaru (2013)	1.5305	7.34	2.27	16.18	-272.3	0.39	22.35	8	15
25	Roanu (2016)	2.98	6.84	0.89	11.55	-207.7	0.83	30.86	6	10
26	Maarutha(2017)	1.41	7.23	0.85	10.72	-225.5	0.31	20.11	2	10
27	Mora (2017)	1.79	5.48	1.35	10.53	-320.4	0.36	29.05	4	8
28	Fani (2019)	3.18	5.11	5.68	12.23	-	-	77.16	10	15
29	Amphan (2020)	4.37	2.51	4.96	17.24	-	-	74.58	7	13
30	BoB03 (1982)	1.67	4.53	0.274	-	-106.8	0.1202	25.72	4	5
31	BoB04 (1982)	1.55	3.27	0.538	-	-104.6	0.1867	25.72	3	3
32	BoB02 (1983)	1.36	4.52	1.246	-	-96.78	0.222	25.72	4	6
33	BoB04 (1983)	3.46	3.54	0.5696	-	-226.4	0.2743	28.29	5	8
34	BoB02 (1984)	1.84	3.11	0.6774	-	-123.5	0.2186	23.14	5	7
35	BoB03 (1984)	2.09	1.85	2.605	-	-145.1	0.1502	43.72	7	7
36	BoB04 (1984)	2.94	4.08	1.288	-	143.3	0.4498	38.58	12	14
37	BoB03 (1985)	0.43	3.72	0.8466	-	137.2	0.1685	25.72	4	5
38	BoB04 (1985)	0.45	4.36	1.07	-	11.78	0.1711	25.72	2	2
39	BoB05 (1985)	1.17	5.07	0.594	-	24.16	0.1617	28.29	6	8
40	BoB06 (1985)	1.68	4.99	0.884	-	38.61	0.1993	25.72	6	9
41	BoB02 (1986)	1.48	8.2	0.549	-	-2.571	0.1816	25.72	7	9
42	BoB04 (1987)	1.52	3.61	0.639	-	33.01	0.1198	23.14	3	5
43	BoB05 (1987)	0.35	4.18	1.54	-	38.41	0.2766	28.29	5	7
44	BoB06 (1987)	1.42	5.15	1.045	-	-31.34	0.3322	25.72	6	8
45	BoB07 (1987)	1.51	4.02	0.29	-	-4.604	0.0992	23.14	11	15
46	BoB08 (1987)	1.36	7.39	0.8408	-	55.89	0.2433	18	7	8
47	BoB02 (1988)	0.60	5.5	0.622	-	71.05	0.0763	18	3	5
48	BoB03 (1988)	1.45	2.78	1.482	-	26.33	0.5621	28.29	5	7

49	BoB04 (1988)	2.28	7.17	3.053	-	-61.05	0.3912	56.58	10	12
50	BoB05 (1988)	0.79	4.78	0.9787	-	-7.767	0.1217	23.14	7	11
51	BoB04 (1990)	1.39	3.72	0.9497	-	23.62	0.4108	23.14	7	9
52	BoB04 (1991)	1.37	6.59	0.7017	-	-9.34	0.3534	20.57	8	10
53	BoB07 (1992)	1.45	7.78	0.3674	-	0.9178	0.1668	23.14	6	8
54	BoB09 (1992)	1.8	2.8	0.3434	-	-131.8	0.1924	28.29	9	10
55	BoB10 (1992)	0.419	2.91	0.6343	-	-230.6	0.2513	36	12	13
56	BoB02 (1993)	0.529	5.61	1.413	12.78	58.91	0.2432	38.58	9	12
57	BoB04 (1994)	1.32	4.61	0.3108	13.64	-82.61	0.1677	23.14	4	6
58	BoB03 (1995)	1.75	5.33	0.9766	13.25	-133.2	0.4607	36	6	7
59	BoB04 (1995)	2.15	7.22	1.115	10.58	-184.3	0.8894	54.01	8	9
60	BoB06 (1996)	0.419	5.72	1.042	14.9	21.76	0.2545	23.14	9	12
61	BoB07 (1996)	0.870	6.15	0.54	15.7	8.696	0.1027	59.15	7	8
62	BoB08 (1996)	1.8	4.83	3.662	20.78	-16.3	0.1876	38.58	12	15
63	BoB08 (1997)	1.5547	2.16	1.52	9.231	-374.8	0.5	15.64	6	8
64	BoB05 (1998)	0.878	7.65	0.94	14.67	-265.7	0.25	37.99	4	8
65	BoB06 (1998)	2.2031	5.88	0.76	10.71	-180.2	0.17	33.52	7	9
66	BoB05 (1999)	1.3759	7.08	2.24	15.79	-172.5	0.12	53.64	5	6
67	BoB06 (1999)	1.2354	4.64	2.72	10.76	-205.8	0.41	62.58	6	10
68	BoB03 (2000)	0.9835	3.22	1.56	10.83	-333.4	0.25	15.64	5	8
69	BoB04 (2000)	1.7421	6.22	0.84	23.32	-263.1	0.27	15.64	5	6
70	BoB05 (2000)	0.8599	9.12	1.81	16.39	-199.7	0.23	29.05	5	7
71	BoB06 (2000)	0.9831	5.09	1.64	14.06	-137.2	0.25	29.05	6	7
72	BoB01 (2001)	0.9093	4.29	1.48	11.98	-147.2	0.19	15.64	4	8
73	BoB03 (2002)	0.7176	8.03	0.76	13.06	-218.7	0.17	28.29	3	8
74	BoB04 (2002)	0.8554	2.83	1.43	10.59	-236.4	0.23	20.11	6	12
75	BoB05 (2002)	0.3800	2.54	0.406	12.25	-160.4	0.0758	18	5	7

76	BoB07 (2003)	1.2533	4.81	1.16	14.68	-281	0.27	22.35	6	7
77	Baaz (2005)	1.7199	2.71	1.62	12.14	-138.7	0.15	20.11	5	9
78	Fanoos (2005)	0.9699	2.93	1.46	11.72	-55.4	0.17	29.05	5	8
79	Ogni (2006)	0.1900	3.74	0.931	9.794	-71.85	0.073	28.29	2	3
80	Sidr (2007)	1.4591	5.11	2.24	14.01	-331.5	0.29	60.35	6	12
81	Rashmi (2008)	1.165	5.38	1.05	10.63	-219.1	0.23	20.11	3	7
82	Khaimukh (2008)	0.2903	4.07	1.24	22.95	-197.9	0.27	20.11	4	8
83	Nisha (2008)	1.1039	4.79	1.86	21.51	-204.3	0.36	22.35	5	9
84	Ward (2009)	0.897	2.38	0.27	18.39	-188.7	0.19	20.11	7	8
85	Giri (2010)	0.821	6.69	1.29	10.59	-66.37	0.12	60.35	4	5
86	Jal (2010)	1.0937	7.69	2	10.6	-197.5	0.31	21.29	8	7
87	Thane (2011)	1.4581	4.93	2.59	24.88	-313.1	0.54	35.76	7	9
88	Nilam (2012)	0.442	6.13	1.56	10.89	-281.9	0.39	24.58	3	10
89	Phailin (2013)	2.2577	5.39	2.71	10.53	-241.4	0.6	62.59	4	12
90	Helen (2013)	0.5009	5.61	2.77	18.28	-183.9	0.19	26.82	4	8
91	Lehar (2013)	0.6713	4.86	1.57	15.61	-264.2	0.18	33.52	6	12
92	Madi (2013)	2.5778	5.15	1.83	28.73	-245.7	0.71	31.29	7	15
93	Hudhud (2014)	2.9978	3.09	4.24	11.65	-237.8	0.72	51.4	5	12
94	Kyant (2016)	0.43	4.09	1.522	10.61	37.02	0.177	20.57	8	10
95	Nada (2016)	0.7012	4.77	1.18	17.38	-207.1	0.35	20.11	3	7
96	Vardah (2016)	1.4837	4.39	2.16	20.25	-292.5	0.48	33.52	6	9
97	Titli (2018)	3.2836	3.45	1.953	10.56	-327.8	0.26	42.46	6	9
98	Gaja (2018)	1.1598	3.49	0.75	24.34	-126.2	0.18	33.52	9	6
99	Phethai (2018)	0.7272	5.98	1.575	29.45	-206.8	0.53	24.58	6	7
100	Bulbul (2019)	2.64	3.21	2.679	11.67	-	-	38.88	6	8
101	Nivar (2020)	1.56	4.04	3.459	15.1	-	-	36	6	6
102	Burevi (2020)	0.9699	4.71	1.272	13.18	-	-	23.14	6	7

Table S4: Locations of various buoy used in this study.

Cyclone	Buoy ID	Location of the Buoy
Aila	RAMA BUOY, 15N 90E	15N 90E
Bijli	RAMA BUOY, 15N 90E	15N 90E
Maarutha	RAMA BUOY, 15N 90E	15N 90E
Mora	RAMA BUOY, 15N 90E	15N 90E
Jal	NIOT BUOY BD14	08°00'33" E 85°31'18" N
Phailin	NIOT BUOY BD10	16°30’12” E 88°00’00” N
Hudhud	NIOT BUOY BD10	16°30’18” E 87°57’57” N
Vardah	NIOT BUOY BD13	13°59’56” E 86°59’53” N

In this study we used the National Institute of Ocean Technology moored buoy system and Research Moored Array for African - Asian-Australian Monsoon Analysis and Prediction (RAMA) for analyzing the depth wise variation of temperature and for the calculation of Mixed Layer Depth (MLD), isothermal layer depth (ILD) and BLT (supplementary figure). The MLD denotes the depth at which the density is 0.125 kg/m3 greater than value at 10 m (e.g. Rao & Sivakumar, 2003) and ILD represents the depth at which the temperature is 0.5ºC lower than that at 10 m. This definition is in accordance with that of MLD such that when there is no salinity variation then the MLD and ILD are inseparable. The positive difference between ILD and MLD is the BLT. The MLD was at its peak during both southwest and northeast monsoon. The minimum MLD is observed in April and May (Vissa et al., 2013).

The buoy data from NIOT were not available for the pre –monsoon cyclones and hence we have used the RAMA buoy data for the analysis. The MLD and BLT has been calculated for pre (five days before the cyclone) and post cyclone period (five days after the cyclone) to understand the influence of tropical cyclones on surface and subsurface parameters. For the pre –monsoon cyclones, the difference between pre- and post-cyclone MLD is highest and was about ~ 29 m for the Cyclone Aila, as seen from Table S2. However, the MLD was very less for the case of Maarutha in the post-cyclone period. The absence of barrier layer during pre–monsoon season was clearly evident in the case of cyclone Aila and Bijli.

The NIOT buoy data were available for cyclones Jal, Phailin, Hudhud and Vardah, and hence was used for the calculation for MLD and BLT for pre- and post-cyclones period as mentioned above.

The post-cyclone MLD was higher for the case of cyclone Jal and was about ~ 19 m and for cyclone Hudhud it was about ~ 5 m. The cyclone Phailin exhibited smaller MLD after the passage and MLD reduced to 18 m in the post-cyclone period from 31 m during the pre-cyclone period. The smaller MLD after the cyclone passage was also observed for Vardah, although it was not a huge difference when compared with cyclone Phailin. Among the four cyclones, cyclone Jal and Vardah occurred over the southwest bay whereas the stronger cyclones Hudhud and Phailin occurred over the northern bay.

Table S5. The estimated MLD and BLT for selected cyclones. Red indicates pre–monsoon cyclones and Green indicates post–monsoon cyclones

Sl No	Cyclone	MLD		BLT	
1	Aila	12.94	42.6	14.19	4.88
2	Bijli	9.38	21.72	6.55	4.87
3	Maarutha	4.96	6.10	15.07	42.91
4	Mora	5.56	-	21.1	-
5	Jal	28.45	47.68	10.94	5.26
6	Phailin	31.21	18.05	19.66	7.26
7	Hudhud	30.65	8.35	35.02	7.94
8	Vardah	42.43	41.71	29.42	27.36

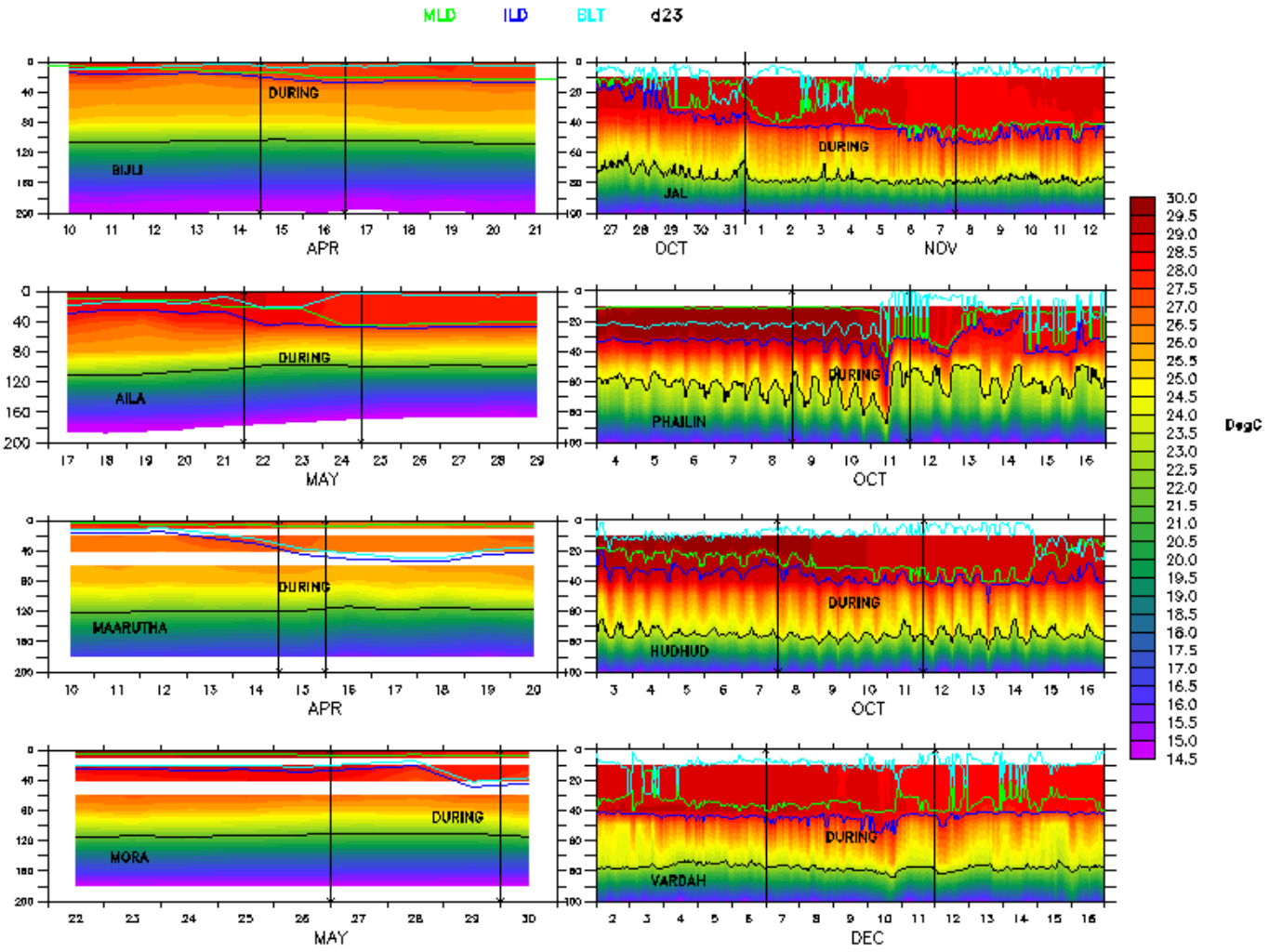

Figure S1: The MLD , BLT, ILD and D23 of some selected cyclones during Pre (left) – and Post (right) – Monsoon season. The vertical black lines indicate the cyclone period.

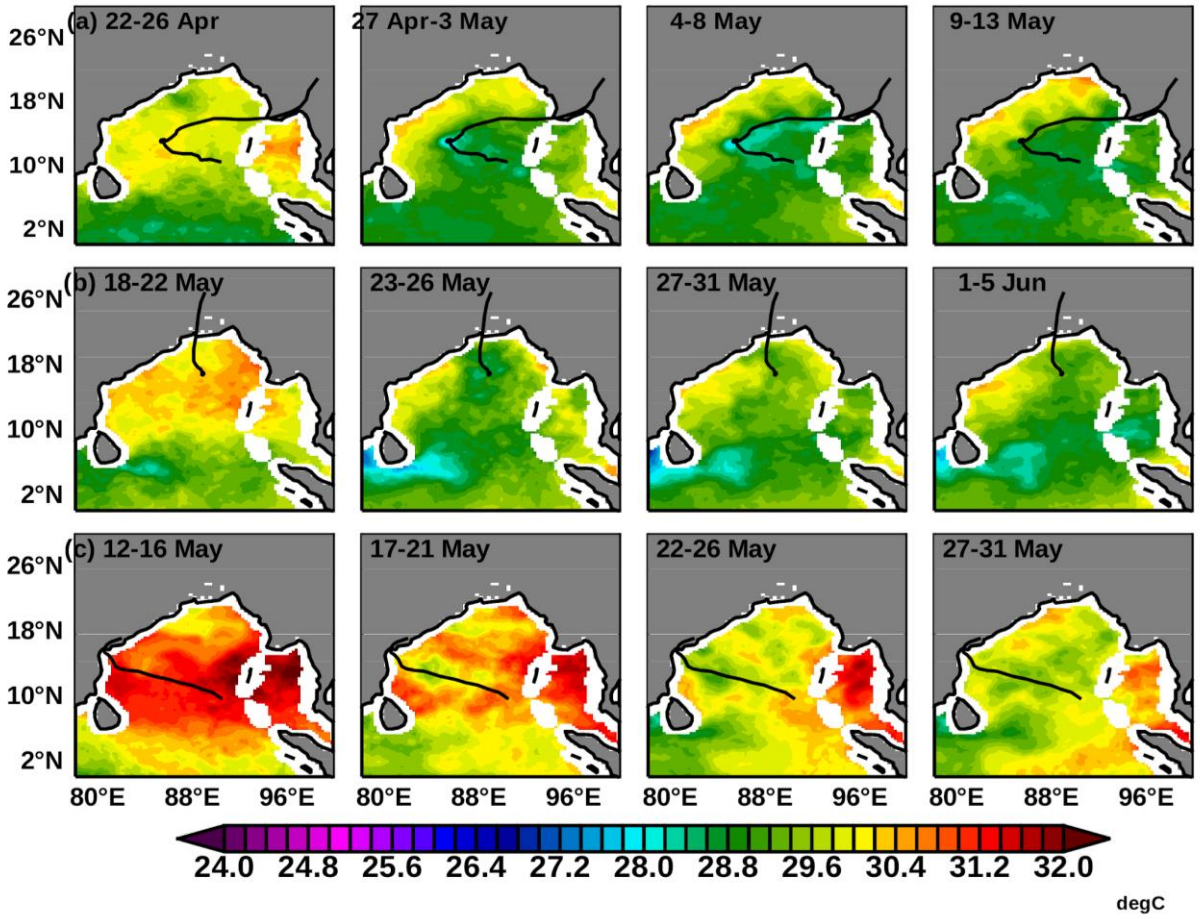

Figure S2: **Evolution of SST during the cyclone passage.** SST averaged for five days before the cyclone, during the entire cyclone period, five days just after the cyclone and the next five days using microwave OISST data for (a) Nargis (2008), (b) Aila (2009) and (c) Laila (2010). The tracks of the cyclone are also shown in their respective plots.

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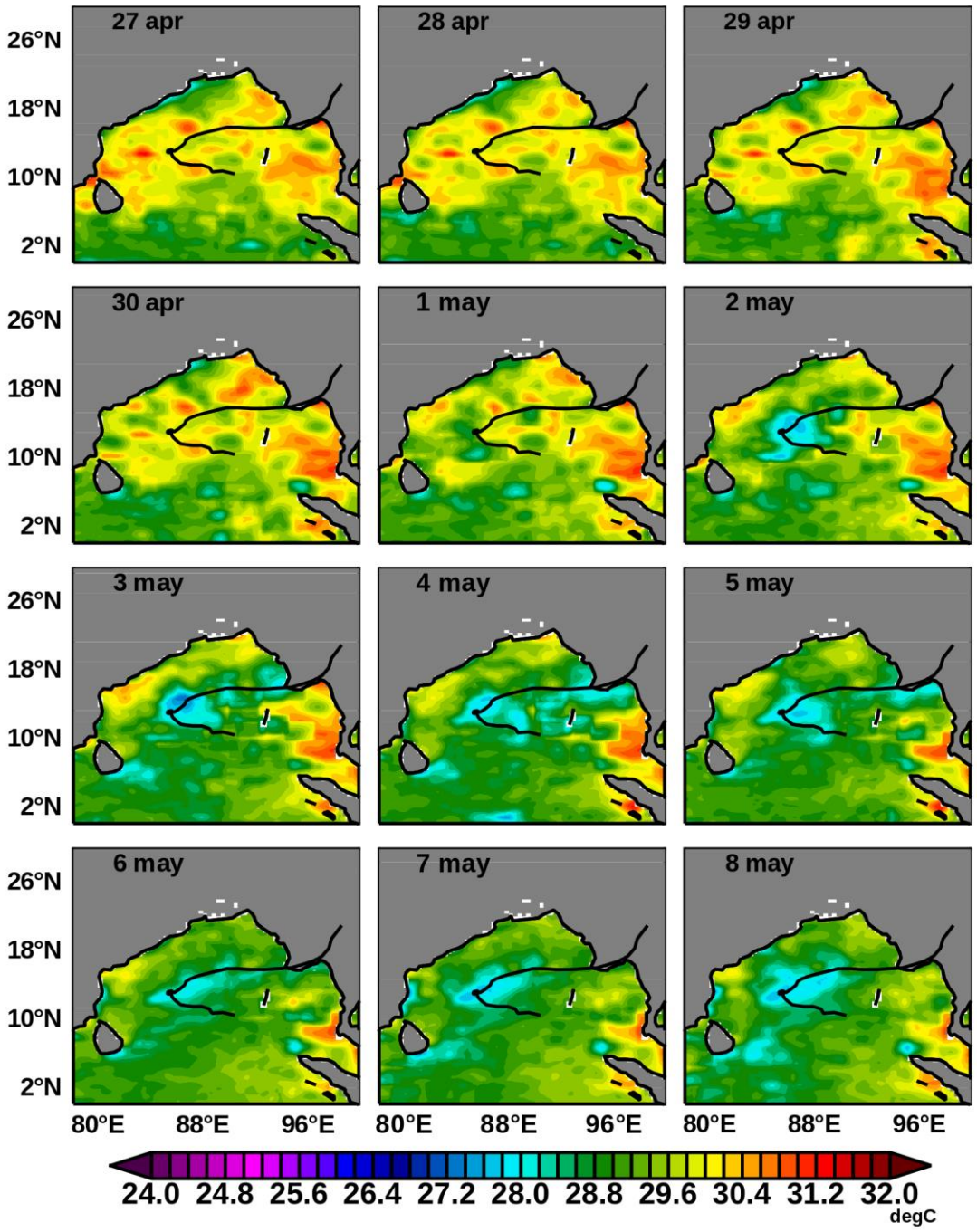

Figure S3: The daily SST for the cyclone Nargis (2008) from 27 April to 8 May using AVHRR data

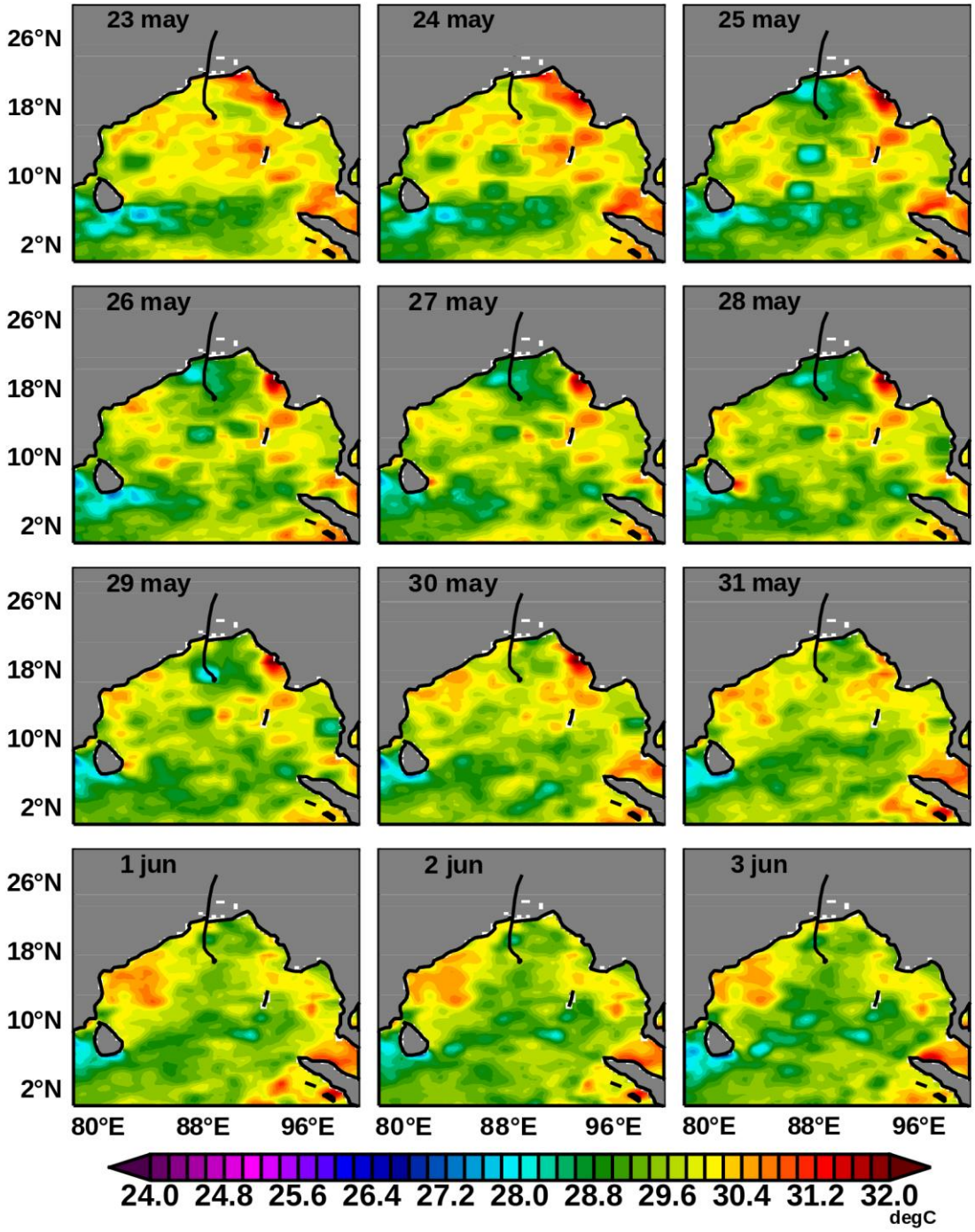

Figure S4: The daily SST for the cyclone Aila (2009) from 23 May to 26 May using AVHRR data

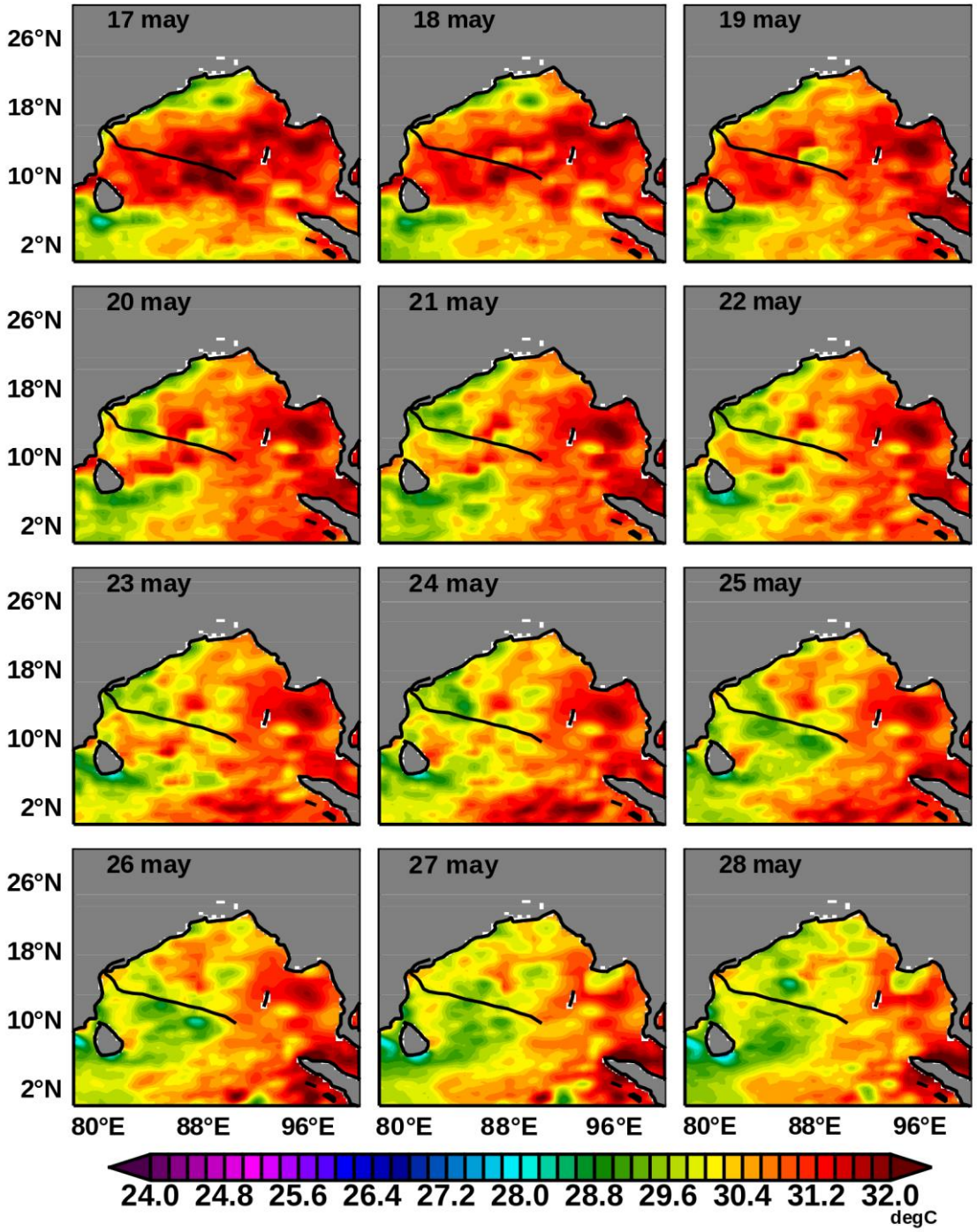

Figure S5: The daily SST for the cyclone Laila (2010) from 17 May to 21 May using AVHRR data

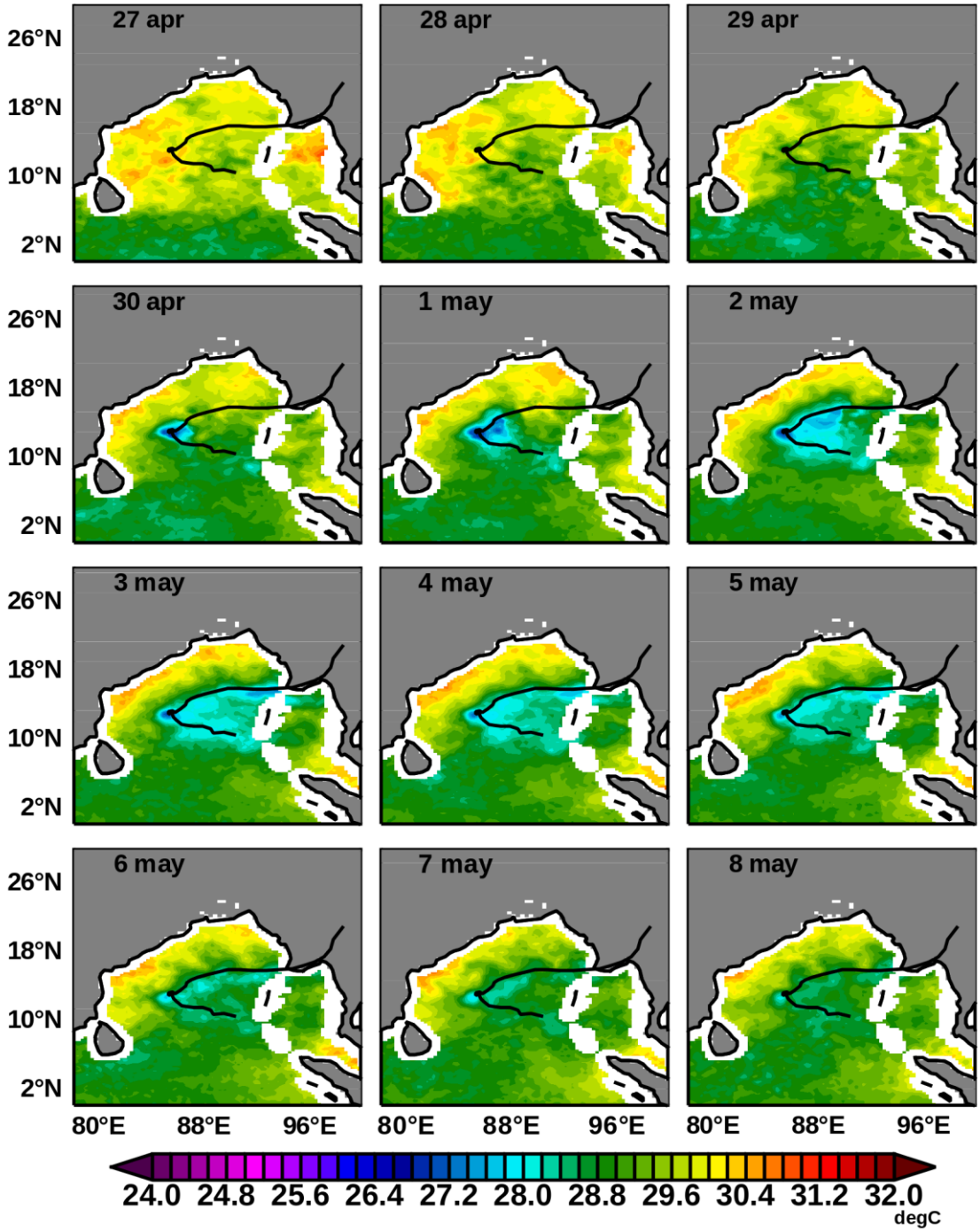

Figure S6: The daily SST for the cyclone Nargis (2008) from 27 April to 8 May using OISST data

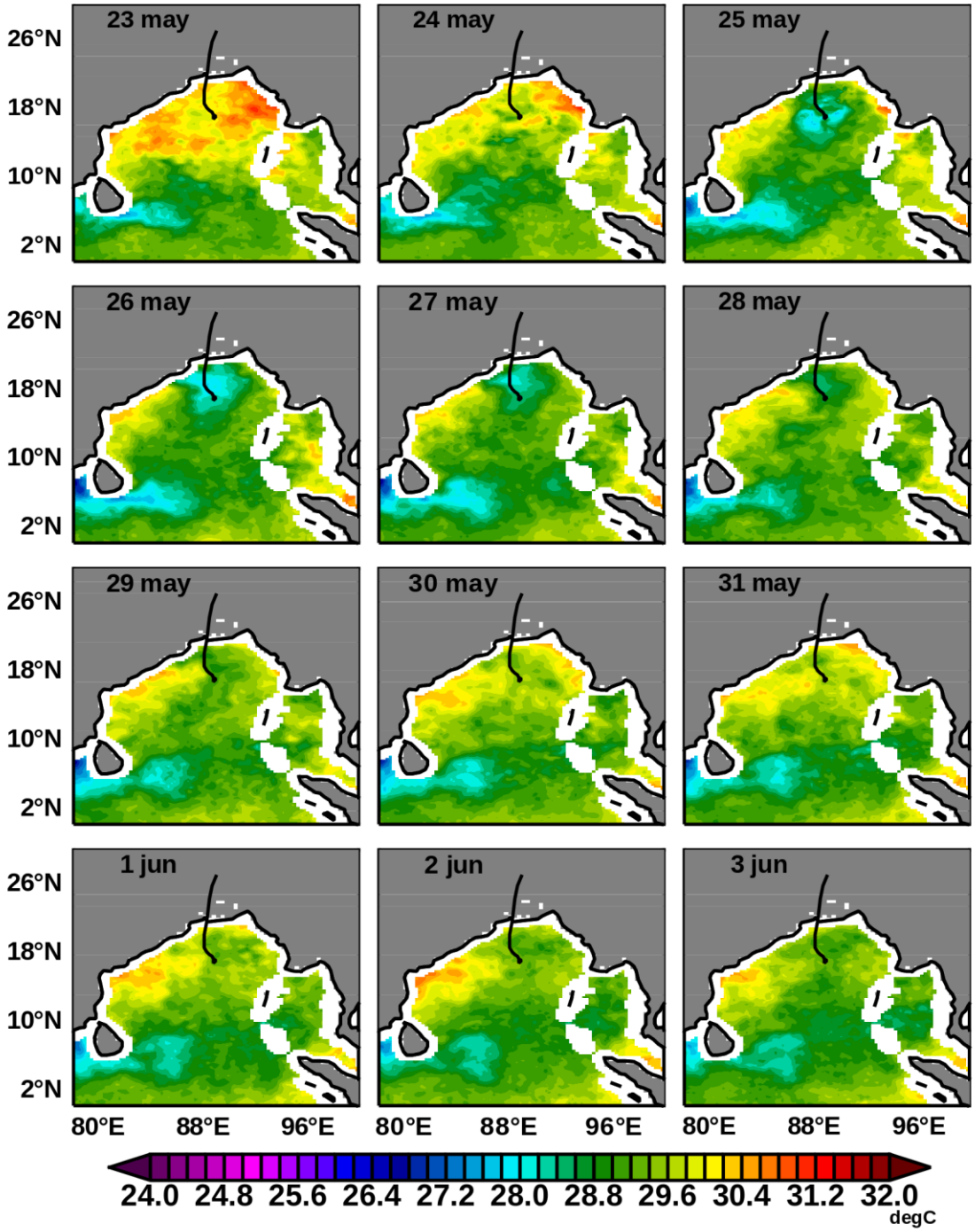

Figure S7: The daily SST for the cyclone Aila (2009) from 23 May to 26 May using OISST data

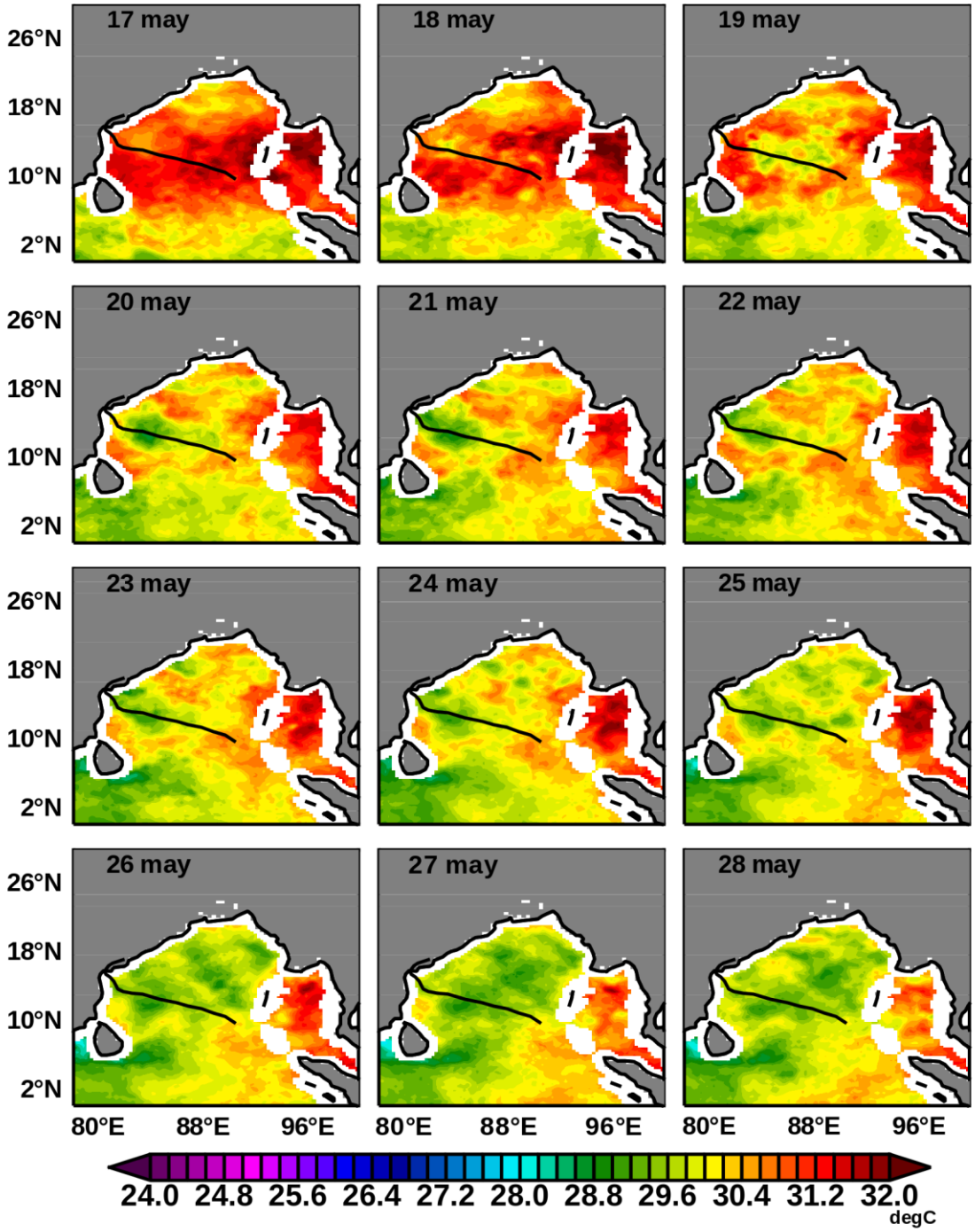

Figure S8: The daily SST for the cyclone Laila (2010) from 17 May to 21 May using OISST data