Supplementary file for:

A comparative evaluation of satellite and bio-Argo-based net primary productivity algorithms for the north Indian Ocean

N. Sunanda, J. Kuttippurath and A. Chakraborty

CORAL, Indian Institute of Technology Kharagpur, 721302, West Bengal, India.

*****Corresponding author: J. Kuttippurath (jayan@coral.iitkgp.ac.in)

Table S1: Argo Float ID, their location, observation start and end dates, and gap dates

WMOID	Basin	Start Date	End Date	Gap Start Date	Gap End Date
1902454	AS	2023-06-03	2024-02-28	2023-11-10	2023-11-30
1902455	AS	2023-06-02	2024-03-07	2023-12-08	2023-12-18
1902457	AS	2023-06-04	2024-02-28	2024-02-08	2024-02-18
1902458	AS	2023-06-14	2024-02-29	2023-12-11	2023-12-21
1902594	BoB	2023-06-15	2024-02-28	2023-06-19	2023-06-29
2902086	BoB	2012-12-30	2016-02-16	2013-02-16	2013-02-21
2902087	BoB	2013-01-01	2016-08-09	2013-10-14	2013-10-24
2902091	AS	2013-02-23	2013-03-15	2013-03-10	2013-03-15
2902093	AS	2013-02-26	2019-04-23	2018-04-18	2018-05-18
2902113	BoB	2013-11-23	2013-11-23	2013-11-23	2013-11-23
2902114	BoB	2013-11-24	2017-10-09	2017-09-14	2017-09-19
2902118	AS	2014-03-09	2021-04-21	2015-12-29	2016-01-08
2902120	AS	2014-03-10	2021-05-02	2017-09-10	2017-09-20
2902123	AS	2014-03-10	2019-08-31	2016-04-28	2016-05-08
2902124	AS	2014-03-11	2017-10-11	2016-11-15	2016-11-25
2902156	AS	2014-12-01	2020-08-14	2019-08-07	2019-08-27
2902158	BoB	2014-12-05	2018-02-02	2017-05-17	2017-05-27
2902161	BoB	2014-12-11	2017-08-12	2014-12-11	2015-07-01
2902174	AS	2015-02-18	2021-03-21	2020-12-20	2021-03-01
2902175	AS	2015-02-20	2020-07-11	2020-04-02	2020-05-22
2902193	BoB	2016-01-27	2018-07-04	2017-06-19	2017-07-04
2902196	BoB	2016-01-28	2018-04-14	2018-03-09	2018-03-15
2902199	AS	2016-03-05	2021-09-16	2018-08-02	2018-09-01
2902202	AS	2016-03-07	2020-11-08	2018-03-21	2018-04-22

2902204	AS	2016-03-08	2020-04-22	2019-08-16	2020-04-02
2902205	AS	2016-03-09	2021-12-23	2019-11-14	2020-06-21
2902209	AS	2016-09-27	2023-07-08	2019-02-28	2020-06-14
2902210	AS	2016-10-01	2022-08-10	2021-07-16	2021-09-04
2902211	AS	2016-10-05	2022-12-08	2021-07-06	2021-08-05
2902217	BoB	2016-12-25	2017-10-03	2017-08-05	2017-08-20
2902245	BoB	2017-11-09	2022-08-09	2022-07-30	2022-08-09
2902263	AS	2018-01-27	2024-03-03	2023-04-18	2023-04-28
2902264	BoB	2018-04-05	2023-04-19	2022-11-30	2022-12-10
2902270	AS	2019-05-04	2024-02-19	2021-10-01	2021-10-31
2902271	AS	2019-05-05	2024-02-27	2023-10-30	2023-11-20
2902272	AS	2019-05-05	2023-08-01	2022-10-06	2022-11-05
2902273	AS	2019-05-06	2024-02-28	2022-10-06	2022-11-25
2902275	AS	2019-05-08	2023-03-08	2022-02-17	2022-04-24
2902276	AS	2019-05-15	2023-10-24	2022-08-28	2022-11-06
2902277	AS	2019-05-23	2023-12-17	2022-02-15	2022-04-06
2902294	BoB	2019-11-25	2023-03-27	2022-01-15	2022-05-07
2903464	BoB	2023-07-03	2024-03-03	2024-02-01	2024-02-21
2903466	AS	2023-07-04	2024-03-01	2023-09-12	2023-10-02
4903660	AS	2023-06-05	2024-03-01	2023-11-13	2023-11-23
4903783	AS	2024-01-31	2024-03-01	2024-01-31	2024-02-10
5903586	AS	2011-12-17	2014-08-14	2014-04-21	2014-04-27
5907092	AS	2023-10-27	2024-03-01	2024-01-22	2024-02-01
6990514	AS	2023-06-05	2024-03-01	2023-11-13	2023-11-23
7901023	AS	2023-09-05	2024-03-01	2023-12-14	2023-12-24
7901136	AS	2023-10-26	2024-03-02	2024-01-22	2024-02-01

Table S2: Paired T-test results of the argo-based estimates

Comparison	Average Difference	Direction	Statistical Significance	P-value	95% CI (of difference)
VGPM vs CbPM	Positive	VGPM > CbPM	Yes	8.16×10^{-109}	(0.108, 0.128)
VGPM vs Eppley	Negative	VGPM < Eppley	Yes	1.26×10^{-23}	(−0.050, −0.034)
CbPM vs Eppley	Negative	CbPM < Eppley	Yes	6.93×10^{-263}	(−0.168, −0.152)

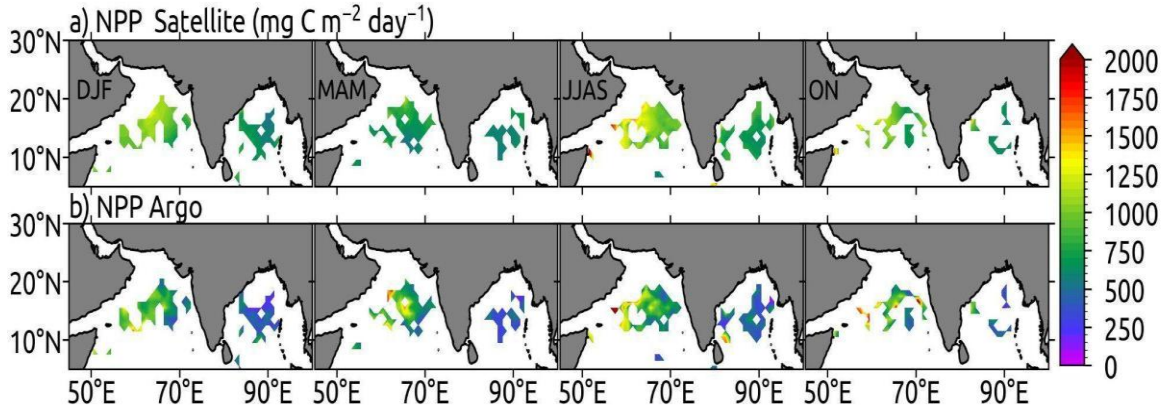

Figure S1: Seasonal variability of Eppley Vertically Generalised Production Model (VGPM) NPP using a) Satellite and b) Argo during December, January and February (DJF), March, April and May (MAM), June, July, August and September (JJAS), and October and November (ON) from 2013 to 2024.

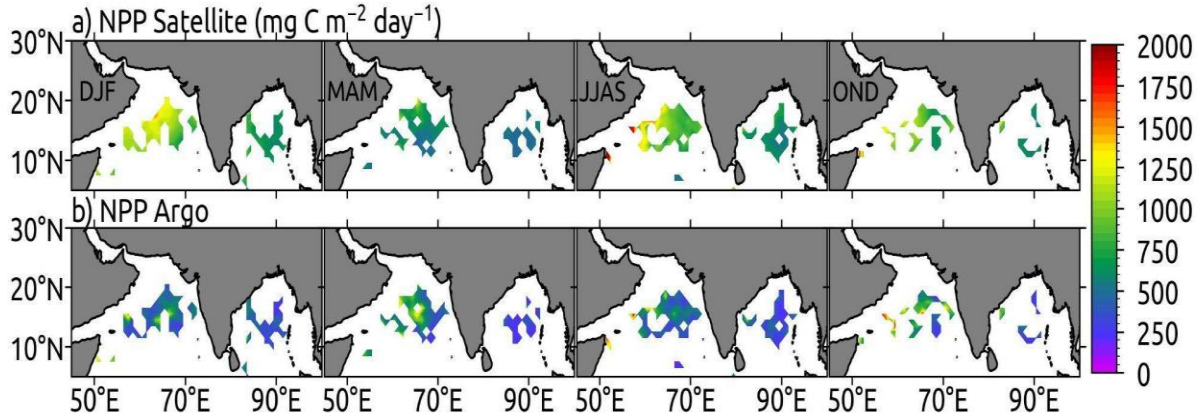

Figure S2: Seasonal variability of Carbon-based Production Model (CbPM) NPP using a) Satellite and b) Argo during December, January and February (DJF), March, April and May (MAM), June, July, August and September (JJAS) and October and November (ON) from 2013 to 2024.

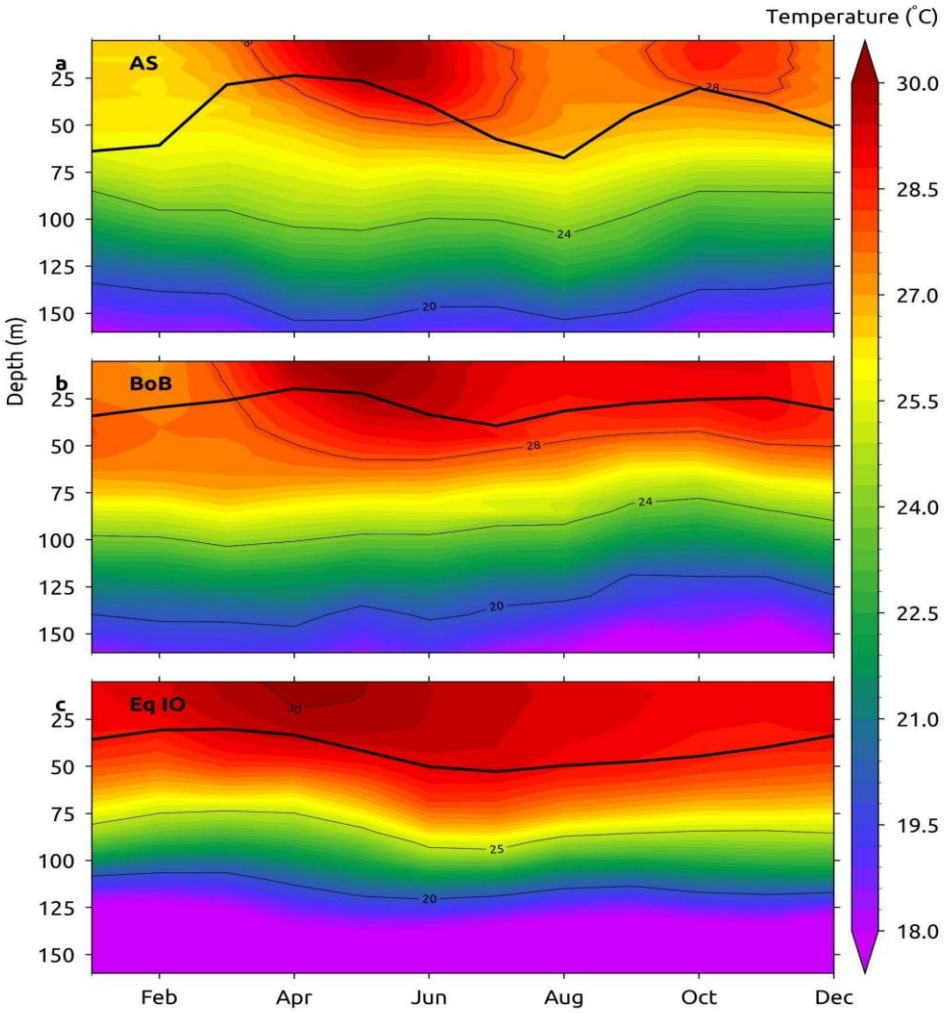

Figure S3: Monthly average of subsurface temperature distribution up to 150 m, with the black solid line denoting the Mixed Layer Depth (MLD) in a) Arabian Sea (AS), b) Bay of Bengal (BoB), and c) Equatorial Indian Ocean (Eq IO) for the period 2013–2020. The x-axis represents months (e.g. Feb is for February).

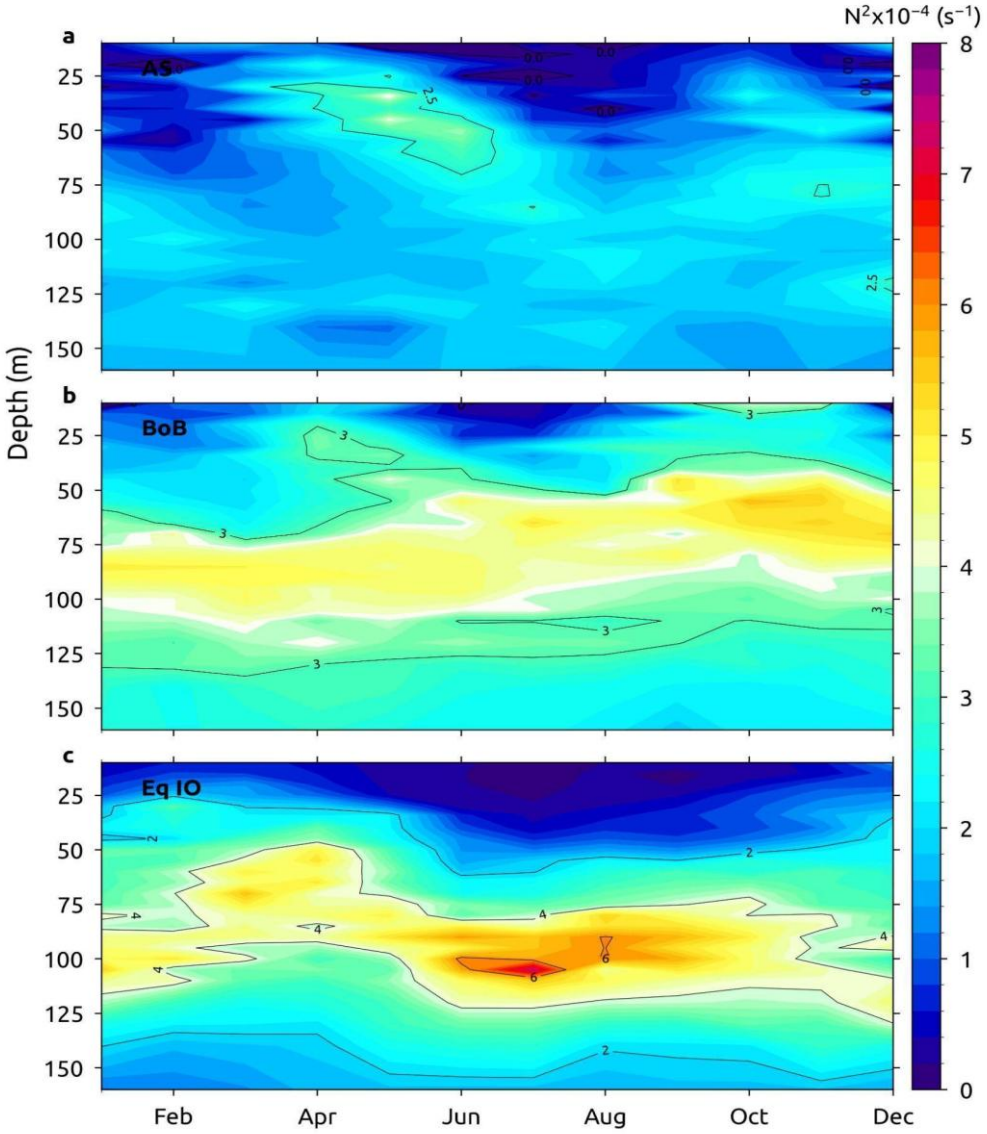

Figure S4: Monthly average of Brunt Vaisala Frequency ($N^2 \times 10^{-4}$) up to 150 m in **a**) Arabian Sea (AS) **b**) Bay of Bengal (BoB) and **c**) Equatorial Indian Ocean (Eq IO) for the period 2013–2020**.** The x-axis represents months (e.g. Feb is for February).

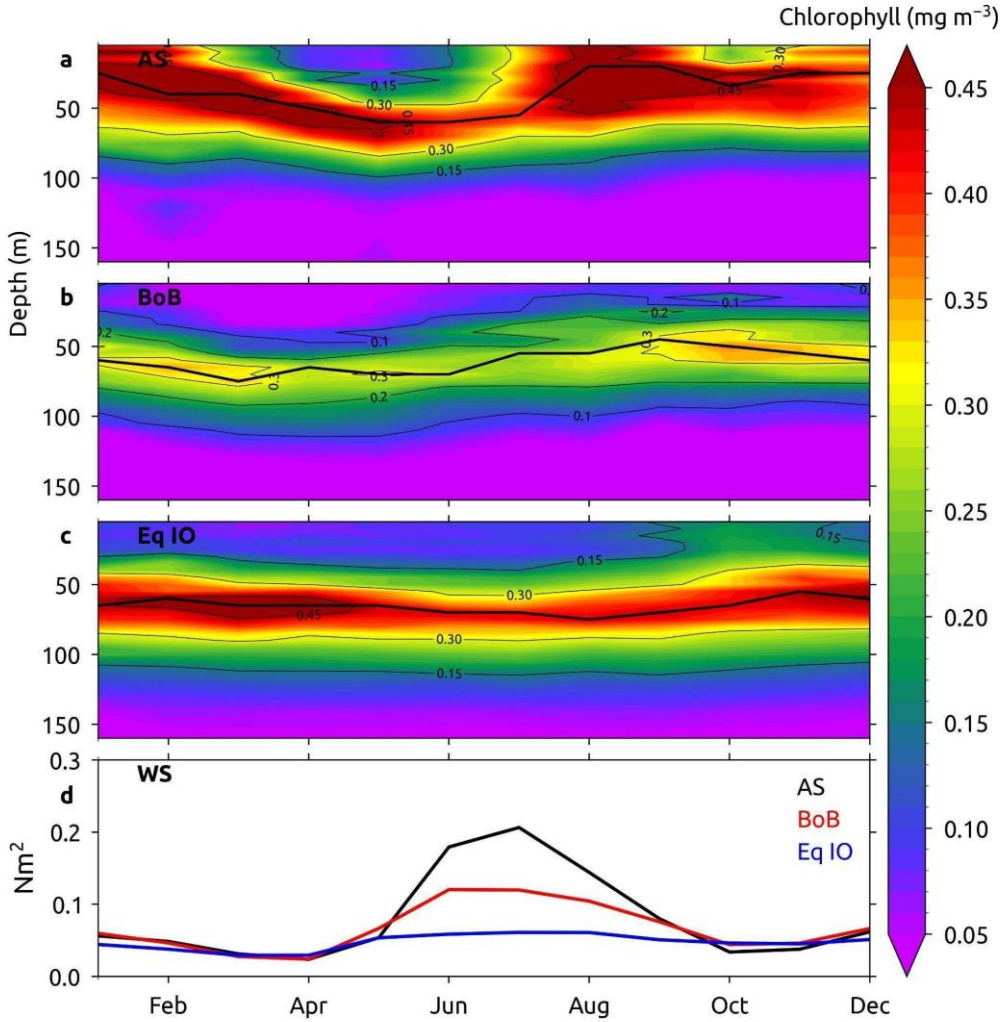

Figure S5: Gridded monthly average of subsurface Chlorophyll-a distribution up to 150 m, with a black solid line denoting the Mixed Layer Depth (MLD) in **a**) Arabian Sea (AS), **b**) Bay of Bengal (BoB) and **c)** Equatorial Indian Ocean (Eq IO), and **d**) annual cycle of wind stress in AS, BoB and Eq IO for the period 2013–2020. The x-axis represents months (e.g. Feb is for February).