

On the use of ABACUS high resolution glider observations for the assessment of phytoplankton ocean biomass from CMEMS model products



**G. Aulicino^a, C. Cesarano^b, M. Zerrouki^c, S. Ruiz^d,
G. Budillon^a, Y. Cotroneo^a**



^a Dipartimento di Scienze e Tecnologie, Università degli Studi di Napoli Parthenope, Napoli, Italy

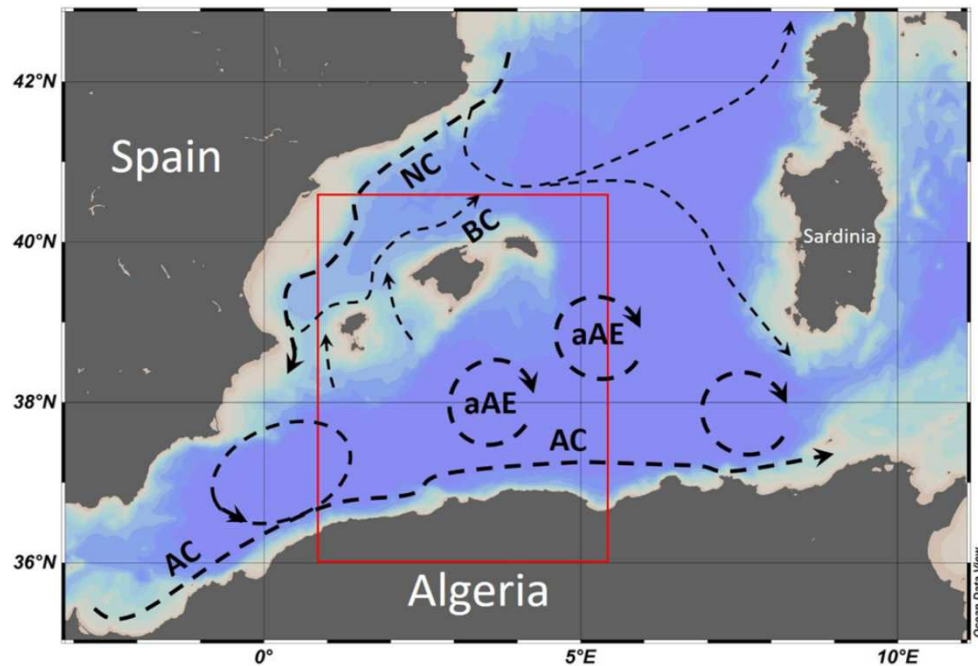
^b Dipartimento di Scienze della Vita e dell'Ambiente, Università Politecnica delle Marche, Ancona, Italy

^c National School for Marine Sciences and Coastal Management, Algiers, Algeria

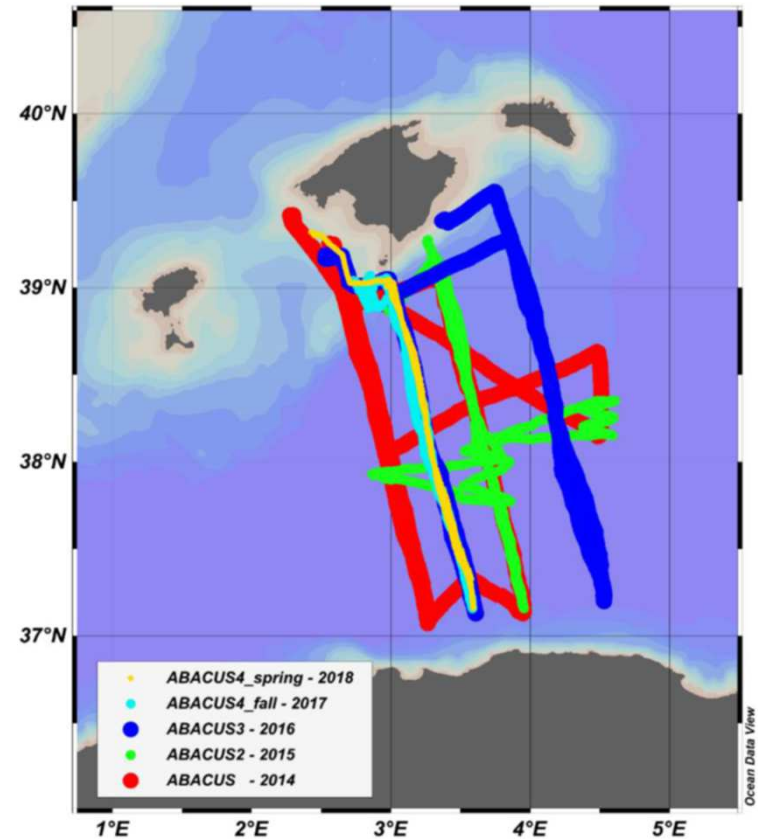
^d Instituto Mediterraneo de Estudios Avanzados, IMEDEA (CSIC-UIB), Esporles, Spain

Aulicino et al., 2021 - On the use of ABACUS high resolution glider observations for the assessment of phytoplankton ocean biomass from CMEMS model products, *Ecological Modelling*, 2021, 455, 109619.

giuseppe.aulicino@uniparthenope.it



Surface circulation in the western Mediterranean Sea. The red box identifies the glider surveys area south of the island of Mallorca. Northern Current (NC), Balearic Current (BC), Algerian Current (AC) and mean position of recurrent anticyclonic Algerian Eddies (aAE) are labelled.



Glider casts positions during the ABACUS missions at sea in autumn 2014 (red), 2015 (green), 2016 (blue), 2017 (cyan), and spring 2018 (yellow).

Chlorophyll concentration:

GLOBAL_REANALYSIS_BIO_001_029

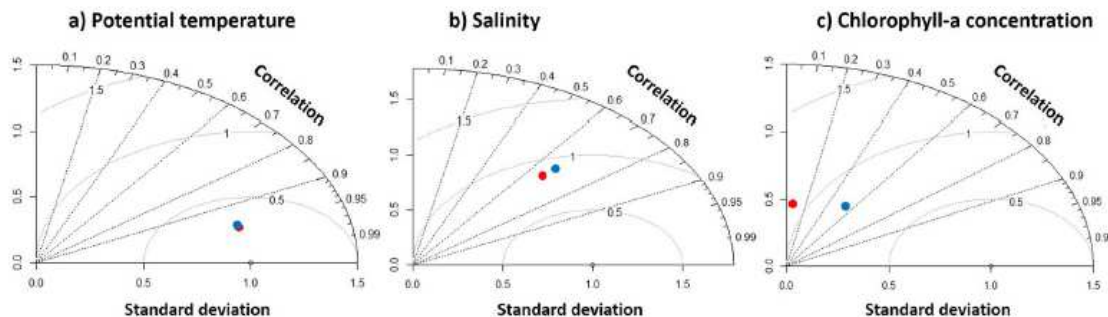
IBI_REANALYSIS_BIO_005_003

Physical parameters:

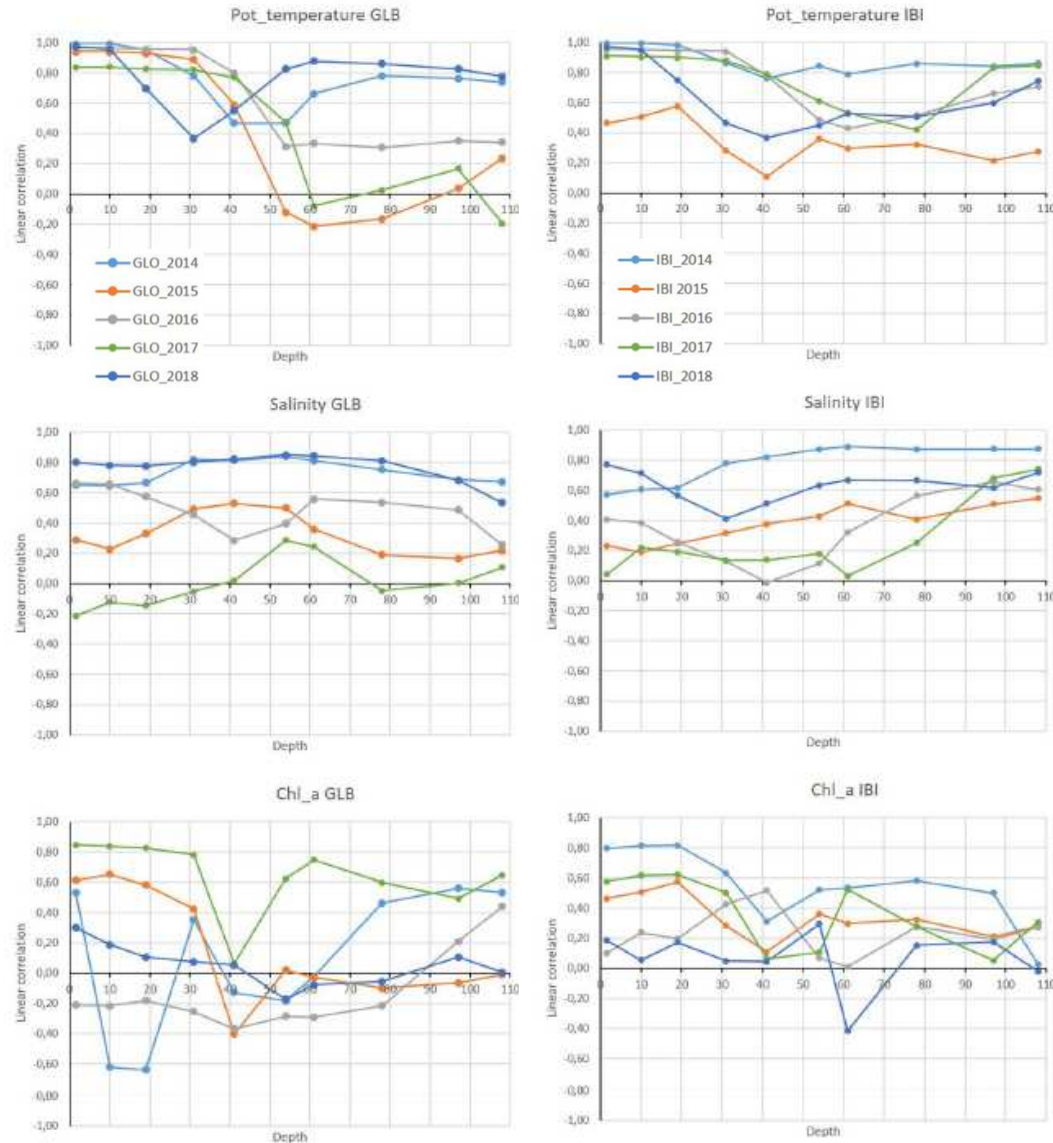
GLOBAL_REANALYSIS_PHY_001_030

IBI_MULTIYEAR_PHY_005_002

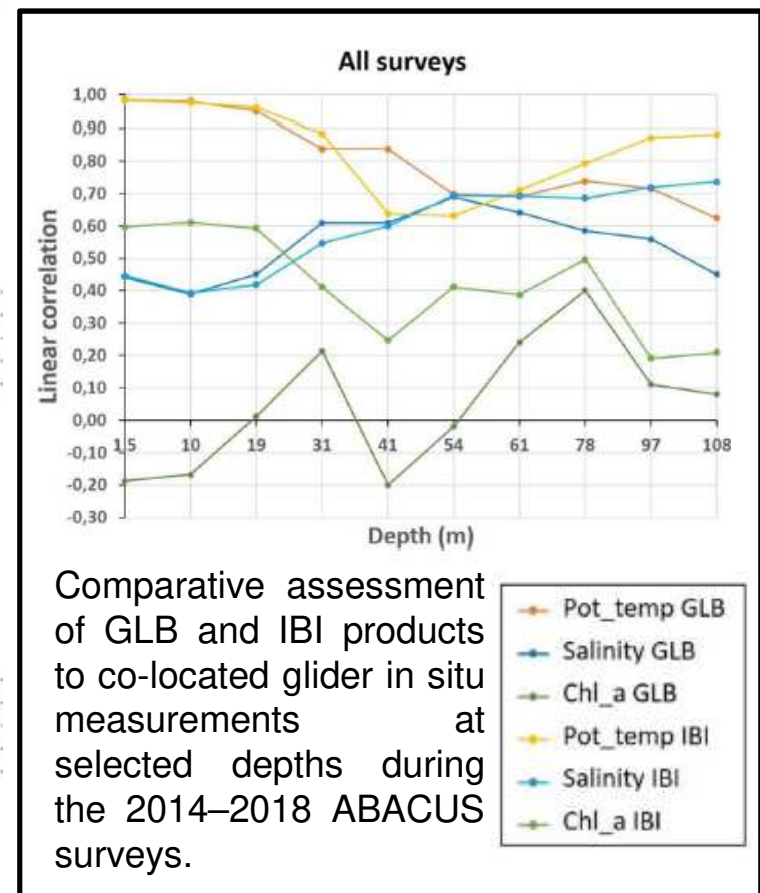
	GLB Chl-a	S	PT	IBI Chl-a	S	PT
Number of points	8,770	20,183	20,183	16,688	16,688	16,688
Correlation coeff (R)	0.05	0.66	0.96	0.55	0.67	0.96
RMSE	0.27	0.29	0.80	0.22	0.34	0.92
Variance	0.05	0.10	8.34	0.07	0.11	10.17
Glider mean value	0.28	37.47	18.54	0.28	37.47	18.58
Model mean value	0.13	37.36	18.61	0.20	37.28	18.28



Sep - Oct 2014	GLB Chl-a	S	PT	IBI Chl-a	S	PT
Number of points	1,452	2,998	2,998	3,220	3,220	3,220
Correlation coeff (R)	-0.03	0.87	0.98	0.63	0.79	0.99
RMSE	0.31	0.20	0.94	0.26	0.26	0.70
Variance	0.07	0.13	20.55	0.11	0.14	20.86
Glider mean value	0.21	37.44	20.48	0.22	37.45	20.36
Model mean value	0.13	37.36	20.36	0.18	37.44	20.27
Nov - Dec 2014	Chl-a	S	PT	Chl-a	S	PT
Number of points	1,268	2,833	2,833	3,055	3,055	3,055
Correlation coeff (R)	-0.47	0.82	0.93	0.60	0.83	0.97
RMSE	0.30	0.20	0.63	0.16	0.24	0.47
Variance	0.04	0.12	3.02	0.04	0.13	3.10
Glider mean value	0.30	37.50	17.17	0.32	37.50	17.16
Model mean value	0.12	37.52	17.08	0.29	37.42	17.11
Oct - Dec 2015	Chl-a	S	PT	Chl-a	S	PT
Number of points	2,207	5,921	5,921	3,784	3,784	3,784
Correlation coeff (R)	-0.04	0.59	0.95	0.62	0.60	0.88
RMSE	0.30	0.43	0.85	0.24	0.52	1.55
Variance	0.05	0.09	7.01	0.07	0.10	7.54
Glider mean value	0.30	37.43	18.91	0.31	37.43	19.09
Model mean value	0.13	37.16	18.95	0.20	37.04	18.30
Nov - Dec 2016	Chl-a	S	PT	Chl-a	S	PT
Number of points	1,694	2,756	2,756	2,836	2,836	2,836
Correlation coeff (R)	-0.09	0.76	0.95	0.30	0.69	0.95
RMSE	0.20	0.24	0.71	0.20	0.24	0.71
Variance	0.02	0.06	4.96	0.02	0.07	4.84
Glider mean value	0.29	37.31	18.71	0.30	37.31	18.81
Model mean value	0.14	37.32	19.16	0.16	37.17	18.64
Nov - Dec 2017	Chl-a	S	PT	Chl-a	S	PT
Number of points	1,011	2,861	2,861	1,761	1,761	1,761
Correlation coeff (R)	0.22	0.07	0.82	0.24	0.31	0.91
RMSE	0.20	0.26	0.91	0.16	0.33	0.81
Variance	0.01	0.03	1.97	0.01	0.03	2.55
Glider mean value	0.28	37.53	18.50	0.26	37.50	18.92
Model mean value	0.12	37.54	18.77	0.21	37.42	18.25
May - Jun 2018	Chl-a	S	PT	Chl-a	S	PT
Number of points	1,160	2,818	2,818	2,035	2,035	2,035
Correlation coeff (R)	0.62	0.83	0.98	0.60	0.73	0.97
RMSE	0.22	0.23	0.39	0.21	0.23	0.36
Variance	0.07	0.12	4.20	0.06	0.10	3.06
Glider mean value	0.26	37.61	16.86	0.24	37.50	16.66
Model mean value	0.18	37.49	16.91	0.19	37.47	16.78



Comparative assessment of GLB and IBI to co-located glider measurements at selected depths for each year of the ABACUS series glider activities



CONCLUSIONS

- CMEMS IBI and GLB model products are well correlated with glider potential temperature and salinity measurements but they still need improvements to provide a correct representation of the chlorophyll concentration over the Algerian Basin.
- Additional efforts are necessary to improve the fleet of operating gliders and increase the number of days at sea and of collected observations.
- After the technical issues that halted the 2019 and 2020 campaigns, the ABACUS glider survey series is back since 2021 to complete more glider missions per year in the Algerian Basin.
- The collected observations will improve the statistical relevancy of the differences (and/or) similarities with co-located model and satellite retrievals.

Many thanks for
your attention!

Full details in:

Aulicino et al., 2021 - Ecological Modelling, 455, 109619

giuseppe.aulicino@uniparthenope.it