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*Supplement of*

## **ARIOS: a database for ocean acidification assessment in the Iberian upwelling system (1976–2018)**

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## Supplement

Table S1: Vertical distribution of seasonal mean values and standard deviation (mean  $\pm$  standard deviation) of temperature, salinity, pH<sub>T</sub>, oxygen and nitrate in the region South Ocean shown in Fig. 1.

	z (m)	winter	spring	summer	autumn
temperature (°C)	0-5	13.6±0.5	13.4±0.7	17.9±0.7	17.7±1.5
	5-25	13.8±0.7	13.6±0.6	17.1±0.7	17.2±1.5
	25-75	13.9±0.6	13.2±0.4	14.1±0.5	14.9±1.0
	75-125	13.7±0.6	13.0±0.5	12.8±0.3	13.2±0.4
	125-200	13.5±0.6	12.6±0.4	12.3±0.3	12.6±0.3
	200-400	12.6±0.3	11.9±0.3	11.6±0.3	11.9±0.3
	400-600	11.5±0.1	11.3±0.1	11.1±0.2	11.2±0.2
	600-900			11.4±0.1	11.4±0.2
	900-1300	11.2±0.1	11.1±0.2	10.9±0.3	11.0±0.3
salinity	0-5	35.82±0.06	35.72±0.11	35.62±0.07	35.71±0.08
	5-25	35.85±0.06	35.67±0.15	35.62±0.07	35.69±0.09
	25-75	35.85±0.05	35.74±0.09	35.71±0.06	35.76±0.08
	75-125	35.86±0.07	35.76±0.07	35.70±0.04	35.76±0.07
	125-200	35.80±0.10	35.73±0.06	35.64±0.04	35.72±0.06
	200-400	35.71±0.04	35.65±0.04	35.59±0.05	35.64±0.05
	400-600	35.64±0.04	35.65±0.05	35.64±0.05	35.64±0.03
	600-900			35.89±0.09	35.99±0.06
	900-1300	36.17±0.02	36.18±0.02	36.19±0.03	36.17±0.07
pH <sub>T</sub>	0-5	8.10±0.02	8.12±0.02	8.11±0.02	8.09±0.02
	5-25	8.11±0.02	8.14±0.02	8.12±0.02	8.09±0.02
	25-75	8.11±0.01	8.12±0.01	8.11±0.02	8.08±0.02
	75-125	8.10±0.01	8.09±0.02	8.08±0.03	8.06±0.02
	125-200	8.07±0.03	8.07±0.03	8.06±0.03	8.05±0.02
	200-400	8.05±0.01	8.04±0.01	8.04±0.02	8.03±0.01
	400-600	8.02±0.01	8.017±0.002	8.02±0.02	8.01±0.01
	600-900			8.01±0.02	7.984±0.003
	900-1300	8.025±0.004	8.024±0.002	8.03±0.01	8.01±0.02
oxygen (μmol kg <sup>-1</sup> )	0-5	249±6	265±17	250±12	244±12
	5-25	250±7	267±13	253±10	240±7
	25-75	249±8	255±9	247±7	236±8
	75-125	247±9	247±9	232±4	227±7
	125-200	230±11	237±9	226±6	224±6
	200-400	227±11	224±8	213±7	220±8
	400-600	209±6	205±5	196±7	200±4
	600-900			186±2	184±2
	900-1300	187±1	189±3	188±4	185±3

Table S2: Monthly mean values and standard deviation (mean  $\pm$  standard deviation) of temperature, salinity, pH<sub>T</sub>, oxygen concentration, nitrate concentration and chlorophyll at the surface waters for five geographical boxes shown in Fig. 1: South Ocean, RB shelf and outer, middle and inner Ría de Vigo.

	month	OCEAN	SHELF	OUTER	MIDDLE	INNER
temperature (°C)	Jan	14.3 $\pm$ 0.4	14.2 $\pm$ 0.4	13.1 $\pm$ 0.8	13.0 $\pm$ 0.7	12.5 $\pm$ 0.4
	Feb	13.3 $\pm$ 0.2	13.1 $\pm$ 0.6	13.0 $\pm$ 0.7	12.7 $\pm$ 0.7	12.6 $\pm$ 0.7
	Mar	13.0 $\pm$ 0.6	12.9 $\pm$ 0.5	13.4 $\pm$ 0.4	13.3 $\pm$ 0.6	13.2 $\pm$ 0.6
	Apr	14.1 $\pm$ 0.4	14.0 $\pm$ 0.3	14.8 $\pm$ 1.2	14.0 $\pm$ 0.9	14.4 $\pm$ 1.1
	May	14.1 $\pm$ 0.9	14.1 $\pm$ 1.1	14.7 $\pm$ 1.0	15.6 $\pm$ 1.5	15.1 $\pm$ 1.3
	Jun	17.5 $\pm$ 1.1	16.1 $\pm$ 0.9	17.1 $\pm$ 1.0	17.3 $\pm$ 1.3	18.4 $\pm$ 1.1
	Jul	17.7 $\pm$ 0.6	16.6 $\pm$ 1.0	17.2 $\pm$ 1.0	17.9 $\pm$ 1.5	16.9 $\pm$ 1.2
	Aug	17.7 $\pm$ 0.9	16.7 $\pm$ 0.6	16.0 $\pm$ 1.7	17.5 $\pm$ 1.5	16.8 $\pm$ 1.7
	Sep	18.5 $\pm$ 1.3	16.5 $\pm$ 1.3	17.3 $\pm$ 1.3	17.1 $\pm$ 1.2	17.8 $\pm$ 1.4
	Oct	17.9 $\pm$ 0.4	17.0 $\pm$ 0.6	16.6 $\pm$ 0.9	15.4 $\pm$ 1.1	15.8 $\pm$ 1.0
	Nov	15.6 $\pm$ 0.6	15.3 $\pm$ 1.1	15.6 $\pm$ 1.4	15.2 $\pm$ 0.9	14.9 $\pm$ 1.2
	Dec	15.1 $\pm$ 0.3	14.8 $\pm$ 0.2	14.8 $\pm$ 1.3	14.1 $\pm$ 0.9	14.6 $\pm$ 1.1
salinity	Jan	35.88 $\pm$ 0.13	35.77 $\pm$ 0.18	33.92 $\pm$ 0.82	33.57 $\pm$ 2.37	34.26 $\pm$ 1.44
	Feb	35.81 $\pm$ 0.04	35.37 $\pm$ 0.84	34.33 $\pm$ 1.63	33.30 $\pm$ 2.51	30.86 $\pm$ 4.78
	Mar	35.81 $\pm$ 0.04	35.24 $\pm$ 0.71	34.43 $\pm$ 0.77	34.52 $\pm$ 1.12	34.42 $\pm$ 1.25
	Apr	35.72 $\pm$ 0.07	35.43 $\pm$ 0.47	35.24 $\pm$ 0.29	34.58 $\pm$ 0.90	34.72 $\pm$ 0.74
	May	35.59 $\pm$ 0.12	35.45 $\pm$ 0.25	34.47 $\pm$ 1.37	34.38 $\pm$ 1.09	33.99 $\pm$ 2.29
	Jun	35.64 $\pm$ 0.13	35.56 $\pm$ 0.12	34.62 $\pm$ 0.81	34.87 $\pm$ 0.74	34.42 $\pm$ 0.54
	Jul	35.60 $\pm$ 0.07	35.58 $\pm$ 0.08	35.36 $\pm$ 0.26	35.27 $\pm$ 0.38	35.19 $\pm$ 0.50
	Aug	35.57 $\pm$ 0.05	35.59 $\pm$ 0.05	35.48 $\pm$ 0.22	35.45 $\pm$ 0.21	35.37 $\pm$ 0.17
	Sep	35.72 $\pm$ 0.12	35.48 $\pm$ 0.18	35.33 $\pm$ 0.19	35.32 $\pm$ 0.29	35.20 $\pm$ 0.27
	Oct	35.74 $\pm$ 0.05	35.65 $\pm$ 0.10	34.94 $\pm$ 0.56	34.84 $\pm$ 0.88	33.98 $\pm$ 1.45
	Nov	35.81 $\pm$ 0.06	35.67 $\pm$ 0.11	34.85 $\pm$ 0.77	34.23 $\pm$ 0.85	33.73 $\pm$ 2.80
	Dec	35.85 $\pm$ 0.06	35.89 $\pm$ 0.26	33.76 $\pm$ 1.36	33.77 $\pm$ 1.51	27.95 $\pm$ 5.50
pH <sub>T</sub>	Jan	8.09 $\pm$ 0.03	8.08 $\pm$ 0.03	8.12 $\pm$ 0.06	8.05 $\pm$ 0.05	8.02 $\pm$ 0.04
	Feb	8.09 $\pm$ 0.02	8.10 $\pm$ 0.03	8.11 $\pm$ 0.05	8.07 $\pm$ 0.05	8.05 $\pm$ 0.06
	Mar	8.11 $\pm$ 0.01	8.11 $\pm$ 0.03	8.18 $\pm$ 0.08	8.13 $\pm$ 0.07	8.18 $\pm$ 0.08
	Apr	8.11 $\pm$ 0.02	8.13 $\pm$ 0.03	8.16 $\pm$ 0.05	8.13 $\pm$ 0.05	8.11 $\pm$ 0.07
	May	8.12 $\pm$ 0.02	8.14 $\pm$ 0.04	8.19 $\pm$ 0.04	8.13 $\pm$ 0.08	8.11 $\pm$ 0.07
	Jun	8.08 $\pm$ 0.03	8.13 $\pm$ 0.03	8.15 $\pm$ 0.04	8.10 $\pm$ 0.07	8.04 $\pm$ 0.09
	Jul	8.11 $\pm$ 0.02	8.13 $\pm$ 0.02	8.11 $\pm$ 0.06	8.09 $\pm$ 0.07	8.02 $\pm$ 0.07
	Aug	8.09 $\pm$ 0.03	8.11 $\pm$ 0.03	8.11 $\pm$ 0.07	8.07 $\pm$ 0.09	7.92 $\pm$ 0.05
	Sep	8.09 $\pm$ 0.02	8.11 $\pm$ 0.03	8.09 $\pm$ 0.05	8.03 $\pm$ 0.07	7.98 $\pm$ 0.11
	Oct	8.09 $\pm$ 0.01	8.11 $\pm$ 0.03	8.06 $\pm$ 0.06	8.00 $\pm$ 0.08	7.94 $\pm$ 0.09
	Nov	8.11 $\pm$ 0.02	8.09 $\pm$ 0.02	8.09 $\pm$ 0.07	8.00 $\pm$ 0.06	7.90 $\pm$ 0.12
	Dec	8.11 $\pm$ 0.01	8.12 $\pm$ 0.01	8.06 $\pm$ 0.03	8.02 $\pm$ 0.04	7.98 $\pm$ 0.02

Table S2: Continued

	month	OCEAN	SHELF	OUTER	MIDDLE	INNER
oxygen ( $\mu\text{mol kg}^{-1}$ )	Jan	244±6	246±5	265±8	252±16	242±11
	Feb	255±5	259±12	255±13	254±15	252±14
	Mar	258±16	268±19	280±27	276±23	260±28
	Apr	268±5	270±7	271±13	276±25	249±26
	May	271±13	269±14	286±22	287±25	260±12
	Jun	244±3	266±11	270±17	284±26	232±19
	Jul	247±12	263±11	269±23	271±25	234±23
	Aug	247±9	259±8	265±23	277±27	204±21
	Sep	241±9	261±14	272±18	251±26	228±34
	Oct	259±13	250±12	249±20	226±21	215±16
	Nov	243±11	242±4	236±9	230±16	209±26
	Dec	243±10	240±12	248±11	237±14	242±16
nitrate ( $\mu\text{mol kg}^{-1}$ )	Jan	2.3±0.5	2.7±0.8	5.3±2.6	7.1±3.8	7.6±2.0
	Feb	3.4±0.7	5.0±2.6	6.3±3.0	6.3±3.4	8.6±4.5
	Mar	4.9±2.4	3.5±2.9	2.1±2.5	2.0±2.4	4.5±2.3
	Apr	0.1±2.4	0.4±0.7	0.4±0.5	0.8±1.0	0.6±0.6
	May	0.02±0.03	0.6±0.4	0.5±0.4	0.5±0.8	0.7±1.3
	Jun	0.04±0.02	0.1±0.1	0.1±0.3	0.3±0.4	0.8±0.8
	Jul	0.1±0.1	0.0±0.1	0.3±0.6	0.5±0.7	1.1±0.8
	Aug	0.08±0.03	0.1±0.1	1.1±1.6	0.6±0.9	3.3±3.2
	Sep	0.1±0.1	0.2±0.7	1.0±0.9	0.9±1.1	2.1±1.4
	Oct	1.7±0.8	0.3±0.7	2.2±2.4	3.4±2.7	3.1±1.5
	Nov	0.1±0.1	1.2±2.9	3.8±2.9	4.3±2.3	7.2±3.2
	Dec	0.4±0.9	1.3±1.0	6.0±3.1	5.7±2.7	8.2±4.1
chlorophyll ( $\text{mg m}^{-3}$ )	Jan	0.5±0.1	0.6±0.1	0.9±0.2	1.0±0.9	0.9±0.3
	Feb	0.5±0.1	0.8±0.3	2.3±1.5	1.8±1.6	1.3±0.9
	Mar	0.5±0.2	1.4±1.5	3.7±2.8	3.9±3.2	3.5±2.3
	Apr	2.6±1.1	1.8±1.4	3.0±1.8	4.2±2.4	3.7±2.1
	May	0.5±0.2	0.6±0.6	4.1±3.0	4.5±4.5	3.4±2.6
	Jun	0.8±0.8	0.7±0.6	3.8±1.7	4.4±2.7	5.2±3.2
	Jul	0.4±0.2	0.7±0.7	3.2±1.9	4.4±2.5	5.0±2.2
	Aug	0.5±0.2	0.8±0.5	2.7±2.3	5.5±4.1	2.0±2.3
	Sep	0.5±0.3	1.6±1.0	4.3±2.4	5.8±3.6	5.1±3.7
	Oct	0.3±0.1	0.8±0.5	4.6±4.1	3.3±3.5	2.7±1.9
	Nov	0.8±0.3	0.9±0.8	2.4±1.1	1.7±2.4	1.6±1.0
	Dec	0.5±0.2	0.4±0.6	1.5±0.8	1.0±0.6	1.2±0.3