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Variability of early autumn planktonic assemblages in the strait of gibraltar: a regionalization analysis

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Table S1: Average values of physical and biogeochemical parameters defining each cluster during spring and neap tides. Mean, N, standard deviation (SD) and range.

			Temperature (ºC)	Salinity	Chlorophyll *a* (mg m^{-3})	Chlorophyll > 20 µm (%)	Nitrite (µM)	Nitrate (µM)	Silicate (µM)	Ammonium (µM)
Spring	CL1	Mean	18.67	36.27	1.67	23.52	0.59	3.38	5.19	3.31
		N	29	29	29	28	29	29	29	29
		SD	1.31	0.16	0.72	16.41	0.15	4.55	3.02	1.93
		Min - Max	(15.3 - 20.6)	(35.7 - 36.6)	(0.2 - 3.3)	(8.9 - 87.7)	(0.2 - 0.8)	(0.4 - 25.4)	(1.4 - 12.0)	(0.7 - 8.1)
	CL2	Mean	18.56	36.53	0.72	10.05	0.32	1.37	3.91	1.51
		N	45	45	45	45	45	45	45	45
		SD	1.59	0.16	0.40	5.59	0.14	1.21	2.91	0.87
		Min - Max	(15.9 - 21.5)	(36.2 - 36.8)	(0.1 - 1.6)	(3.2 - 30.7)	(0.1 - 0.7)	(0.0 - 5.8)	(0.7 - 12.2)	(0.0 - 4.7)
Neap	CL1	Mean	18.44	36.31	1.63	24.77	0.52	2.02	4.43	3.49
		N	17	17	17	17	17	17	17	17
		SD	1.15	0.13	1.08	18.39	0.15	2.39	2.76	1.42
		Min - Max	(15.9 - 20.0)	(36.0 - 36.6)	(0.4 - 4.5)	(8.3 - 66.8)	(0.3 - 0.9)	(0.2 - 10.0)	(1.1 - 10.5)	(0.6 - 6.3)
	CL2	Mean	18.47	36.54	0.65	11.33	0.26	0.62	5.20	1.03
		SD	1.36	0.14	0.41	7.13	0.14	0.83	3.87	0.85
		N	55	55	55	54	55	55	55	55
		Min - Max	(15.5 - 20.7)	(36.2 - 36.9)	(0.1 - 1.6)	(2.2 - 38.4)	(0.1 - 0.6)	(0.0 - 3.5)	(0.7 - 17.3)	(0.0 - 3.2)
Total	CL1	Mean	18.59	36.29	1.65	23.99	0.52	2.88	4.91	3.38
		N	46	46	46	45	46	46	46	46
		SD	1.24	0.15	0.86	17.03	0.16	3.95	2.92	1.75
		Min - Max	(15.3 - 20.6)	(35.7 - 36.6)	(0.2 - 4.5)	(8.3 - 87.7)	(0.2 - 0.9)	(0.2 - 25.4)	(1.1 - 12.0)	(0.6 - 8.1)
	CL2	Mean	18.51	36.54	0.68	10.75	0.28	0.96	4.62	1.24
		N	100	100	100	99	100	100	100	100
		SD	1.46	0.15	0.40	6.48	0.14	1.12	3.51	0.89
		Min - Max	(15.5 - 21.5)	(36.2 - 36.9)	(0.1 - 1.6)	(2.2 - 38.4)	(0.1 - 0.7)	(0.0 - 5.8)	(0.7 - 17.3)	(0.0 - 4.7)

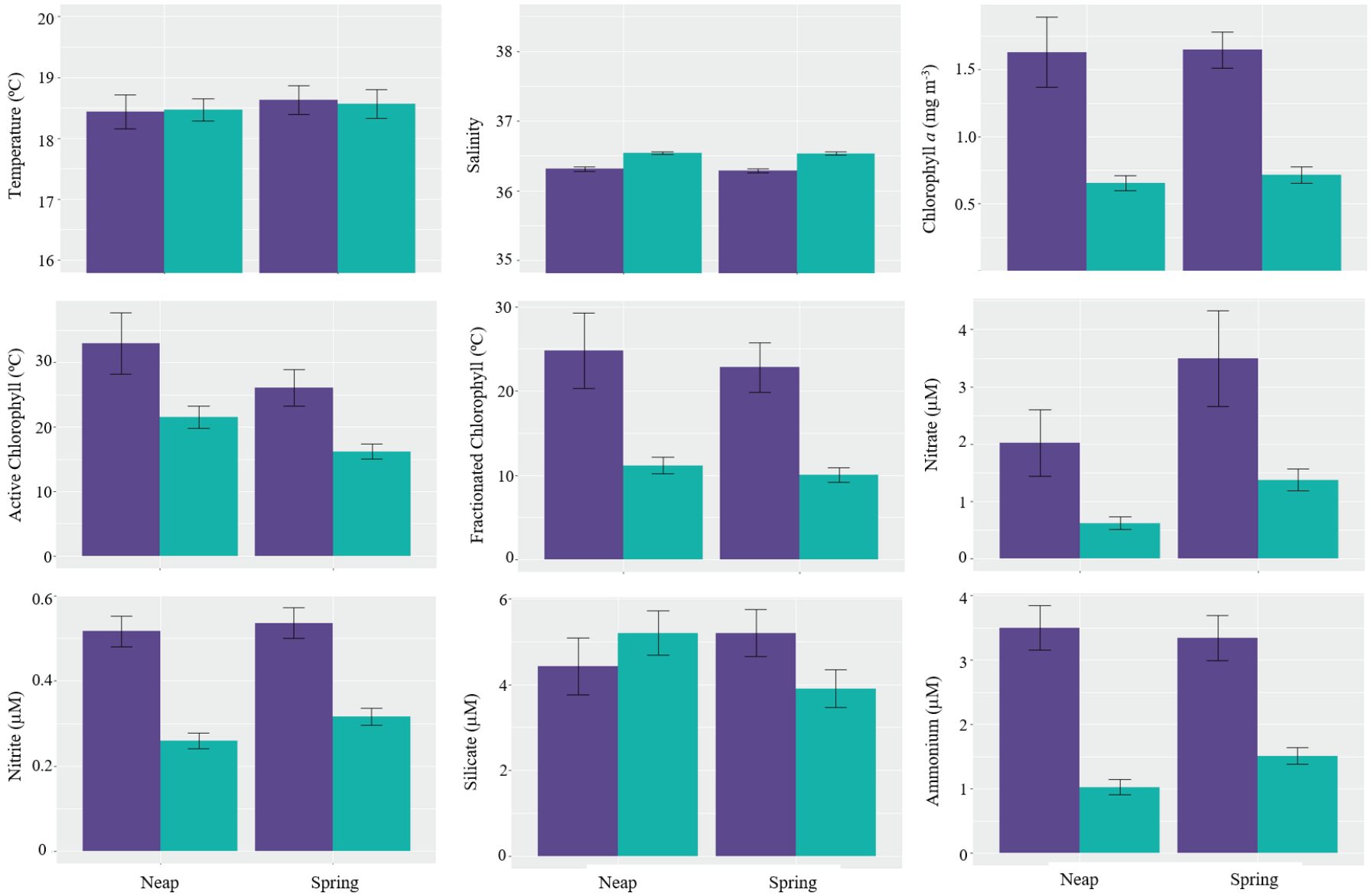

Fig. S1: Average values of physical and biogeochemical variables defining each cluster during spring and neap tides. Purple bars represent CL1, green bars for CL2.

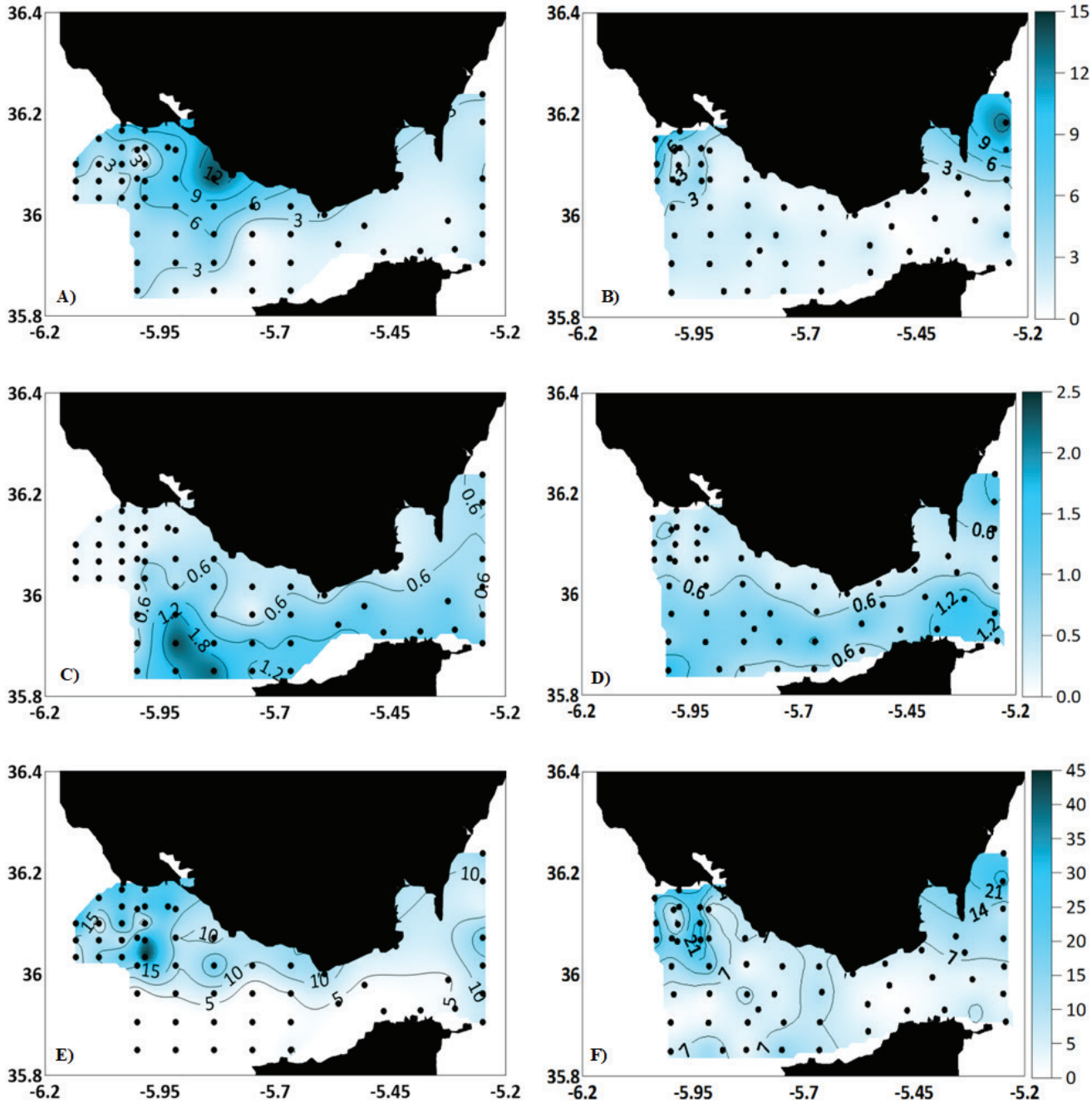

Fig. S2: Picoplankton groups biomass distribution. Synechococcus (A-B), Prochlorococcus (C-D) and Cryptophytes (E-F) biomass (mgC m-3) during spring (A, C, E) and neap tides (B, D, F).

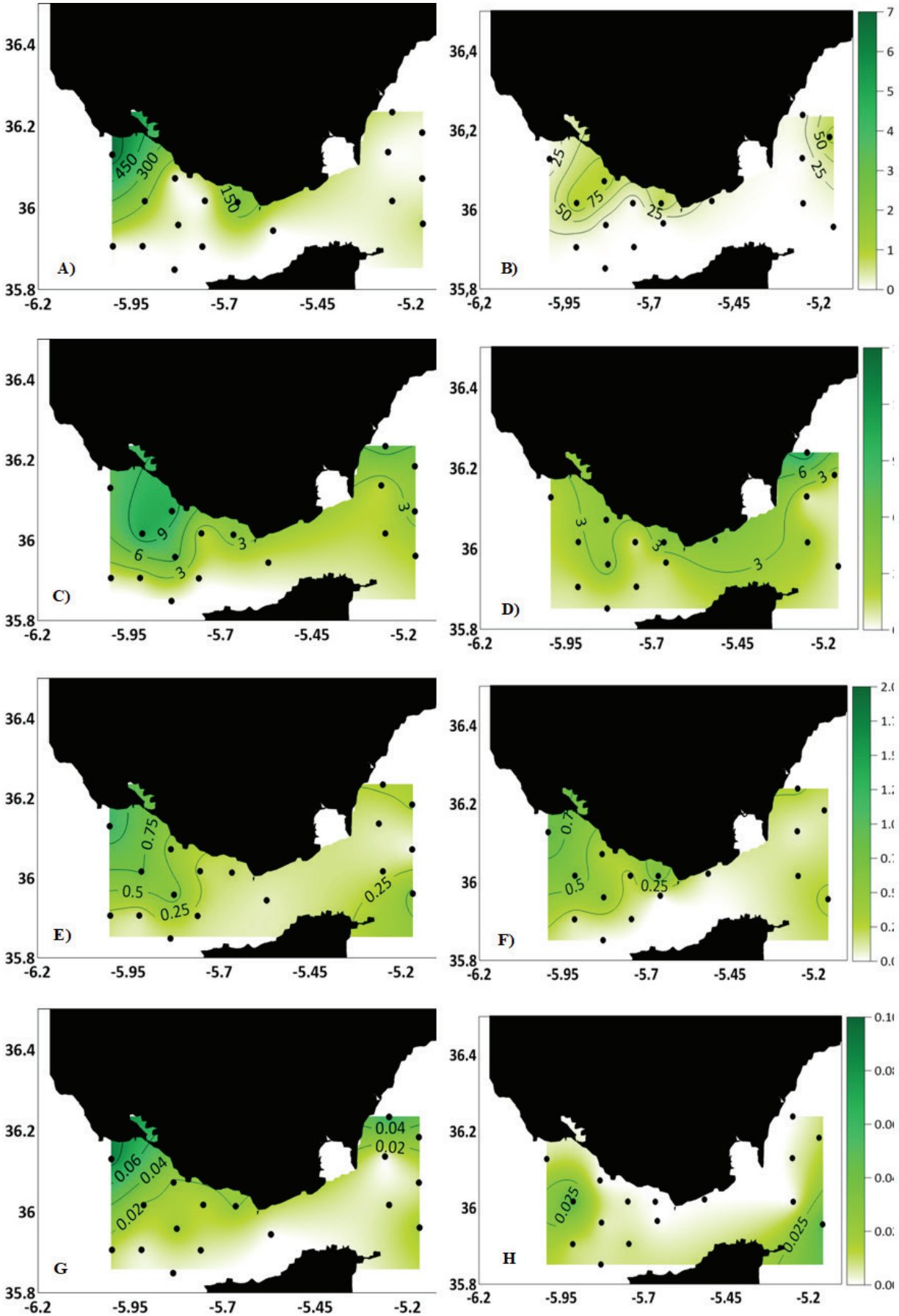

Fig. S3: Main microplankton groups biomass (mgC m-3) distribution during spring (A, C, E, G) and neap (B, D, F, H) tides. A and B represent diatoms, C and D dinoflagellates, E and F correspond to tintinnids, and G and F for silicoflagellates. Note different scales among groups.

Table S2. Main pico and nanoplankton groups cell densities (cell mL-1) and biomass

	Spring tides		Neap tides		Total	
	Abundance (cell mL^{-1}) Mean ± SD (min - max)	**Biomass (mgC m^{-3}) Mean ± SD (min - max)**	**Abundance (cell mL^{-1}) Mean ± SD (min - max)**	**Biomass (mgC m^{-3}) Mean ± SD (min - max)**	**Abundance (cell mL^{-1}) Mean ± SD (min - max)**	**Biomass (mgC m^{-3}) Mean ± SD (min - max)**
Synechococcus	18258 ± 15337	3.3 ± 2.7	5928.5 ± 15149.9	2.8 ± 3.2	11336.2 ± 16362.3	3.0 ± 3.0
	(394 - 84299)	(0.1 - 15.0)	(0 - 65839)	(0.1 - 13.5)	(0 - 84299)	(0.1 - 15.0)
Prochlorococcus	27066 ± 18878	0.8 ± 0.5	2110.5 ± 4893.2	0.7 ± 0.4	13055.7 ± 17960.8	0.7 ± 0.5
	(2877 - 84989)	(0.1 - 2.4)	(0 - 20603)	(0.2 - 1.8)	(0 - 84989)	(0.1 - 2.4)
Cryptophytes	180.8 ± 127.9	14.9 ± 10.6	146.9 ± 127.0	14.2 ± 11.2	164.1 ± 128.1	14.6 ± 10.9
	(2 - 575)	(0.2 - 47.6)	(3 - 531)	(1 – 47.2)	(2 - 575)	(0.2 – 47.6)

Table S3. Microplankton abundance (cell mL^{-1}) and biomass (mgC m^{-3}) by major groups during neap and spring tides.

	Spring tides		Neap tides		Total	
	Abundance (cell mL^{-1}) Mean ± SD (Min - Max)	**Biomass (mgC m^{-3})** Mean ± SD (Min - Max)	**Abundance (cell mL^{-1})** Mean ± SD (Min - Max)	**Biomass (mgC m^{-3})** Mean ± SD (Min - Max)	**Abundance (cell mL^{-1})** Mean ± SD (Min - Max)	**Biomass (mgC m^{-3})** Mean ± SD (Min - Max)
Diatoms	**6.15 ± 11.99** (0 - 50.99)	**77.18 ± 70.12** (0.83 - 86.91)	**2.80 ± 3.22** (0 - 11.36)	**25.36 ± 37.15** (0.07 - 95.79)	**4.53 ± 8.93** (0.06 - 51)	**52.06 ± 125.73** (0.07 - 686.91)
Single rounded cells	0.16 ± 0.24 (0 - 1.03)	0.25 ± 0.45 (0 - 1.93)	0.06 ± 0.05 (0 - 0.17)	0.11 ± 0.09 (0 - 0.29)	0.11 ± 0.18 (0 - 1.03)	0.18 ± 0.33 (0 - 1.93)
Pennates	0.02 ± 0.02 (0 - 0.06)	0.07 ± 0.12 (0 - 0.48)	0.01 ± 0.02 (0 - 0.08)	0.09 ± 0.13 (0 - 0.47)	0.01 ± 0.02 (0 - 0.08)	0.08 ± 0.12 (0 - 0.48)
Skeletonema like	0.18 ± 0.14 (0 - 0.45)	0.12 ± 0.15 (0 - 0.59)	0.15 ± 0.13 (0 - 0.43)	0.08 ± 0.12 (0 - 0.43)	0.16 ± 0.14 (0 - 0.45)	0.10 ± 0.13 (0 - 0.59)
Lineal chains and *Rhizosolenia* like	0.80 ± 1.49 (0.07 - 6.31)	5.8 ± 11.96 (0.17 - 47.92)	0.09 ± 0.08 (0 - 0.33)	0.42 ± 0.41 (0 - 1.26)	0.46 ± 1.11 (0 - 6.31)	3.19 ± 8.89 (0 - 47.92)
Helical chains	4.71 ± 9.79 (0.01 - 41.49)	68.02 ± 151.53 (0.23 - 610.44)	2.43 ± 2.98 (0 - 10.39)	23.89 ± 35.94 (0 - 92.04)	3.61 ± 7.31 (0 - 41.5)	46.63 ± 112.2 (0 - 610.44)
Other diatoms	0.27 ± 0.43 (0 - 1.75)	2.92 ± 6.23 (0 - 25.99)	0.07 ± 0.09 (0 - 0.36)	0.78 ± 0.87 (0 - 2.43)	0.17 ± 0.33 (0 - 1.75)	1.88 ± 4.58 (0 - 25.99)
Dinoflagellates	**0.41 ± 0.29** (0 – 1.07)	**3.83 ± 3.33** (0.19 - 10.48)	**0.45 ± 0.28** (0 - 0.98)	**2.72 ± 2.49** (0.67 - 10.63)	**0.43 ± 0.28** (0.07 - 1.07)	**3.29 ± 2.97** (0.19 - 10.62)
Peridiniales	0.39 ± 0.28 (0.1 - 1.06)	0.76 ± 0.58 (0.16 - 2.18)	0.44 ± 0.28 (0.06 - 0.97)	1.03 ± 0.66 (0.09 - 2.17)	0.41 ± 0.28 (0.06 - 1.06)	0.89 ± 0.62 (0.09 - 2.18)
Ceratium/Neoceratium	0.01 ± 0.01 (0 - 0.04)	3.05 ± 3.07 (0 - 9.78)	0.01 ± 0.01 (0.001 - 0.03)	1.68 ± 2.08 (0.23 - 8.84)	0.01 ± 0.01 (0 - 0.04)	2.39 ± 2.69 (0 - 9.78)
Other dinoflagellates	0.003 ± 0.01 (0- 0.03)	0.03 ± 0.07 (0 - 0.24)	0.01 ± 0.01 (0 - 0.02)	0.01 ± 0.04 (0 - 0.15)	0 ± 0 (0 - 0)	0.02 ± 0.06 (0 - 0.24)
Tintinnids	**0.02 ± 0.02** (0.001 - 0.09)	**0.32 ± 0.3** (0.02 - 1.16)	**0.02 ± 0.02** (0 - 0.08)	**0.29 ± 0.27** (0 - 0.89)	**0.02 ± 0.02** (0 - 0.1)	**0.31 ± 0.28** (0 - 1.16)
Silicoflagellates	**0.04 ± 0.05** (0 - 0.2)	**0.02 ± 0.02** (0 - 0.09)	**0.016 ± 0.02** (0 - 0.09)	**0.01 ± 0.02** (0 - 0.05)	**0.03 ± 0.04** (0 - 0.2)	**0.01 ± 0.02** (0 - 0.09)
Foraminiferans	**0.003 ± 0.006** (0 - 0.023)	**0.02 ± 0.05** (0 – 0.17)	**0.0001 ± 0.0004** (0 - 0.001)	**0.19 ± 0.45** (0 – 1.85)	**0.001 ± 0.004** (0 – 0.023)	**0.1 ± 0.32** (0 – 1.85)
Coccolithophores	**0.001 ± 0.002** (0 - 0.011)	**0 ± 0** (0 - 0.01)	**0.0015 ± 0.003** (0 - 0.01)	**0 ± 0** (0 - 0.01)	**0 ± 0** (0 - 0.01)	**0.001 ± 0.002** (0 - 0.007)
Others	**0.07 ± 0.12** (0 - 0.45)	**0.27 ± 0.37** (0 - 1.38)	**0.008 ± 0.01** (0 - 0.05)	**0.27 ± 0.38** (0 - 1.02)	**0.04 ± 0.09** (0 - 0.45)	**0.27 ± 0.37** (0 - 1.38)

Table S4. Mesoplankton abundance (ind m-3) and biomass (mgC m-3) by major groups during neap and spring tides.

	Spring		Neap		Total	
	Abundance (ind m^{-3}) Mean ± SD (Min - Max)	**Biomass (mgC m^{-3})** Mean ± SD (Min - Max)	**Abundance (ind m^{-3})** Mean ± SD (Min - Max)	**Biomass (mgC m^{-3})** Mean ± SD (Min - Max)	**Abundance (ind m^{-3})** Mean ± SD (Min - Max)	**Biomass (mgC m^{-3})** Mean ± SD (Min - Max)
Amphipods	0.06 ± 0.18 (0 - 0.56)	0.26 ± 0.06 (0.21 - 0.30)	0.18 ± 0.31 (0 - 0.53)	0	0.09 ± 0.20 (0 - 0.56)	0.17 ± 0.16 (0 - 0.30)
Appendicularians	29.33 ± 43.95 (1.14 - 141.31)	0.72 ± 1.13 (0 - 3.76)	35.25 ± 10.96 (22.85 - 43.65)	3.85 ± 2.40 (1.38 - 6.18)	30.70 ± 38.41 (1.14 - 141.32)	1.44 ± 1.95 (0 - 6.18)
Ascidians	0.01 ± 0.03 (0 - 0.09)	0	0.33 ± 0.58 (0 - 1.00)	0	0.08 ± 0.28 (0 - 1.00)	0
Bryozoans	1.31 ± 2.02 (0 - 6.15)	0.03 ± 0.05 (0 - 0.12)	1.89 ± 2.23 (0.18 - 4.41)	0.03 ± 0.04 (0 - 0.08)	1.45 ± 1.99 (0 - 6.15)	0.03 ± 0.05 (0 - 0.12)
Chaetognats	25.19 ± 33.92 (2.38 - 95.38)	9.66 ± 14.61 (0.44 - 45.95)	16.73 ± 13.71 (5.43 - 31.98)	46.36 ± 75.73 (1.74 - 133.80)	23.24 ± 30.14 (2.39 - 95.38)	18.13 ± 37.08 (0.45 - 133.80)
Cirripedis	3.54 ± 5.56 (0 - 18.46)	0.04 ± 0.09 (0 - 0.26)	2.14 ± 2.73 (0 - 5.21)	0.01 ± 0.01 (0 - 0.01)	3.21 ± 4.98 (0 - 18.46)	0.03 ± 0.08 (0 - 0.26)
Cladocerans	204.78 ± 243.19 (7.74 - 697.93)	7.99 ± 15.18 (0 - 49.11)	32.74 ± 23.11 (9.84 - 56.06)	1.29 ± 1.03 (0.10 - 1.89)	165.08 ± 223.91 (7.74 - 697.93)	6.44 ± 13.48 (0 - 49.11)
Small Copepods	183.34 ± 255.10 (0 - 883.07)	0.74 ± 0.91 (0 - 3.08)	101.28 ± 106.44 (13.52 - 219.67)	1.25 ± 1.17 (0.14 - 2.48)	164.41 ± 228.02 (0 - 883.08)	0.86 ± 0.95 (0 - 3.08)
Medium Copepods	110.04 ± 133.17 (0.75 - 403.49)	4.90 ± 5.20 (0.05 - 12.55)	89.78 ± 117.01 (11.64 - 224.31)	4.14 ± 1.92 (2.47 - 6.24)	105.36 ± 125.15 (0.75 - 403.49)	4.72 ± 4.58 (0.05 - 12.55)
Large Copepods	25.09 ± 34.25 (0.15 - 98.69)	16.18 ± 32.14 (0.61 - 104.20)	10.19 ± 6.65 (3.11 - 16.30)	55.36 ± 51.74 (20.29 - 114.78)	21.65 ± 30.49 (0.15 - 98.70)	25.22 ± 38.93 (0.61 - 114.78)
Cumaceans	1.01 ± 0.02 (0 - 0.07)	0.01	0	0	0.01 ± 0.02 (0 - 0.07)	0.01 ± 0 (0.01 - 0.01)
Decapods	9.89 ± 17.65 (0 - 56.39)	22.23 ± 47.50 (0 - 139.00)	1.28 ± 2.21 (0 - 3.83)	0.23	8.24 ± 14.47 (0 - 56.40)	20.23 ± 45.55 (0 - 139.00)
Doliolids	4.82 ± 8.43 (0 - 28.27)	0.54 ± 0.51 (0 - 1.34)	1.10 ± 0.60 (0.41 - 1.47)	0.33 ± 0.41 (0.07 - 0.81)	3.96 ± 15.72 (0 - 28.28)	0.48 ± 0.47 (0 - 1.34)
Scaphopods	0.19 ± 0.49 (0 - 1.53)	0	0.72 ± 0.63 (0 - 1.16)	0.02 ± 0.03 (0 - 0.04)	0.31 ± 0.55 (0 - 1.54)	0.01 ± 0.02 (0 - 0.04)
Euphausiaceans	12.34 ± 6.29 (2.33 - 24.44)	13.58 ± 30.56 (0.02 - 97.66)	9.78 ± 6.16 (5.04 - 16.75)	35.16 ± 59.85 (0.56 - 104.27)	11.75 ± 6.10 (2.34 - 24.45)	18.56 ± 37.24 (0.02 - 104.27)
Gastropods	0.40 ± 1.26 (0 - 3.99)	0.04	0	0	0.31 ± 1.11 (0 - 3.99)	0.04
Medusas	0.08 ± 0.20 (0 - 0.61)	0.05 ± 0.07 (0 - 0.10)	0.02 ± 0.04 (0 - 0.07)	0.03	0.07 ± 0.17 (0 - 0.61)	0.04 ± 0.05 (0 - 0.10)
Limacinidae	0.40 ± 1.26 (0 - 3.99)	0.01	0.74 ± 1.27 (0 - 2.21)	0.02 ± 0 (0.02 - 0.02)	0.48 ± 1.22 (0 - 3.99)	0.01 ± 0.01 (0.01 - 0.02)

Continued

Table S4 continued

	Spring		Neap		Total	
	Abundance (ind m^{-3}) Mean ± SD (Min - Max)	**Biomass (mgC m^{-3})** Mean ± SD (Min - Max)	**Abundance (ind m^{-3})** Mean ± SD (Min - Max)	**Biomass (mgC m^{-3})** Mean ± SD (Min - Max)	**Abundance (ind m^{-3})** Mean ± SD (Min - Max)	**Biomass (mgC m^{-3})** Mean ± SD (Min - Max)
Molluscs	0.16 ± 0.27 (0 - 0.72)	0.02 ± 0.02 (0 - 0.06)	0.53 ± 0.53 (0 - 1.05)	0.01 ± 0.02 (0 - 0.02)	0.25 ± 0.36 (0 - 1.05)	0.01 ± 0.02 (0 - 0.06)
Mysidaceans	0.25 ± 0.34 (0 - 1.03)	28.24 ± 53.16 (0.04 - 122.24)	0	0	0.19 ± 0.31 (0 - 1.03)	28.24 ± 53.16 (0.04 - 122.24)
Nauplii	2.30 ± 4.91 (0 - 15.96)	0.03 ± 0.05 (0 - 0.14)	0.59 ± 0.49 (0.12 - 1.10)	0.01 ± 0.01 (0 - 0.02)	1.91 ± 4.33 (0 - 15.96)	0.02 ± 0.04 (0 - 0.14)
Ophiuroideans	0.15 ± 0.48 (0 - 1.52)	1.40 ± 2.21 (0 - 5.28)	0	1.57	0.12 ± 0.42 (0 - 1.52)	1.43 ± 1.98 (0 - 5.28)
Ostracods	14.33 ± 23.21 (0 - 64.61)	0.24 ± 0.63 (0.01 - 1.79)	4.30 ± 6.79 (0.14 - 12.13)	0.06 ± 0.09 (0 - 0.16)	12.02 ± 20.76 (0 - 64.62)	0.19 ± 0.53 (0 - 1.79)
Polychaets	1.30 ± 1.70 (0 - 5.67)	0.07 ± 0.10 (0 - 0.28)	0.37 ± 0.59 (0 - 1.05)	0	1.08 ± 1.55 (0 - 5.68)	0.06 ± 0.09 (0 - 0.28)
Pteropods	0.02 ± 0.07 (0 - 0.21)	0	0	0	0.02 ± 0.06 (0 - 0.21)	0
Stomatopoda	0.04 ± 0.05 (0 - 0.12)	13.84 ± 26.40 (0.02 - 53.42)	0	0	0.03 ± 0.05 (0 - 0.12)	13.84 ± 26.40 (0.02 - 53.42)
Unidentified	2.48 ± 2.73 (0 - 9.23)	0.12 ± 0.16 (0 - 0.41)	1.61 ± 1.57 (0 - 3.13)	0.01 ± 0.01 (0 - 0.01)	2.28 ± 2.48 (0 - 9.23)	0.10 ± 0.15 (0 - 0.41)

Table S5. Summary scheme signing main features defining each cluster.

Cluster 1	**Cluster 2**
> Chlorophyll *a*	> Salinity
> Chlorophyll > 20 µm	> Silicate
> Active Chlorophyll	> Prochloroccoccus
> Nitrate	> Foraminiferans
> Nitrite	> Appendicularians
> Ammonium	
> Particles biomass	
> Presence *Synechoccoccus*	
> Presence of coastal diatoms: *Guinardia striata* and *Chaetoceros debilis, Rhizosolenia setigera, etc.*	
> Meroplankton	

Table S6. Total abundance of copepods orders (ind m-3).

	Abundance (ind/m3) (min – max)
Calanoida	197.04
	(26.61 - 690.77)
Cyclopoida	45.25
	(1.61 - 286.15)
Harpacticoida	13.56
	(0 - 96.92)
Poecilostomatoida	35.79
	(0 - 179.6)
Other Copepoda	3.35
	(0 - 14.49)

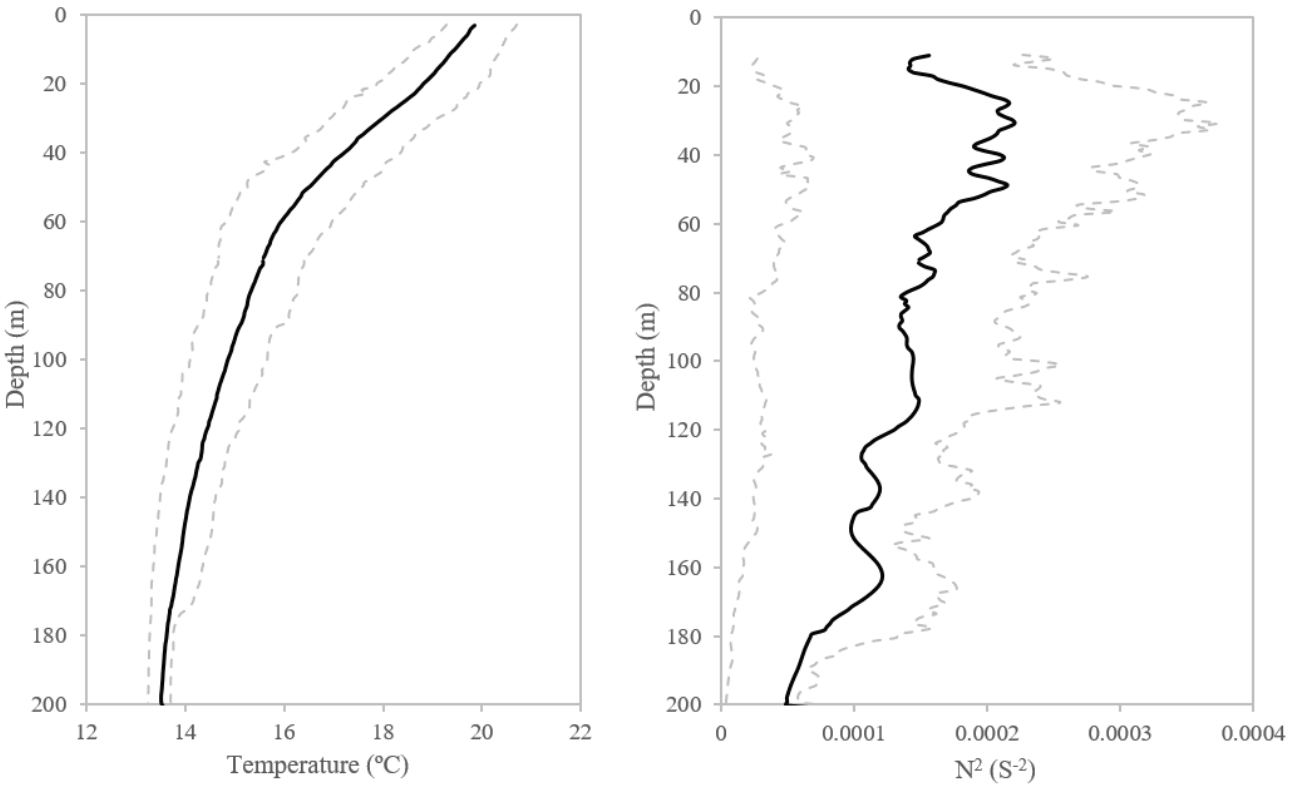

Fig. S4: Mean temperature, (A) and N2 (B) profiles averaged for all the stations. The dashed lines represent the 20th and 80th percentiles in both plots.