Phytoplankton community responding to a changing environment; case study: southern Adriatic

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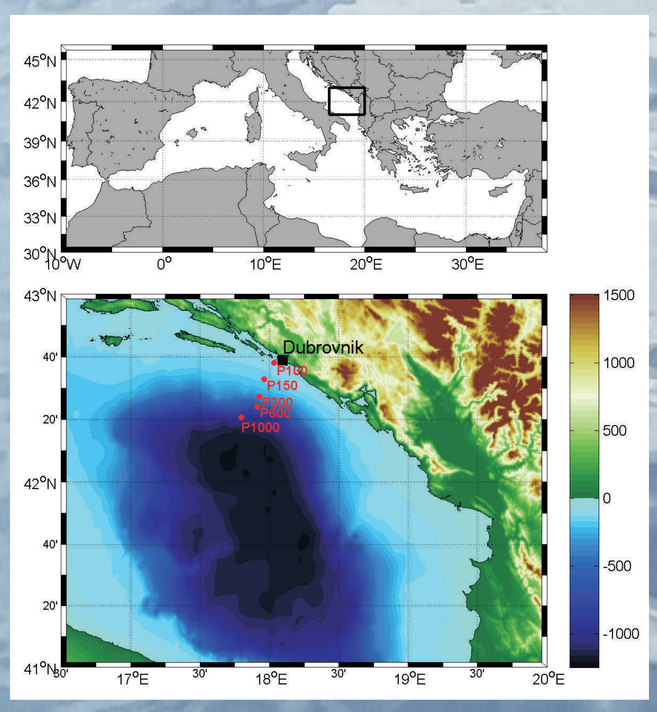

Figure 1. Map of investigated area

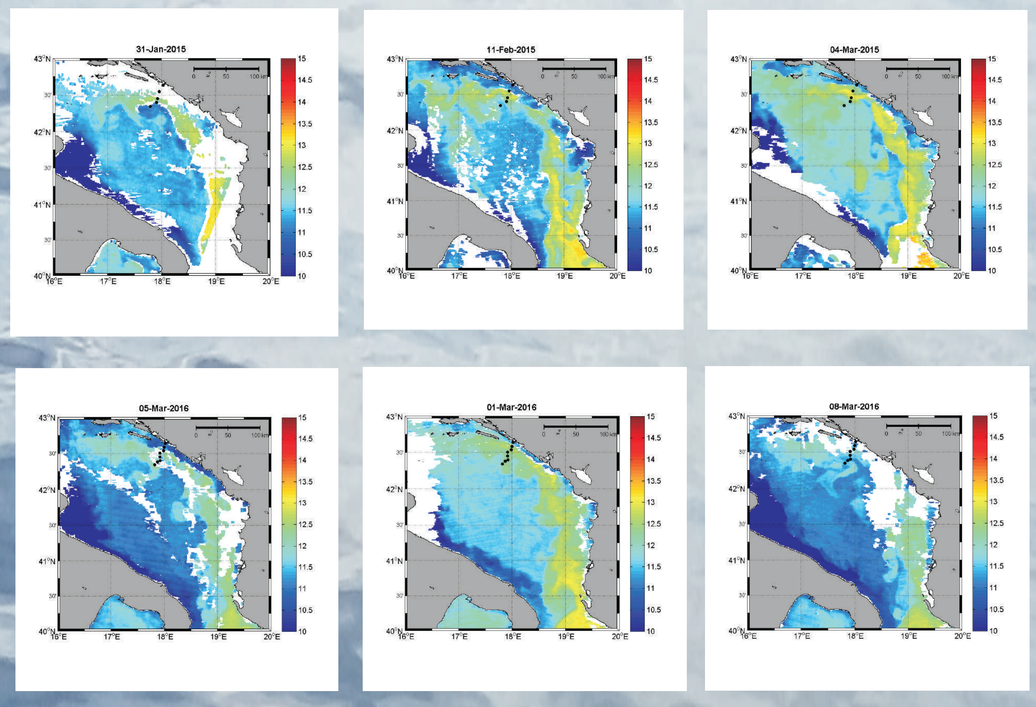

Figure 2. Maps of sea surface temperature (°C) before, during and after the cruises in 2015 and 2016. Sampling stations are noted as circles in panels.

The southern Adriatic is the transition area where complex water exchange between the Mediterranean Sea and the Adriatic Sea is taking place, with pronounced decadal variability of physical and biogeochemical properties (Fig. 1, 2). The area is oligotrophic, with low terrestrial nutrient inputs, characterized by complex physical dynamics leading to deep-water convection during winter, which in turn enhances thermohaline circulation and advection of waters through the Otranto Strait (Fig. 2).

The abundances of micro-, nano- and picophytoplankton, community structure, chlorophyll a (Chl a) concentrations as well as physical and chemical properties were investigated in the winter of 2015 and 2016 in the area stretching from coastal to open waters southern Adriatic (Fig. 2, 3). The consecutive winters substantially differed: while 2015 was characterized by deep vertical mixing, Chl a signal and viable phytoplankton cells detected up to 500 m depth, 2016 exhibited much weaker vertical mixing, detecting Chl *a* only up to 200 m depth. At the same time Chl *a* concentrations were up to four times higher than during previous winter. Microphytoplankton abundance and composition in both sampling campaigns were an order of magnitude lower then pico- and nanoplankton, and the community was composed mostly of diatoms (Fig. 4, Table 1). Nanophytoplankton was mostly composed of coccolithophores (in average 50 %), showing changes in abundance between the years. Picophytoplankton, on the other hand, showed community changes between the investigated years, where Prochloroccocus in 2016 took over the dominance over Synecoccocus, previously confirmed as dominant in investigated area (Fig. 4, Table 1).

Table 1. Maximum (MAX), minimum (MIN), average (AVG), standard deviation (STDEV), for physico-chemical parameters and abundance of phytoplankton size fractions along along investigated profile in the southern Adriatic in A) 2015 and B) 2016. N- number of measurments/samples

A

	N	MAX	MIN	AVG	STDEV
Temperature (°C)	9691	15,53	13,29	14,50	0,49
Salinity	9691	38,80	36,67	38,71	0,12
Oxygen (mg/L)	9691	7,80	5,51	6,84	0,32
Chlorophyll *a* (µg/L)	9672	0,105	0	0,04	0,031
Nanophytoplankton	117	44020	0	11507	8817
Picophytoplankton	117	22408	0	10981	5453
Microphytoplankton	117	19700	100	4319	3366

B

	N	MAX	MIN	AVG	STDEV
Temperature (°C)	6332	15,41	13,56	14,61	0,43
Salinity	6332	38,92	36,17	38,71	0,50
Oxygen (mg/L)	6332	7,881	6,220	6,83	0,40
Chlorophyll *a* (µg/L)	6638	0,40	0	0,0065	0,08
Nanophytoplankton	64	97740	0	18676	17435
Picophytoplankton	64	58884	21	21860	18270
Microphytoplankton	64	17920	0	2681	3211

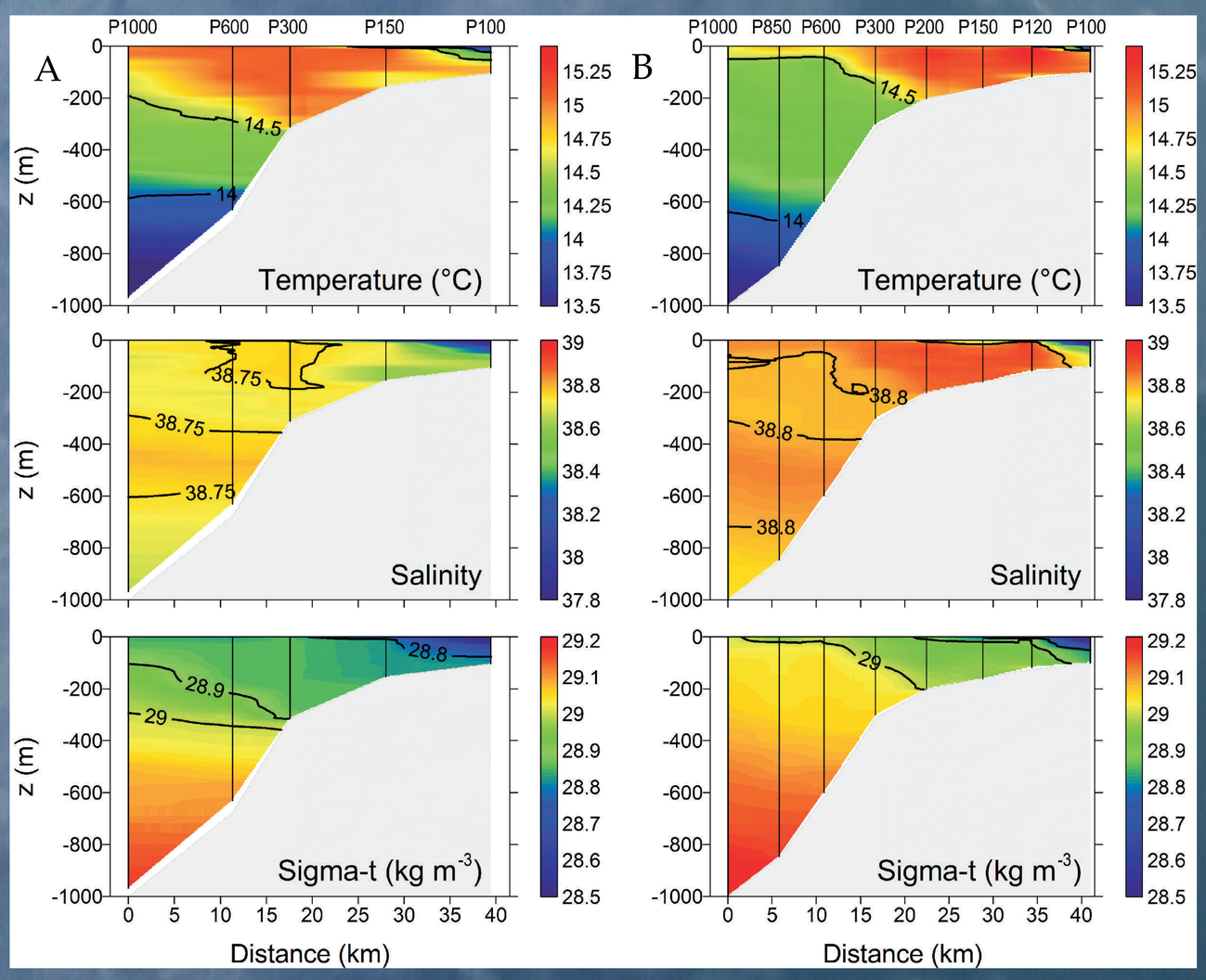

Figure 3. Spatial distribution temperature, salinity and density (sigma-t) over the investigated profile in A) 2015 and B) 2016.

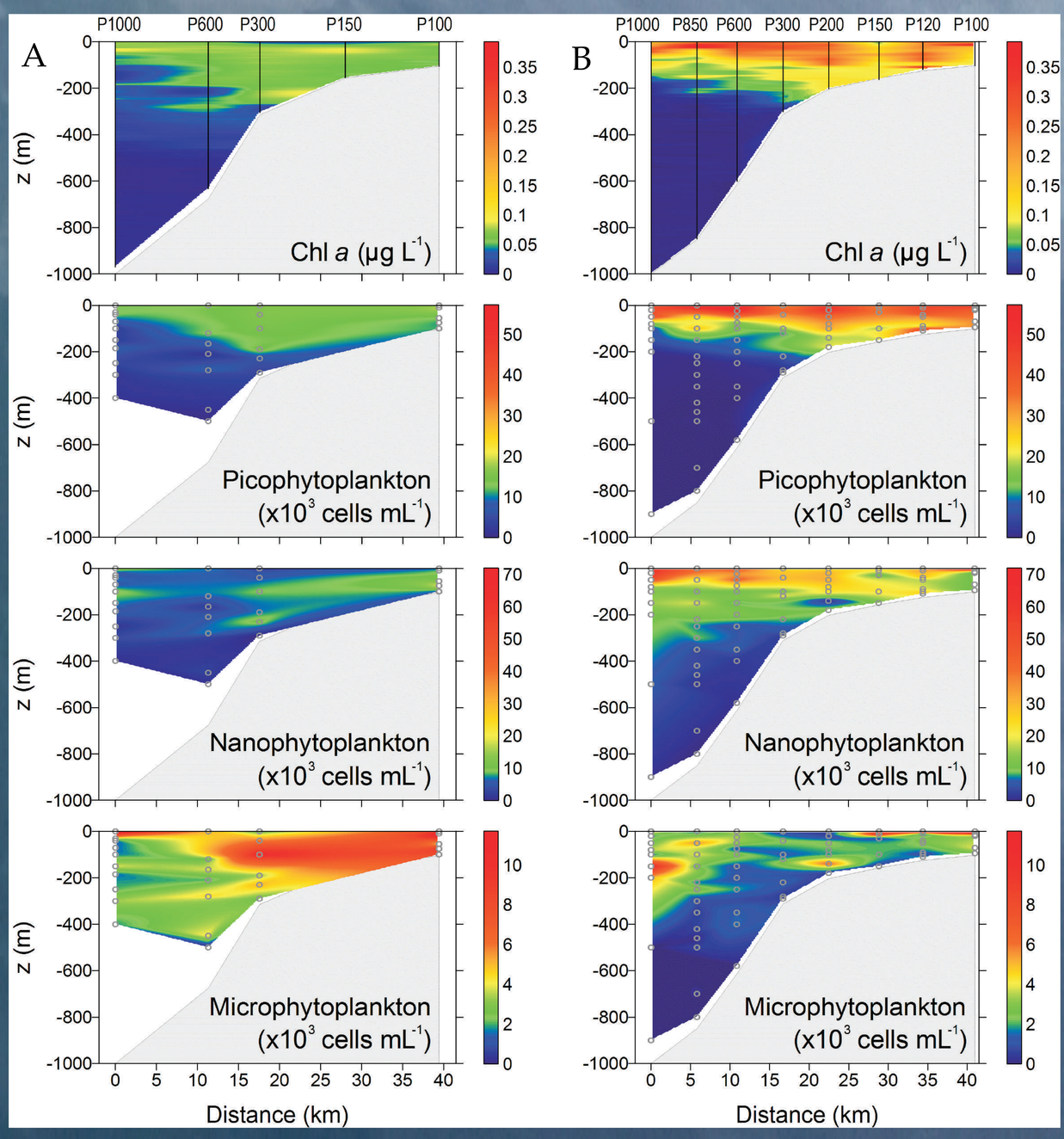

Figure 4. Spatial distribution of chlorophyll a concentration concentration and picophytoplankton, nanophytoplankton and microphytoplankton abundance along the investigated profile in A) 2015 and in B) 2016.

Acknowledgment

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