# WINTER TRENDS IN THE NORTHERN ADRIATIC

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## Abstract
Winter (February) phytoplankton blooms characterise the northern Adriatic. A significant decrease of winter phytoplankton abundance in the western part and an increase in the eastern one during the 1990-2007 period was observed. Furthermore, salinity and nutrient winter trends in the western and eastern part of the northern Adriatic differ as well. An interpretation of the observed changes was required.
*Keywords: Adriatic Sea, Nutrients, Phytoplankton, Po Delta, Salinity*

### Introduction
The northern Adriatic is one of the most productive regions of the Mediterranean Sea. A well defined eutrophication gradient decreases eastwards, mainly due to the Po River discharge [1], leading to a significantly higher phytoplankton abundance in the western part. Especially high phytoplankton blooms appear in winter (February). Blooms are especially intense when waters from the Po River spread over the large northern Adriatic area (in prep.). We are presenting western and eastern winter trends in phytoplankton abundances, salinity and nutrient concentrations for the 1990-2007 period.

### Methods
Phytoplankton (20-200 µm), salinity and nutrient (total inorganic nitrogen and orthophosphate) samples were collected in February at stations SJ108 and SJ107 at standard oceanographic depths along the along the Po River Delta - Rovinj transect for the 1990-2007 period (Figure 1). Parameters were determined by standard oceanographic methods.

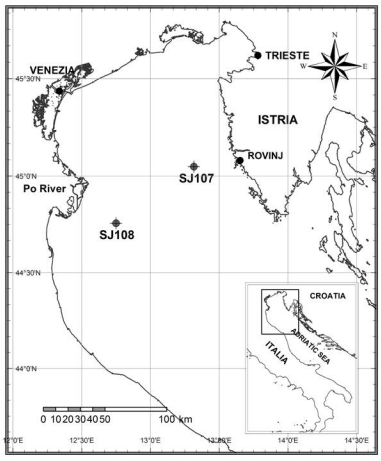


Fig. 1. Northern Adriatic map with sampling stations

### Results
In the western part (SJ108), surface phytoplankton abundances and nutrient concentrations decreased, while in the eastern one (SJ107) they increased over the last 20 years. Salinity of the surface layer showed an opposite trend (Figure 2). Phytoplankton abundances *vs*. nutrients and salinity showed a positive and negative correlation, respectively.

### Conclusion
Winter trends in phytoplankton abundances in the western and the eastern part of the northern Adriatic in the 1990-2007 period significantly differ and correspond to trends in salinity and nutrient concentrations. Decreasing trends in the western (eutrophic) and increasing ones in the eastern (oligotrophic) part were observed. We suppose that the observed phytoplankton and nutrient decreasing trends in the western part of the northern Adriatic ecosystem were a direct consequence of the extreme change in the Po River freshwater inflow (in prep.). However, the eastern conditions could be probably assigned to circulation regime changes.

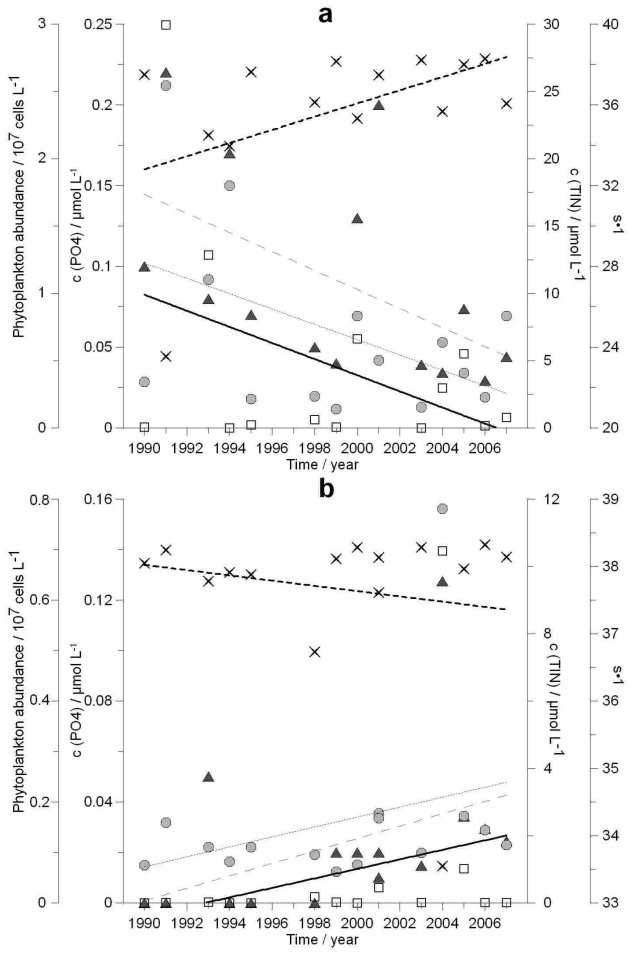


Fig. 2. Phytoplankton abundance (open square, bold-solid line), salinity – s (x-sign, bold-dashed line), total inorganic nitrogen – TIN (grey circle, dot line) and orthophosphate concentration – P (solid triangle, dashed line) in the western part of the northern Adriatic – station SJ108 (a) and in the eastern – station SJ107 (b) during the period 1990-2007 with corresponding linear fit lines

## References
1 - Degobbis D., Precali R., Ivancic I., Smodlaka N., Fuks D. and Kveder S., 2000. Long-term changes in the northern Adriatic ecosystem related to anthropogenic eutrophication. *Int. J. Envir. and Pollut.*, 13 (1-6): 495-533.