

OLIGOTROPHICATION OF THE NORTHERN ADRIATIC, TRUE OR FALSE?

Robert Precali^{1*}, Tamara Djakovac¹ and Danilo Degobbis¹

¹ Center for Marine Research, Ruder Boškovic Institute - precali@cim.irb.hr

Abstract

From 2003 to 2008 NA experienced a reduced input of freshwater and nutrients. In the second part of 2008, after five years, the Po River flow was higher than its average and in the whole NA the “oligotrophication scenario” (reduced trophic level) shifted to usual behaviour. The response to the change was immediate, indicating the fragility of the pelagic ecosystem.

Keywords: Chlorophyll-a, Nutrients

Introduction

The northern Adriatic (NA) is mainly under the influence of the Po River (70 % of the inflow), one of the largest Mediterranean rivers. The last decade is characterized by a strong decrease in Chl *a* concentration in the whole NA and confirmed all over the basin ($-0.11 \text{ mg m}^{-3} \text{ a}^{-1}$) from satellite derived information [1]. A decrease in freshwater inflow and input of nutrients resulted in a reduced availability (greater limitation) of phosphorous (P), and accumulation of total inorganic nitrogen (TIN) in the ecosystem [2]. In this work we are trying to understand how fragile such an ecosystem is when freshwater input increases again.

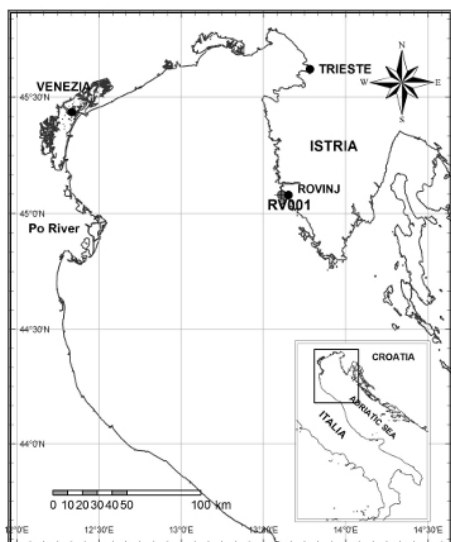


Fig. 1. Northern Adriatic map and station locations

Methods

Sampling, parameters determination and calculation

Water samples for nutrients (ammonium, nitrite, nitrate, orthosilicate and orthophosphate) and chlorophyll *a* concentration measurements were collected on a monthly scale from Jan 2007 to Dec 2008 at five oceanographic depths at station RV001 near Rovinj (Croatia, Fig. 1). Parameters were determined by standard oceanographic methods described in previous authors' publications. To understand the recent variability only residuals, after the removal of model values, are presented.

Model

Data collected from 1972-2002 on a monthly base were used to build an annual model. On annual scale through the data a Fourier smoother (with retained three harmonics) was passed.

Results and discussion

Station RV001 in the Istrian coastal area well represents the main processes in the open NA waters mainly because the local ones are not pronounced [2]. In the period 2007-2008 Chl *a* and orthophosphate (PO_4) concentrations were systematically lower than average confirming the overall trend in the wider area (Fig.2, [2]). On the contrary, TIN concentrations were higher than average over a great part of the investigated period, showing the coupling of greater P limitation and accumulation of TIN in the ecosystem. In 2008, more pronounced in the second part of the year (Fig. 2), the freshwater inflow increased and resulted in TIN consumption as more P was available in the ecosystem. The

increase of biomass (Chl *a*) was not observed probably due to a higher efficiency of nutrients use by the phytoplankton community.

The results show that the ecosystem rapidly responds to the input of fresh nutrients and that is well adapted to such a type of *stimuli*. Oligotrophication of the area is than only a measure to nutrient inputs, and controlled by the effectiveness of anthropogenic mitigation measures and climatic oscillations.

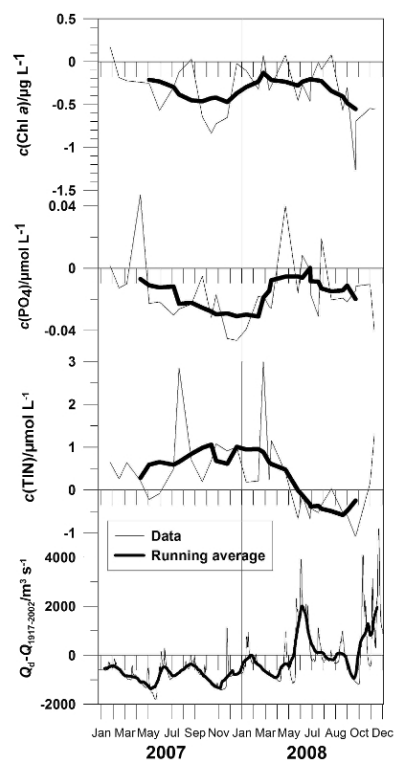


Fig. 2. Residuals (model – 1972-2002 removed) for chlorophyll *a* (Chl *a*), orthophosphate (PO_4) and total inorganic nitrogen (TIN) concentration (*c*), and Po River flow (*Q*) at Pontelagoscuro in the period 2007-2008. Thin line – residuals, thick line – running average

References

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