

DISTRIBUTION OF CARBOHYDRATES IN THE KARSTIC ESTUARY OF THE KRKA RIVER

Nataša Tepić¹*, Goran Olujić¹ and Marijan Ahel²

¹ Center for Marine and Environmental Res., Rudjer Boskovic Institute, Zagreb, Croatia - tepic@irb.hr

² Hydrographic Institute of the Republic of Croatia, Split, Croatia

Abstract

Seasonal and spatial distributions of dissolved (DTCHO) and particulate carbohydrates (PTCHO) were investigated in the highly stratified estuary of the Krka River over a period of one year. The observed longitudinal and vertical and concentration profiles indicate that the strongest accumulation of DTCHO occurs in the surface layer of during summer, reaching 1 mg C/L in the most eutrophic part of the estuary. The results are discussed in relation to hydrographic characteristics and nutrient dynamics of the estuary.

Keywords : Adriatic Sea, Estuaries, Carbon.

Introduction

Carbohydrates (CHO) represent one of the largest reservoirs of the organic carbon in the sea and play an important role in various processes of the biogeochemical cycle of marine organic matter. In some areas, affected by anthropogenically-enhanced eutrophication, such as northern Adriatic, CHO are involved in the aggregation processes, leading to massive mucilage events [1]. The aim of this study was to investigate carbohydrate distribution in a highly stratified estuary, situated in the central part of the eastern Adriatic coast, as related to hydrographic conditions and nutrient dynamics.

Materials and methods

Carbohydrates, including both dissolved and particulate fractions, were determined by MBTH method [2] after hydrolysis with HCl (1.7 M). Hydrographical parameters were measured in situ by a CTD probe (Seabird, USA), while nutrients were determined by standard methods. This paper covers the dataset from February to October 2000, including 6 sampling campaigns at four stations, situated along the longitudinal profile of the estuary, thus comprising high variability of hydrological and nutrient conditions.

Results and discussion

Seasonal and spatial distributions of PTCHO and DTCHO showed high variability of both CHO fractions. The total CHO concentrations spanned between 55 and 1107 $\mu\text{g C/L}$, with DTCH/PTCHO ratios varying over wide ranges. However, the concentration of PTCHO was always significantly lower than that of DTCHO, which typically contributed more than 80 %. One of the most important characteristics of the Krka estuary is a very stable stratification throughout the year, and this feature was clearly reflected in the distribution of all hydrographic and biogeochemical parameters, including CHO (Figure 1).

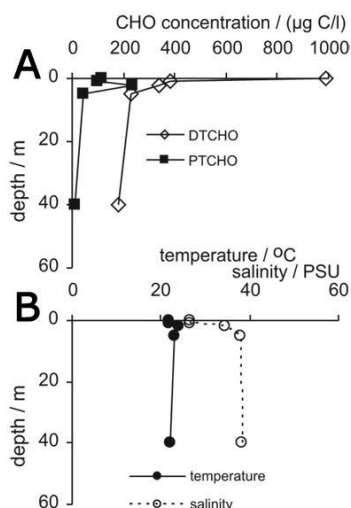


Fig. 1. Vertical concentration profiles of PTCHO and DTCHO (A) and salinity and temperature (B) in the Krka estuary (E4A; July 2000).

Typically, the concentration of CHO was higher in the brackish surface layer than in the underlying marine layer, which is due to the stronger phytoplankton activity, fostered through river- and wastewater-borne nu-

trients. The distribution of CHO along the longitudinal profile of the estuary showed that enhanced CHO concentrations in the brackish layer were observed on all stations, however the effect was more clearly pronounced on the most eutrophic station E4A, situated in the lower part of the estuary. Seasonal distribution of CHO indicated that significant accumulation of DTCHO (up to 1 mg C/L) occurred in summer, which can be explained by increased production of carbon-rich phytoplankton materials under severe nitrogen-depleted conditions. Despite such a high CHO concentrations, formation of macroaggregates, similar to those in the northern Adriatic, was not observed, probably due to the relatively short residence-time of the brackish layer in the Krka estuary.

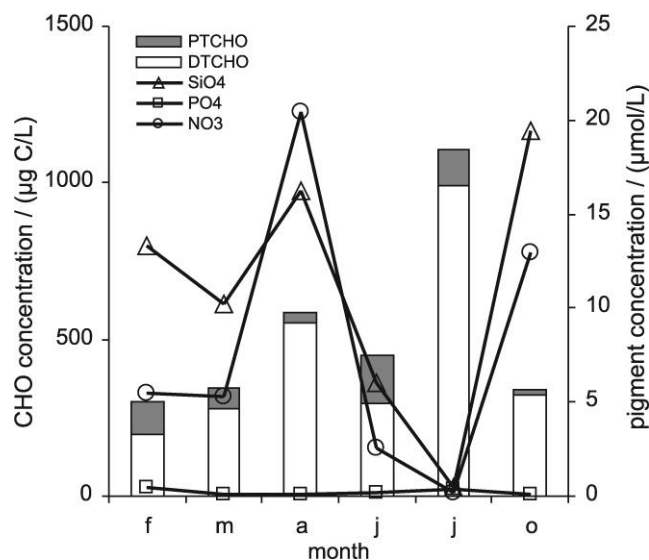


Fig. 2. Seasonal distribution of CHO and nutrients in the brackish layer of the Krka estuary (E4A).

References

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