

ORGANOTIN CONTAMINATION IN THE COASTAL ZONE OF THE EASTERN ADRIATIC (SIBENIK AREA)

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Abstract

Organotin compounds (OTC) were measured with two different analytical methods in sediment, mussels and seawater from the central part of the eastern Adriatic coast. Butyltin compounds were found in all analyzed samples, with the highest concentrations obtained in samples from the several investigated marinas. These results indicate that TBT is still in use in Croatia and that coastal area is contaminated with these highly toxic compounds.

Keywords: *Adriatic Sea, Sediments, Pollution, Monitoring, Bivalves*

Introduction

The extensive use of tributyltin (TBT) compounds in ship antifouling paints over last four decades has created a global pollution problem. The widespread use of organotin compounds (OTC) started in 1950s and already in 1970s the negative effects of TBT on marine organisms were discovered. TBT containing antifouling paints were banned first on the ships less than 25 m and from January 2008 the use of TBT is banned in EU countries. The use of TBT in antifouling paints in Croatia is still not regulated by legislative.

In addition, there is no data on the level of OTC in samples from the Croatian Adriatic coast. However, a high degree of imposex (widely used as a biomonitoring tool of TBT contamination), found in gastropoda *H. trunculus* from the eastern Adriatic coast in 2005 [1], suggested that Croatian coasts might be highly contaminated with TBT. Here we present first data on the level of OTC (methyl, buthyl, octyl and phenyl species) in samples from the central Adriatic.

Sampling and methods

Samples for organotin analysis were collected at 7 coastal locations in the Sibenik area, central part of the Croatian Adriatic coast, in September 2009. Sampling locations included 5 marinas (RO-Rogoznica; MN-Mandalina; SL-Solaris, SK-Skradin; V-Vodice), Sibenik port (L-Luka) and one referent station in the Sibenik channel (MA-Martinska) which is not heavily exposed to the ship traffic. At every location sediment cores, mussels and seawater were collected. Analysis of organotin compounds were performed with two different analytical techniques, GC-PFPD (Gas Chromatography Pulse Flame Photometric Detection) and GC-ICPMS (Gas Chromatography Inductively Coupled Plasma Mass Spectrometry).

Results and discussion

Distributions of butyltin compounds (MBT-monobutyl; DBT-dibutyl; TBT-tributyl) in surface sediment, mussels and seawater at 7 sampling locations are presented in Fig. 1. Significant levels of all butyltin compounds are found at all sampling locations, especially in marinas Mandalina (MN) and Rogoznica (RO). The concentration levels in sediment and mussels are comparable with the ones determined in samples from the Slovenian coast in 2002 [2] and indicate that TBT is still in use in Croatia. TBT derivatives prevail in sediment and mussels which also suggests recent input of TBT into marine environment. More abundant concentration of DBT than TBT in water reflects instability of TBT in water and fast decomposition into lower butyl derivatives. At all location except referent one (Martinska), level of DBT in seawater was higher than 0.2 ng/l, which is permitted level of individual butyltin derivatives in water defined by Croatian and European regulative. Total concentration of butyltin compounds in analyzed sediment cores decreases with depth and DBT and MBT prevail in deeper sediment layers, both indicating TBT decomposition in sediment with time. From other butyltin compounds traces of some methyl and octyl derivatives are found in water and mussels.

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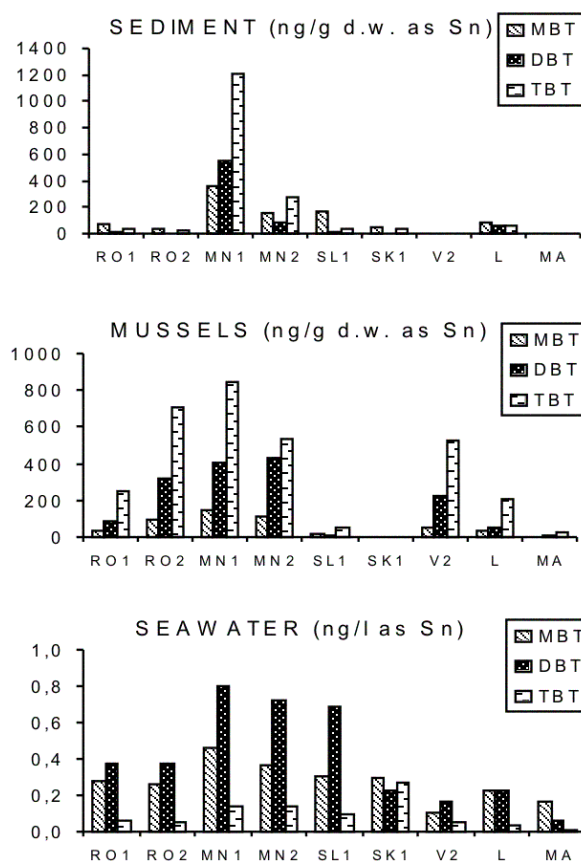


Fig. 1. Distribution of butyltin compounds in surface sediment, mussels and seawater from the Šibenik area (eastern Adriatic coast).

References

- 1 - Šcancar, J., Zuliani, T., Turk T., Milacic R., 2007. Organotin compounds and selected metals in the marine environment of Northern Adriatic sea. *Environ. Monit. Assess.* 127: 271-282.
- 2 - Prime, M., Peharda, M., Jelic, K., Mladineo, I., Richardson, C.A., 2006. The occurrence of imposex in *Hexaplex trunculus* from the Croatian Coast. *Mar. Pollut. Bull.* 52: 800-815.