



Anthropogenic pollution indicators in marine environment of the Eastern Part of the Gulf of Finland

Zoya Zhakovskaya, Vladimir Nikiforov, Varvara Mamontova, Larisa Khoroshko, Ekaterina Chernova, and Iana Russkikh

St.-Petersburg Scientific Research Centre for Ecological Safety, Russian Academy of Sciences (SRCES RAS), Russian Federation (zazhak@hotmail.com)

Pollution involving hazardous substances is considered one of the major problems affecting the state of the Baltic marine environment. However, assessment of the vast majority of the hazardous substances (including accepted as pollution indicators) in the environment have not been monitored in Russian Federation yet. Moreover there are no official guideline values for their presence or release in environment. For our investigation we have selected the organotin biocides and widespread pharmaceutical diclofenac. The study is focused on surface marine water and bottom sediments, collected from the eastern part of the Gulf of Finland during the navigation seasons of 2012-2013.

Organotin compounds belong to a large group of key marine contaminants. They had been widely used in the world industry as antifouling paints, fungicides and biocides until the middle of 1980s. Tributyltin (TBT) and triphenyltin (TPhT) are the most hazardous of all organotin compounds, causing such biological effects as shell deformation, endocrine disruption, imposex and intersex phenomena at the concentration of 2 ng/L. The use of TBT in antifouling paints was banned within EU in 2003 and within Russian Federation in 2008. Monobutyltin (MBT), dibutyltin (DBT), tributyltin (TBT) and triphenyltin (TPhT) were analysed as ethyl derivatives using electron impact gas chromatography-mass spectrometry (GC-MS-EI) in single ion monitoring mode (SIM). TBT and TPhT were frequently found above MAC of 1.5 ng/L and 2 ng/g dw respectively in both water and bottom sediment samples collected from the Gulf of Finland water basin. The highest detected concentration detected mainly in coastal areas with dense ship traffic were 670 ng/L (TBT) in water samples, 440 ng/g dw (TBT), 160 ng/g dw (TPhT) in sediment samples.

Potential risks from the environmental presence of pharmaceuticals and personal care products (PPCP), such as medicine, hormones, means of personal hygiene, etc. reveal in abnormal physiological processes and reproductive impairment, increasing number of cancer incidences and increasing of bacterial antibiotic resistance.

Diclofenac one of anthropogenic markers, was analyzed by the method of liquid chromatography high-resolution mass-spectrometry, using LTQ Orbitrap (Thermo Finnigan) in natural water and sediment samples. Mass spectra were recorded in several modes: full scan, SIM and MRM using positive and negative ionization. Resolution was 30000. Diclofenac were detected in several water samples (in the range of 3,9-270,0 ng/L).

The obtained results are using for "Biota spatial distribution/Geological diversity/Pollution" model validation.

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