

IDENTIFICATION AND DETERMINATION OF VARIOUS ORGANIC COMPOUNDS MARKED AS CONTAMINATION IN ENVIRONMENTAL WATER SAMPLES TAKEN FROM THE WESTERN SHORE OF ADMIRALTY BAY (KING GEORGE ISLAND, ANTARCTIC)

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ABSTRACT

Although Antarctica is considered as one of the most pristine regions of the world, the growing anthropogenic activities (touristic, some scientific operations) as well as long range atmospheric transport of pollution from urban areas are leading to increasing levels of pollutants in this environment. The aim of this study was to characterize the variety of chemical compounds occurring in the water samples. The organic contamination of Antarctic surface waters nearby the Antarctic Polish Polar Station on the western shore of Admiralty Bay was investigated. This area belongs to Antarctic Specially Protected Area (ASP 128), and thus particular attention should be paid to it.

The research encompassed water samples of streams and small lakes in the surroundings of the station. Gas chromatography-mass spectrometry was applied to elucidate the composition of dichloromethane extracts of surface water (volatile and semi-volatile organic compounds). Moreover, polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs) have been determined and quantified. Additionally spectrophotometric analysis of total phenol and formaldehyde content has been applied. The presence of n-alkanes and PAHs indicates the source of organic fuels and products of their refining. Nevertheless we cannot exclude impact of long range atmospheric transport of pollution. The presence of PCBs as well as phenols and formaldehyde also point out the anthropogenic impact on the environment, mostly from remote areas. Furthermore, multivariate dataset has been created, and Principal Components Analysis was employed to reveal hidden dependence in the data.

Based on this preliminary study we can conclude that different organic contaminants present in the hydrosphere constitute a threat for the Antarctic ecosystem, for which reason

the monitoring of contamination should be continued. Moreover, interdisciplinary research should be applied to check the effect of contamination on living organisms (e.g. toxicological test). Furthermore, renewable energy should be used in the station in the future. This kind of eco-friendly energy production would lead to reduced usage of diesel generators and thereby to a better preservation of the polar ecosystem.

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