

## WHETHER THE VOLCANIC ERUPTIONS MAY HAVE IMPACT OF OCCURRENCE OF DIOXIN-LIKE COMPOUNDS IN THE AQUATIC ECOSYSTEM IN THE SOUTH OF THE ISLAND OF WEST SPITSBERGEN (FJORD HORNSUND, SVALBARD)?

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### ABSTRACT

Volcanic eruptions are regarded as one of the most intensive natural phenomena that involve emission of tons of pollutants into the atmosphere. Due to the scale of this occurrence, some volcano eruptions constitute a particular threat to the areas of the Earth that are considered susceptible to changes. It is thus of importance to attempt estimate the impact of volcano eruption and the consequent release of compounds on remote areas, including particularly sensitive polar ecosystems. Nevertheless, it would be a negligence if the authors were to ignore other potential sources of pollutants emission, including natural ones (e.g. fires of forests, grasslands, heathlands and steppes), as well as anthropogenic emissions. It should be noted that in the unique environmental and geographical conditions, all of the listed emission sources may co-occur, strengthening the impact and compensating the adverse effects substances may have on the environment. The scholars investigating these aspects indicate, however, that there appears to be a „research gap” in terms of knowledge on emission of dioxin-like compounds from volcanic sources.

The presented work pursues to indicate the likely sources of emission of stable organic compounds falling into the dioxin-like group that have been detected and identified in the Arctic tundra environment, as well as to confirm the hypothesis concerning the impact of the Eyjafjallajökull volcano eruption (Iceland, 63.63°N, 19.62°W), from April 14th to May 22nd, 2010, and the relatively short eruption of the Grímsvötn volcano and the pollutants emission resulting from these occurrences on changes in the Arctic ecosystem of the southern part of the West Spitsbergen island. (Fiord Hornsund, Svalbard, 7.00°N, 15.33°E). Particular attention is given to polycyclic aromatic hydrocarbon compounds (PAHs) due to their documented harmful effect on the flora and fauna species of the Arctic.

Surface water from main stream were collected from the Fuglebekken basin (Hornsund fjord). The water samples (n=15, 1L volume) were collected in the summer session (June 25th–July 9th) every year from 2010 to 2013 (in total 60 samples).

The present investigation reveals the results of the analysis of the concentrations of organic compounds (non-purgeable organic carbon (NPOC) and PAHs), which have been determined in surface water samples by the Analyzer TOC-VCSH/CSN SHIMADZU and

GC-MS[EI] (Agilent Technologies 7890A gas chromatograph with an Agilent Technologies 5975C mass spectrometric detector and splitless injector (7683B)).

The conducted analysis involved anthropogenic and natural factors that may affect the concentration of PAHs in the analysed water samples. An attempt is made to indicate the emission source of the compounds being deposited and to identify the extent, to which the substances under analysis actually affect the Arctic ecosystems. Moreover, the work employs the following: diagnostic ratios PAH, air masses backward trajectory analysis, Lidar observations and land relief analysis in order to provide a multi-level interpretation of the obtained data. Natural environment constitutes a complex system of subtle correlations that need to be perceived as a dynamic medium, in which multi-faceted processes take place.

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