



2023 Master internship at University of Gdańsk



TITLE : Recognition of source of origin of PM1 and PM2.5 aerosols and selected pollutants in sea surface microlayer in Port of Brest

LAB & PEOPLE

- Name of the hosting lab:
 1. Department of Chemical Oceanography and Marine Geology, Faculty of Oceanography and Geography, University of Gdańsk
 2. Chimiste de l'Environnement Marin, Université de Bretagne Occidentale (UBO, Brest)
- General activities of the lab:

Oceanography, atmospheric chemistry, marine chemistry
- Website:

https://old.oig.ug.edu.pl/universytet/struktura_ug/wydzial_oceanografii_i_geografii/katedra_oceanografii_chemicznej_i_geologii_morza

<https://www-iuem.univ-brest.fr/lemar/recherche/equipe-chibido/>
- Number of staff / PhD: 15/8 (UG)
- Supervisor name and contact:

Anita Lewandowska (anita.lewandowska@ug.edu.pl)

Matthieu Waeles (matthieu.waeles@univ-brest.fr) / Laboratory LEMAR

Research conducted as part of Internship by a master's student from Brest will be part of a larger project, carried out as part of Martyna Malinowska's doctorate. Her assistant supervisor will be Dr. Matthieu Waeles. The whole cooperation is the aftermath of the cruise from Gdynia to Cadiz, which took place as part of SEA EU in 2022.

TOPIC OF THE INTERNSHIP

- Scientific context of the internship (max 20 lines)

The assessment of the degree of air pollution in ports requires considering many emission sources. In addition to the role of sea ships, one should remember about everyday activities related to, for example, reloading of goods or trucks or trains used for their transport but also sandblasting, painting or painting of ships. This results in

the release of aerosols of different size, which contain toxic and hazardous substances, such as heavy metals, polycyclic aromatic hydrocarbons (PAHs) or elemental carbon [Journal of Laws of 2009; McLean Ch. i.in., 2001; Wiśniewska et al, 2019]. It has been estimated that the vast majority of the world's fleet spends an average of 20% of their time at sea and the remaining 80% in or in the vicinity of a port. Research using data on geographical marine activity has shown that 70 to 80% of pollution from ships occurs within 400 km from land [Corbett et al., 1999]. This leads not only to the deterioration of air quality in port areas and their surroundings, but also has a negative impact on sea water, soil, as well as rivers and lakes located in these areas [Puig et al., 2014].

The research goal is the recognition of the concentrations and source origin of the most important PM1 and PM2.5 aerosols components as well as of the surface microlayer of the sea and subsurface water in Port of Brest. In addition it will be determined the load of selected toxic and hazardous substances (e.g. trace metals, PAHs, elemental carbon) for human health and other living organisms brought with the deposition of PM1 and PM2.5 into the surface water in Port of Brest. The research hypothesis we put forward is: The state of air quality and, consequently, the surface microlayer of the sea in the Brest Port region is determined to a greater extent by the municipal and housing sector and land transport than by maritime transport and port activities.

Keywords : aerosols and microlayer pollution, harbour region, anthropopressure, trace metals, PAHs, organic and elemental carbon

Bibliography :

Corbett, J.J, Fischbeck, P.S., and Pandis, S.N. (1999), "Global Nitrogen and Sulfur Emission Inventories for Oceangoing Ships", Journal of Geophysical Research, Vol. 104, 10-11, DOI:[10.1016/S2092-5212\(10\)80009-4](https://doi.org/10.1016/S2092-5212(10)80009-4)

Government Statement of 2 December 2008 on the binding force of the Stockholm Convention on Persistent Organic Pollutants, made in Stockholm on 22 May 2001 Journal of Laws of 2009, No. 14, item 77)

McLean Ch. i.in., 2001. Simulation in shipyards: simulation of shipbuilding operations, IEEE Computer Society Washington, DC, USA, 870-876, DOI:[10.1109/WSC.2001.977386](https://doi.org/10.1109/WSC.2001.977386)

Puig M., Wooldridge Ch., Darbra R. M., Identification and selection of Environmental Performance Indicators for sustainable port development, Marine Pollution Bulletin, Volume 81, Issue 1, 2014, 124-130, DOI:[10.1016/j.marpolbul.2014.02.006](https://doi.org/10.1016/j.marpolbul.2014.02.006)

Wiśniewska K., A. U. Lewandowska, M Staniszevska, 2019, Air quality at two stations (Gdynia and Rumia) located in the region of Gulf of Gdansk during periods of intensive smog in Poland, Air Qual Atmos Health, 12:879–890

Tasks and duties entrusted to the student:

The first objective of this internship will be collecting of PM1 and PM2.5 aerosols and microlayer and subwater samples in Port of Brest. Then, in the collected samples, the student will conduct gravimetric and chemical analyses. Trace metal concentrations (Al, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, As, Sr, Mo, Cd, Ba, Pb) will be analyzed in Brest. In turn, in Gdynia (University of Gdańsk) an analysis of selected cations and anions,

organic and elemental carbon and polycyclic aromatic hydrocarbons (FLU, CHRY, PYR, B(a)P, B(a)A), is planned. In addition student will analyse meteorological condition all samples analysis of concentrations of selected chemical compounds, including substances toxic and hazardous to human health and other living organisms, under the influence of changing meteorological and prepare air mass trajectories.

Skills to be acquired or developed:

Understanding of air-sea water interaction, recognition of pollution source of origin in air and sea water of harbour, operation of specialized measuring and analytical equipment (ion and gas chromatography, thermo-optical carbon analyzer, IC PMS, samplers for sampling aerosols and sea surface microlayers)

PROFILE OF THE DESIRED STUDENT

- Minimum level of study required: First year of Master
- Field(s) of study: Oceanography, atmospheric sciences
- Scientific skills : Work in the laboratory and in field conditions (sea, coastal zone), performs basic statistical data analyses
- Language skills required : Spoken and written English

THE INTERNSHIP ASSIGNMENT:

Desired duration of the internship (in months): 6 months desired (first 3 in France and after 3 in Poland)

Desired Starting date of the mission: *(please indicate the level of flexibility)* : October or November 2023

Indicative weekly schedule: *35h / week*

Remuneration ?

Erasmus grant : additional Erasmus grant could be asked to your own university

Internship agreement: *an internship agreement will be signed.*

To SEA-EU students:

If you're interested please send your CV and letter of motivation to the scientist in charge, email before the date / / 203.