

## A new approach to make indoor air quality in the accommodation of ships understandable and actionable for seafaring staff

Carro Gustavo<sup>1</sup>, Schalm Olivier<sup>1</sup>, Demeyer Serge<sup>2</sup> and Jacobs Werner<sup>1</sup>

<sup>1</sup> Hogere Zeevaartschool Antwerpen (HZS), Noordkasteel-Oost 6, 2030 Antwerpen, Belgium  
E-mail: [gustavo.carro@hzs.be](mailto:gustavo.carro@hzs.be)

<sup>2</sup> Universiteit Antwerpen (UA), Prinsstraat 13, 2000 Antwerpen, Belgium

Today's society is increasingly aware of the impact of air quality on human life. Air quality in and around ships is a challenging subfield because pollution is aggravated by cargo vapours, exhaust emission and even cooking on board. The assessment of the air quality requires substantial chemical analyses at several locations over prolonged periods. However, the huge amounts of collected data and the complexity of the underlying relationships are important barriers for persons not trained in data science. The situation is aggravated by the plethora of guidelines, standards, recommendations, and legislations from several countries and organizations specifying permitted exposure limits. These criteria often result in contradicting information, confusing seafarers.

The purpose of this study is to develop a mathematical method to translate all this complex data and opinions into more accessible information, easy to understand for non-specialists. We developed a mathematical algorithm where all these opinions were brought together statistically, resulting in a more subtle interpretation. The concentration values of the pollutants were associated with an estimated Risk parameter. The values of Risk were presented in a simplified way using colour-maps. Air Quality Indices were also analysed in this work. The method developed was applied on a dataset obtained from a measuring campaign performed on board the 'Research Vessel Belgica', sailing close to the coast of Belgium. Multiple parameters such as Sulphur Dioxide, Nitrogen Dioxide, Carbon Monoxide, Ozone, and Particulate Matter concentrations were analysed during the time of the measuring campaign. During this talk, we will present the Air Quality Indices we derived during the measuring campaign and the actionable interpretations we derived from them.

Keywords: Air quality assessment; Intuitively readable data; Visual analytics