

Abstract

This thesis contributed to the further development of the SeaCanairy, a mobile air quality measurement system. The air circuit was optimized and the electrical diagram redesigned, making the system more accessible to users with no experience with this prototype

Significant progress was made with the integration of cabinet heating, which significantly reduced hygroscopic growth and improved the accuracy of the OPC-N3 sensor. Furthermore, several technical issues were addressed, such as the influence of the pump configuration, the need for an additional I²C line, and electromagnetic interference. Thanks to hardware and software adjustments, the error rate of the OPC-N3 sensor decreased from approximately 60% to approximately 3%.

Not all objectives were achieved. For example, the calibration of the Alphasense gas sensors will need to be repeated in the future, and the flow rate of the OPC-N3 sensor proved unstable, which noticeably affected the measurement results.

Despite these challenges, this research confirms that the SeaCanairy is a promising platform for reliable air quality measurements. With further optimizations in calibration, flow stabilization and software, the system can develop into a robust instrument for long-term measurement campaigns and maritime applications.