

Abstract

This thesis investigates the spatial analysis of uniform corrosion in the Ghent-Terneuzen Canal in the context of the COMIC project, arising from a discovery of significant corrosion damage in the Zelzate marina in early 2021. The research focuses on the influence of geographical and industrial factors on corrosion rate and delay along the canal.

The distribution and intensity of uniform corrosion throughout the canal is quantified to identify potential corrosive hotspots. The widely used mass loss measurement on steel coupons was applied to the entire channel at 7 time points. An asymptotic regression model was applied to the measured corrosion rates for 11 zones in the channel. A higher stabilization of the corrosion rate was observed in the northern half of the channel versus a lower stabilization in the southern half. In addition, the corrosion rate slows down faster in the northern half than in the southern half.

The conclusions of this study highlight the need for targeted monitoring and predictive systems to effectively control corrosion. The model used indicates that corrosion cannot be assumed to evolve the same way over time in a single interconnected port zone.

Recommendations for future research include further investigating the influence of physicochemical aquatic parameters and specific microbial mechanisms that contribute to corrosion and developing more nuanced protection strategies for marine infrastructure.