

Application of the OSOM+ Systematic Observation Methodology to Maritime Structures at the Port of Sines

RUI CAPITAO ¹, CONCEIÇÃO FORTES ², RUTE LEMOS ², RUTE LEMOS ², MARIA JOÃO HENRIQUES ², LUÍS GABRIEL SILVA ²

¹ LNEC – National Laboratory for Civil Engineering, Portugal, rcapitao@lneec.pt

¹ LNEC – National Laboratory for Civil Engineering, Portugal, jfortes@lneec.pt

¹ LNEC – National Laboratory for Civil Engineering, Portugal, rlemos@lneec.pt

¹ LNEC – National Laboratory for Civil Engineering, Portugal, mjoao@lneec.pt

¹ LNEC – National Laboratory for Civil Engineering, Portugal, lgilva@lneec.pt

Abstract

The National Laboratory for Civil Engineering (LNEC)'s current OSOM+ (Systematic Observation of Maritime Structures) methodology has been applied to the maritime and port infrastructure at the Port of Sines since 2018—including the west breakwater, the general cargo terminal breakwater, the marina protection breakwater, the fishing harbour breakwater, and the service port breakwater. The aim of this application was to monitor the performance of these structures and, when necessary, recommend timely maintenance interventions (Capitão et al., 2021).

During each monitoring campaign, systematic photographic records were captured at georeferenced locations along each structure, and online forms were completed in situ to document observed anomalies. In parallel, drone-based photogrammetric surveys were conducted, providing more detailed and accurate information on the condition of the structures.

The migration of the ANOSOM platform to a cloud-based GIS system—ANOSOM-WEB—now enables an intuitive and comprehensive online interface for end-users. This platform includes a mobile interface that supports field operators during visual inspection campaigns, allowing efficient on-site data input and real-time access to relevant information stored in the corresponding maritime structure database.

The implementation of OSOM+ between 2018 and 2023 has enabled the assessment of the current condition, evolution, and risk status of the port structures at Sines. Based on these assessments, it has been possible to plan maintenance and/or repair activities in a timely and informed manner.

This paper presents the application of the OSOM+ programme to the maritime works at the Port of Sines, including comparative results from inspections carried out in 2018, 2020, 2022, and 2023. These comparisons are based on visual inspections and drone data and are supported by a critical analysis of georeferenced photographs, orthomosaics, point clouds, digital surface models, and profiles.

Keywords

Maritime infrastructure monitoring / OSOM+ methodology / Drone photogrammetry / Cloud-based GIS inspection system