



HAL
open science

In-situ conservation of historical metallic shipwrecks: complementary approach from on-site global measurements to multiscale characterization

Florence Mercier-Bion, Justine Vernet, Jean-Paul Gallien, Philippe Dillmann,
Eddy A Foy, Jean-Bernard Memet, Marine Bayle, Clémentine Caubisens,
Laurent Urios, Nathalie Huet, et al.

► To cite this version:

Florence Mercier-Bion, Justine Vernet, Jean-Paul Gallien, Philippe Dillmann, Eddy A Foy, et al..
In-situ conservation of historical metallic shipwrecks: complementary approach from on-site global
measurements to multiscale characterization. EuroCorr 2022 - the European Corrosion Congress
2022, Aug 2022, Berlin, Germany. cea-03766416

HAL Id: cea-03766416

<https://cea.hal.science/cea-03766416v1>

Submitted on 1 Sep 2022

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

In-situ conservation of historical metallic shipwrecks: complementary approach from on-site global measurements to multiscale characterization

Florence Mercier-Bion, Justine Vernet, Jean-Paul Gallien, Philippe Dillmann, Eddy Foy, Laboratoire Archéomatériaux et Préviation de l'Altération (LAPA)/NIMBE-UMR 3685 CEA-CNRS, CEA Saclay, Gif-sur-Yvette (FR) ; **Jean-Bernard Memet, Marine Bayle, Clémentine Caubisens**, A-CORROS Expertise, Arles (FR) ; **Laurent Urios**, Université de Pau et des Pays de l'Adour, CNRS, IPREM, Pau (FR) ; **Nathalie Huet, Lila Reboul**, Département des Recherches Archéologiques Subaquatiques et Sous-Marines (DRASSM), Marseille (FR)

Thousands of historic metallic wrecks are lying underwater along the European coasts, as testimonies of the industrial revolution and especially the two World Wars conflicts. Until now, few attention has been given by academics to those vessels leading to severe looting and degradation. Beyond the loss of our modern cultural heritage, the collapse of these structures also provokes the release of polluting compounds, e.g. oil, toxic compounds from chemical weapons, with drastic consequences for the marine environment. The **Save Our Shipwrecks** project (SOS) proposes to implement cathodic protection treatments on two shipwrecks lying off the French Mediterranean (Marseille) and Channel coasts (Dieppe), respectively. Cathodic protection (CP) is widely practiced for uncorroded metals but its application on bio-colonized and corroded structures constitutes a real scientific and technical challenge.

This work presents the innovative methodology and the first results obtained **1)** to understand the corrosion mechanisms, including microbiologically induced and anaerobic corrosion, and **2)** to assess the effectiveness of CP on shipwrecks, by combining:

- on-site measurements of electrochemical corrosion potential and metal residual thickness with the prototype Triton©;
- biodiversity analysis on historic samples and surrounding environment;
- multiscale characterization of corrosion layers and concretions carried out in anoxic conditions
- electrochemical tests on samples surface and on each corrosion layer