Title:
Microbial Community Responses to a Wartime Wreck: the John Mahn case Study

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Almost 300 shipwreck sites can be found in the Belgian part of the North Sea. These are mainly ships that were sunk during the First and Second World War. Historic shipwrecks form an anthropogenic landmark in marine environment, yet their influence on the local geochemistry and microbiology remains largely unexplored. As solid heterogeneous substrates, shipwrecks are rapidly colonized by microorganisms, which allows other organisms to attach and form an assemblage with dynamic community interactions. These assemblages influence the shipwrecks' structural integrity and subject it to years-long (bio-)corrosion, which can ultimately cause leakage of fuels, heavy metals and explosives. In this study, sediment and steel hull samples were taken around the V-1302 *John Mahn,* at increasing distance from the wreck in different directions. Polycyclic aromatic hydrocarbons, explosives and heavy metal levels were determined and related to the microbial composition, which showed that low (µg/kg) levels of among others benz(a)anthracene and fluoranthene remain, probably originating from the coal bunker. This indicates the wreck is to this day influencing the surrounding sediments. Biodegrading taxa like *Rhodobacteraceae*, *Flavobacteriaceae* and *Chromatiaceae* are more abundant in samples with higher aromatic pollutant content. Sulphate reducing bacteria (such as *Desulfobulbia*) are taking part in the corrosion of the steel hull. Correlations between the pollutant concentrations and the differential relative abundance of specific OTU's indicated the microbial genera and families that might play a role in the biodegradation of the leaking pollutants. By understanding better how, even after 70 years, World War shipwrecks can still significantly influence the surrounding sediment, better management strategies could be developed to preserve these artificial reefs and remediate the areas surrounding them.