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Today, the North Sea is the final resting place for hundreds of shipwrecks from the two world wars. Many of these ships were still partially or fully loaded with munitions at the time of their sinking. The increasing corrosion of munition shells in the saline environment leads to an increased leakage of chemical substances into the marine ecosystem posing risks to marine organisms. A large amount of the chemicals preserved in the munitions are toxic and classified as CMR substances (carcinogenic, mutagenic, toxic for reproduction). Particularly, the 2,4,6 - trinitrotoluene (TNT) is of great concern here, since it has been the most commonly used explosive during the world wars. The accumulation in the tissue of various organisms has been proven in previous studies, but the knowledge about the biological effects of TNT on marine organisms is still limited.

To investigate the biological effects of World War munition on marine organisms, field studies were conducted on three selected wrecks (SMS Ariadne, SMS Mainz, UC30) from the First World War in the southern North Sea, as well as from a suitable reference area. Therefore, non-migratory dabs (*Limanda limanda*) were caught as close as possible to the wreck sites and investigated using a multi-biomarker approach. The dabs were first examined for obvious alterations in the liver before being dissected for subsequent assessment of relevant tissues.

The results show that dabs fished near the wrecks react negatively to the elevated TNT concentration in the water. The percentage of dabs with liver alteration is significantly increased in the fish caught at the wreck sites compared to the dabs from the reference area. Similarly, those results can also be mirrored at the cellular level. Elevated TNT concentrations in the water lead to the accumulation of metabolic end products in the liver tissue and alter the activity of enzymes involved in the anti-ox-defense system.

These results correlate with the TNT concentrations detected in the water and therefore suggest a negative impact of the explosive compounds still left on war wrecks on marine organisms.

4.07.P-Tu391 Bacterial Clues of Shipwreck TNT Pollution in the North Sea

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Almost 300 shipwrecks are found in the Belgian part of the North Sea. At the time of sinking, many were armed and fully or partially loaded with ammunition. One of the most important substances in this context is 2,4,6-trinitrotoluene (TNT). Commonly used as an explosive for military applications, TNT is equally known for its toxicity as well as its potentially mutagenic and carcinogenic properties. Corrosion ultimately results in the leakage of dissolved explosives from lost munitions in shipwrecks, causing the surrounding sediments to be contaminated by TNT and related organic compounds. Marine biota like fish and shellfish bioaccumulate these compounds, thereby creating a risk to human seafood consumers. By analysing changes in the marine microbial community in the presence of TNT and its metabolites, we aim to identify bacterial taxa that can serve as indicators for pollution of dissolved explosives from shipwrecks.

This study investigates the link between dissolved explosives and the microbial fingerprint in sediments next to a WWII destroyer. This wreck still has semi armour-piercing shells on board, which are leaking low levels of TNT into the surrounding sediments. Samples were taken by divers at 10-meter increments away from the wreck and were analysed for their concentrations of dissolved explosives using gas chromatography combined with mass spectrometry (GC-MS). Next, 16S rRNA gene long-read nanopore sequencing will be explored as a rapid, cheap tool to map the microbial composition of sediment samples. Previous studies show a sensitive shift in microbial fingerprints in the presence of aromatic pollutants. Here, we expect to find changes in the microbial community, potentially towards TNT-degrading taxa, in samples with higher concentrations of dissolved explosives.

4.07.P-Tu392 Spatial Distribution of WWII Legacy Munition Compounds in the Baltic Sea.

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After about eight decades in the sea, WWII legacy dumped munitions are at different stages of corrosion and continue to leak chemicals into the water column and sediment. Rise in demand for renewable energy, conservation of biodiversity and reduced risk of human exposure to munition compounds (MCs), to mention but a few, necessitate assessment of the current status of dumpsites, exploration of cleanup options and prioritization of sites for cleanup. To this end, mapping of the MC pollution in the Baltic Sea, particularly in the German Waters, is ongoing. Water and sediment samples are collected and analysed for MCs using an Ultra High-Performance Liquid Chromatograph coupled to a High-Resolution Mass Spectrometer. Water samples collected in October 2022 show the major hotspots of current TNT release to be in the Kolberger Heide – Falshöft sections (reaching 10 ng L^{-1}) whereas the Lübeck Bay is a major hot spot for DNB and RDX emissions (reaching 75 ng L^{-1} at a site off Haffkrug and 37 ng L^{-1} at a site off Neustadt, respectively). Transformation products of TNT, 2-ADNT and 4-ADNT were detected in all water samples, the highest concentrations being observed at Kolberger Heide (1.4 and 3.4 ng L^{-1},