

## **Global Carbon Cycling and Complex Molecular Patterns in Aquatic Systems: Integrated Analyses Powered by Semantic Data Management**

Initiative: zukunft.niedersachsen (nur ausgewählte Ausschreibungen)

Ausschreibung: Digitalisierung in den Naturwissenschaften

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Laufzeit:

Dissolved organic matter (DOM) in the ocean is one of the largest carbon reservoirs on Earth, storing about 700 billion tons of carbon. Due to its size, this reservoir plays an essential role in the global carbon cycle and, hence, for our climate. In contrast to the other large organic carbon reservoirs on Earth's surface (soils, permafrost and vegetation), it is unknown what controls the size of the DOM pool and how dynamic it is. Even small changes could have a significant impact on the global climate. The overall goal of this research is to identify the mechanisms controlling the turnover of DOM and to assess the vulnerability of this carbon reservoir. Over the past decade, a wealth of highly diverse molecular data regarding DOM and marine microbes, that consume and produce DOM, have been collected. To gain deeper insights into the global carbon cycle it is necessary to combine these very complex, heterogeneous data in the oceanographic context. The data must be cross-linked by extensively using digital tools like semantic data management and machine learning techniques. The goal is to develop the digital infrastructure to provide analysis tools to integrate geochemical, microbial and environmental data for improving our understanding of biogeochemical cycles on the global scale. This effort will help to predict changes of chemical and ecological turnover rates induced by increasing global CO<sub>2</sub> levels.

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