

# OceanTEA: A Platform for Sharing Oceanographic Data and Analyses

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Ocean observation systems, such as the global array of more than 3000 free-drifting Argo floats belonging to the Global Ocean Observing System [1] or the modular ocean laboratory MoLab [2, 3], produce an increasing amount of time series data. Both, statistical data mining techniques and manual exploration via visualization are necessary for oceanographers to extract scientific knowledge from such vast datasets. Therefore, scientists require a platform to explore and analyze data visually, supporting their collaboration and research. To deliver results and foster the impact of publications, such platform should facilitate automatic and interactive access to research results for scientists, their peers and the public.

Our software platform OceanTEA (*Oceanographic Time Series Exploration and Analysis*) supports oceanographers in their research and publication efforts (Figure 1). The platform leverages modern web technology to support scientists in interactively exploring and analyzing high-dimensional datasets. By relying on a microservice architecture [4, 5], OceanTEA can be deployed on desktop computers as well as cloud computing infrastructure with built-in scalability. Therefore, OceanTEA can be used to make data and analyses available on the web. This helps scientists to collaborate on exploring datasets (e.g., with limited access within an institute) as well as for providing interactive visualizations along with journal or conference publications. For example, OceanTEA is currently employed in studying the impact of ongoing climate change on cold-water coral reef ecosystems [6], demonstrating its applicability to the domain.

We ensure the sustainability of OceanTEA by releasing its source code (Apache 2.0 license [7]) and providing an online live demo which are both available on GitHub.<sup>1</sup> In the future, we will apply OceanTEA to scientific projects within the cluster of excellence *Future Ocean* funded by the German Research Foundation. By supporting research in the cluster, we secure resources for the maintenance and evolution of OceanTEA. Our

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<sup>1</sup><https://github.com/a-johanson/oceantea>

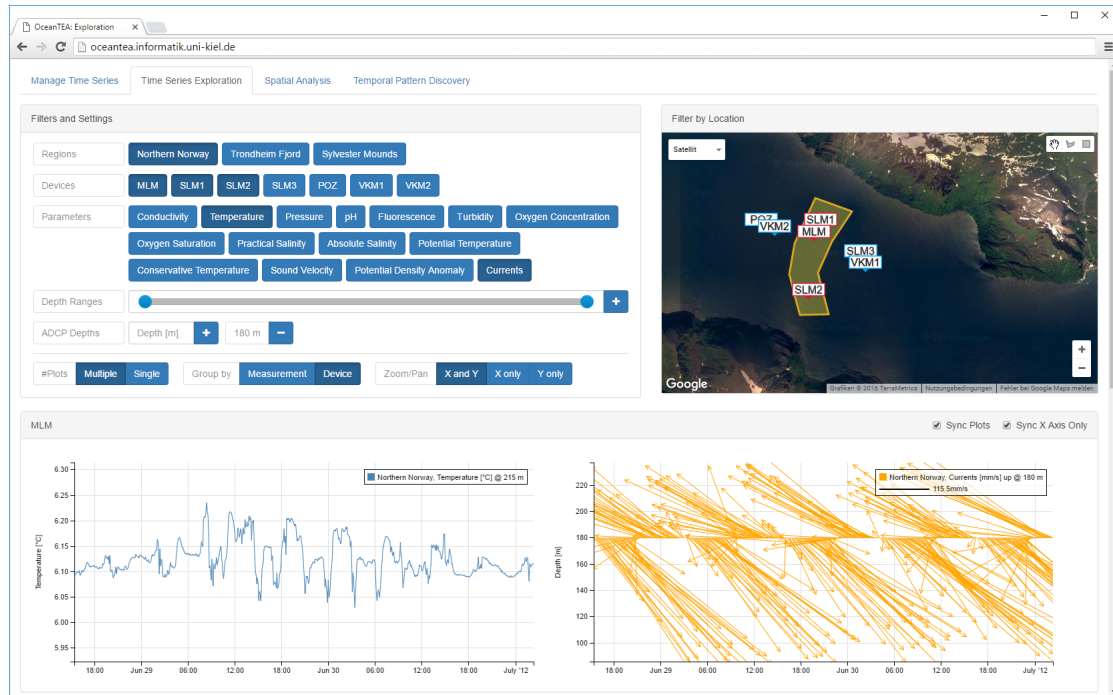


Figure 1: The data exploration view of OceanTEA.

tool facilitates open science by providing access to data, by supporting scientists in their publication efforts, and by providing source code and documentation of our platform.

OceanTEA already implements the management of time series data, their interactive exploration, and a spatial analysis component (a screenshot of the exploration view of OceanTEA is displayed in Figure 1). A module which offers temporal pattern discovery in multiple time series is currently being developed. Furthermore, we plan to extend OceanTEA to become a platform to support the creation of executable papers [8] for scientific publications based on ocean system simulations. As a first step, we implemented an interactive illustration of modeling results with OceanTEA to accompany our publication on cold-water coral reef systems mentioned above [9]. In this way, OceanTEA can be used to create dynamic visualizations of figures in papers to add value to publications reporting on data-driven research right from the beginning of the peer review process. Thereby, we incentivize authors to make their data publicly available.

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