Beitrag ID: **17** Typ: **Talk**

Can data-driven ocean models build the core of a what-if digital twin of the ocean?

Mittwoch, 18. Juni 2025 13:51 (12 Minuten)

In the past years, data driven machine learning models have revolutionized numerical weather prediction, outperforming traditional numerical models for the atmosphere both in efficiency and precision. Trained on reanalysis data, these models enable the generation of much larger simulation ensembles and, due to their differentiable architecture, offer new and efficient ways to directly integrate observational data. While data driven models are well established in atmospheric sciences, their application for the ocean remain in its early stages. In this contribution, I will present ongoing research in the Ocean Dynamics research unit to develop data-driven models for the ocean and sea-ice. I will highlight how these models could form the basis of a digital twin to merge model outputs and observational data and enables interactive, exploratory „what-if" simulations.

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