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ExaOcean: Improving Performance of the ICON-O Oceanmodel on heterogeneous Exascale-Supercomputers with Machine Learning

Ocean models are a key component of every weather or climate model. Despite the computing power of modern supercomputers, however, important dynamical features can so only be resolved in simulations over a few weeks.

ExaOcean will deliver modern mathematical algorithms to achieve better parallel scaling and faster runtimes in highly resolved simulations on new supercomputers. We will integrate techniques from machine learning into mesh based algorithms, using data from highly resolved short term simulations to train a correction term for long term simulations we lower mesh resolution. This will enable “effectively sub-mesoscale resolving simulations”, where the effect of the sub-mesoscale vortices on the larger scale dynamics is represented via the ML correction term.

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Keywords

ocean modeling
super-resolution
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machine learning
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