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Implicit time stepping and the Ocean General Circulation

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The global ocean circulation is a prototypical multi-scale phenomenon: the large scale circulation is controlled by mesoscale turbulence on the order of tens of kilometers. Resolving these scales is prohibitive for performing realistic simulations on time scales that are climatologically relevant (centuries, millennia).

Recent advances in iterative methods show promise to revolutionize ocean modeling. However, whether or not implicit techniques will be able to compete with conventional (semi-)explicit methods strongly depends on the efficiency of preconditioners.

Here we will report on plans to apply implicit time stepping techniques to the Parallel Ocean Program (POP), the state-of-the-art ocean model of Los Alamos National Laboratory.