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Finite element analysis of open ocean deep convection; model validation and analysis.

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Deep convection is a highly localised event in both time and space, but has far reaching effects on large-scale circulation and global climate. An unstructured adaptive model has the potential to capture the small scale structures and the large-scale processes simultaneously. We will present initial results from the testing and validation of the finite element model described by Ford et al (2004). These data will be compared against simulations performed by Jones and Marshall (1993), as well as a reference fixed mesh simuation, in order to provide a quantitative measure of the model's performance.

At a larger scale however (such as that of a general circulation model) vertical mixing may need to be parameterised. In order to develop a parameterisation that can be applied to a fully unstructured model, we require a better understanding of how convection is represented by a mesh-adaptive finite element ocean model. To this end, we perform time series analyses of vertical heat fluxes, vorticity and eddy kinetic energy. These data also give an insight into the effects of model resolution on the physical properties of the system.