



A comprehensive suite for evaluation of single column turbulent closures

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An open source implementation of a benchmark suite for evaluation of vertical turbulent diffusion parametrizations utilized in large-scale atmospheric and ocean models is presented. The suite includes a collection of $k - \varepsilon$, k , and zero order closures and a set of DNS (Direct Numerical Simulation), LES (Large-Eddy Simulation), and laboratory experiments data as well as previously introduced benchmarks such as GABLS1 and GABLS2. The suite is designed to make it easy to include additional experiments and implement other closures within a uniform numerical formulation. An evaluation of implemented closures based on these experiments is presented. It's shown that within uniform numerical formulation closures significantly differ only in experiments with non-stationary turbulent regimes. The role of stability functions and steady-state solutions on closure performance is also discussed.