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On the use of idealised test cases for ocean model development

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When comparing realistic simulations produced by two ocean general circulation models, differences may emerge from alternative choices in boundary conditions and forcings, which alters our capacity to identify the actual differences between the two models (in the equations solved, the discretization schemes employed and/or the parameterizations introduced). The use of idealised test cases (idealized configurations with analytical boundary conditions and forcings, resolving a given set of equations) has proven efficient to reveal numerical bugs, determine advantages and pitfalls of certain numerical choices, and highlight remaining challenges. I propose to review historical progress enabled by the use of idealised test cases, and promote their utilization when assessing ocean dynamics as represented by an ocean model. For the latter, I would illustrate my talk using illustrations from my own research activities using NEMO in various contexts. I also see idealised test cases as a promising training tool for inexperienced ocean modellers, and an efficient solution to enlarge collaboration with experts in adjacent disciplines, such as mathematics, fluid dynamics and computer sciences.