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An evaluation of the mixed precision version of NEMO 4.0.1

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One of the requirements to keep improving the science produced using NEMO is to enhance its computational performance. The interest in improving its capability to efficiently use the computational infrastructure is two-fold: on one side there are experiments that would only be possible if a certain threshold of throughput is achieved, on the other side any development that achieves an increase in efficiency would help saving resources while reducing the environmental impact of our experiments. One of the opportunities that raised interest in the last few years is the optimization of the numerical precision. Historical reasons brought many computational models to over-engineer the numerical precision: solving this miss-adjustment can payback in terms of efficiency and throughput. In this direction, a research was carried out in order to safely reduce the numerical precision in NEMO which led to a mixed-precision version of the model. The implementation has been developed following the approach proposed by Tintó et al. 2019, in which the variables that require double precision are identified automatically and the remaining ones are switched to use single-precision. The implementation will be released in 2020 and this work presents its evaluation in terms of both performance and scientific results.

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