



Performance portability on GPU and CPU with the ICON global climate model

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In order to prepare for new supercomputer architectures, the global climate model ICON is being ported to GPU. Most of the porting is achieved using OpenACC compiler directives. For time critical components such as physical parametrizations, code restructuring and optimizations are necessary to obtain optimal performance. In some cases these GPU-optimizations may have negative impact when running the same code on a CPU architecture. In order to address such performance portability issues, a single column domain specific language, the CLAW-DSL is proposed. This DSL is based on the CLAW source to source translation tool and is designed to address the physical parametrizations of atmospheric models for which horizontal columns are independent. With this approach, the physical parametrization is written in Fortran only considering the vertical dependencies. The CLAW tool adds the horizontal dimensions as necessary and generates optimized code for different target architectures. We show in this work the performance of key physical parametrizations of the ICON model on CPU and GPU and present the CLAW-DSL and CLAW tools for Fortran source code.