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Can we afford three-dimensional radiative transfer in NWP and LES models?

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Next generation NWP models shift from statistical cloud parametrizations to physics based convection, by increasing the spatial resolution to considerably less than 1km. The calculation of atmospheric heating rates still relies heavily on one dimensional schemes (independent column approximation, ICA), although recent studies showed that three dimensional radiative heating rates may have considerable impact on clouds and precipitation.
Simple approximations such as the ICA are needed because of the extraordinary computational burden of known 3D radiative transfer operators (Monte Carlo based or SHDOM) which makes the assessment of 3D RT-effects on cloud dynamics cumbersome. Thus, to date NWP/LES simulations which include 3D RT effects are only performed for limited time periods and domain sizes. In order to study the full extent of 3D RT effects a fresh approach is needed:
We present a new RT-scheme which compares well in computational speed to currently employed 1D-schemes whilst incorporating principal 3D-effects. Special emphasis in the development of such a RT-scheme has to be laid on the calculation of atmospheric heating rates. Furthermore the scalability on massively parallel computers is mandatory.