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“Can Spectral Deferred Correction methods improve Numerical Weather Prediction?”

Atmospheric motion covers a broad range of time- and spatial scales. Low and high pressure systems can influence us for days or even weeks and they extend up to hundreds of kilometers. In contrast, sound waves pass by in seconds with wavelengths of centimeters to meters. Implicit-explicit (IMEX) time stepping methods can help to avoid drastic limitations on the time step induced by the variety of scales without requiring computationally expensive fully nonlinear implicit solves. I will introduce Spectral Deferred Correction (SDC) methods as a strong competitor to currently used schemes. They allow an easy construction of high order schemes in contrast to e.g IMEX Runge-Kutta methods which require a growing number of coupling conditions with increasing order.