Development of Local Meteorological Model based on LES Model

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ABSTRACT: We have been developed local meteorological model based on LES (Large Eddy Simulation) model. One of the methods of describing topography is by using standard terrain following coordinate system (z* or sigma). However, the terrain following coordinate system poses a problem that the truncation error increases with a slope angle of more than 45º. In this study, we developed a LES model with generalized curvilinear coordinate system to overcome this problem. Several model verification tests are performed in order to evaluate the accuracy of the dynamics, physics, coordinate transformation, and the effects of stratification. From these results it can be concluded that at present, our model is correctly developed, at least with regarding the dynamics, physics, boundary conditions, and coordinate transformation. For further verification, numerical tests over steep slope mountains were performed. It is shown that models using the z* coordinates simulates results with computational error over steep slope mountains, but remarkable numerical error was not found with the generalized curvilinear coordinate system even when the slope angle is 59.0º. Finally, parallel computation tests are performed on the super computer, T2K-Tsukuba. As a result, the parallelization efficiency is confirmed to be about 0.8 when 128 and 0.5 when 1024 processors are used.