



## **Basic Development of Urban Meteorological Model Based on Large-Eddy Simulation for Investigation on Convection Genesis**

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Localized torrential rainfall disasters in rainy season is called as “Guerrilla-heavy-rainfall disasters” in Japanese media. This kind of rainfall disaster is caused by single or multi isolated cumulonimbus clouds that grow rapidly within one hour since its generation. Nakakita et al. (2014) found that it is important to detect the clouds at its “baby-cell” stage earlier using X-band weather radar, and to predict the risk of disaster by vertical vorticity in a cumulonimbus cloud at its developing stage. However, the radar cannot detect the “convection genesis”, i.e. air motion of thermal without precipitation particles. This trigger of generating baby-cell is concerned to be much affected by urban area. So the purpose of this study is to develop an urban meteorological model based on large-eddy simulation (LES) intended to clarify the convection genesis.

It is experimentally verified by numerical experiment using a mesoscale meteorological model with land use scheme that an urban area has some influence on precipitation changes, in some previous studies. But we think that it needs to reduce parameterization about urban canopy. On the other side, CFD model based on large-eddy simulation, that analyzes the dynamics and physics in urban canopy layer, is able to compute a complex turbulence structure affected by buildings. However it is basically made for analysis in boundary layer. Therefore, in order to analyze the convection genesis, we developed basic compartment of an urban meteorological model based on large-eddy simulation and quasi-compressible system that calculate equations of momentum, pressure, potential temperature and water vapor. This model can calculate through urban canopy layer to above boundary layer on a scale possible to resolve buildings explicitly, and clarify process of formation rain drop by cloud microphysical model. Some numerical experiments about relation between vortex generation and development of baby-cell of rainfall under some urban conditions are performed.