

## Observation system simulation experiments of the meso-scale convergence that causes the local heavy rainfall

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One of aims of the project 'Social system reformation program for adaption to climate change' is to observe thunderstorms that caused local heavy rainfalls in the urban area and to clarify mechanisms of their generation, development and decay by using observation data and outputs of the numerical models. In the Nerima local heavy rainfall, which is one of typical local heavy rainfalls, convection cells were generated by the convergence that was caused by the thermodynamic low system. It is expected that thunderstorms can be reproduced when the large-scale convergence is reproduced by the assimilation.

In this study, the observation system simulation experiments on the data of airplane or Doppler Lidar and temperature profiler that deployed in the urban area, which have the information of horizontal convergence of low-level airflows, was conducted. Truth data was reproduced with the LETKF nest system by the assimilations of GPS precipitable water vapor data and of horizontal wind of Doppler radars. The following three simulant observation data which surrounded the thunderstorm were produced from the truth data of 15 JST, 2 hour before the development of the thunderstorm. First one is the airplane data, which is water vapor, temperature and horizontal wind at the height of 400 m surrounding the Osaka Plain with the horizontal interval of 37.5 km. Second one is the Doppler Lidar data which is the horizontal winds below the height of 200 m at the same points of the airplane data. And the last one is the temperature profiler, of which data is the temperature profiles below the height of 600 m. The impact of these simulant data was investigated by their assimilation into the initial condition of 15 JST which were obtained by assimilation of conventional data only. In this study, the thunderstorm was developed where it was reproduced in the truth data, when the airplane data or the Doppler Lidar and temperature profiler data were assimilated. These results show that observation data surrounding the thunderstorm can improve its rainfall forecast even if the direct observation data of the thunderstorm cannot be used.

Keywords: local heavy rainfall, observation system simulation experiment