Seino, N., R. Oda, H. Sugawara, and T. Aoyagi, 2018: Observations and simulations of the mesoscale environment in TOMACS urban heavy rain events. *J. Meteor. Soc. Japan*, **96A**, 221-245. https://doi.org/10.2151/jmsj.2018-029

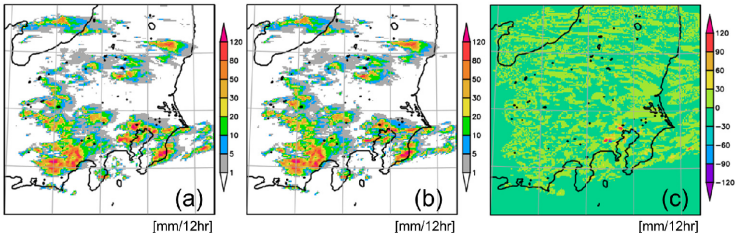

Figure 1. Simulated precipitation amount in the afternoon (12–24 JST) of August 26, 2011, in (a) the CRNT experiment, (b) the LURB experiment, and (c) the difference between the experiments (CRNT–LURB).

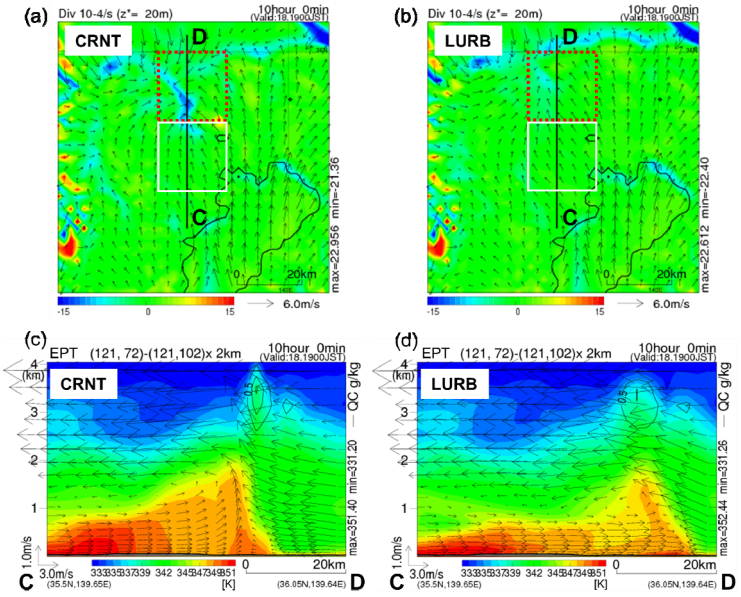

Figure 2. Simulated horizontal divergence field in the CRNT and LURB experiments at 19 JST on July 18, 2013. The white rectangle indicates the central urban area. The vertical cross sections along lines C–D show equivalent potential temperature (colors), wind vectors, and cloud water contents (contours) at 0.5 g kg^{-1} intervals.

- We investigated the formation and development processes of an extremely developed thunderstorm (Case 1 on August 26, 2011) and a moderately developed thunderstorm (Case 2 on July 18, 2013). Radiosonde sounding data showed that, compared to Case 2, the mesoscale environment of the severe storm in Case 1 featured a lower level of free convection and a deeper layer of easterly flow.
- Numerical simulation results fairly represented the spatial distribution and amounts of the rainfall in both cases. In Case 1, the formation of a distinct convergence zone between easterly and southerly flows was the likely trigger of active convective systems around Tokyo.
- To further examine the urban impact on precipitation, we performed two comparative simulations: one using realistic current urban surface conditions (CRNT experiment) and the other using less-urbanized surface conditions (LURB experiment). The CRNT experiment yielded more rainfall than the LURB experiment in the central urban area (Fig. 1). It appears that the higher temperatures caused by urbanization can lead to increased rainfall in Tokyo, not by the change in the static stability, but by intensifying convergence, ascending motion, and the upward transport of the low-level moisture (Fig.2).