

## Toward assimilation of dense and frequent 3-D lightning location data on a severe local rainfall forecast

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In recent years, a dense and frequent lightning observation system named “BOLT” was developed (e.g. Yoshida et al. 2014), observing every  $10^{-6}$  seconds 3-dimensional lightning locations at 100-m resolution. The original data has a 70-km range in the horizontal and a 20-km range in the vertical. To assimilate the lightning location data with a regional numerical weather prediction model “SCALE” (Nishizawa et al. 2015), an observation operator to convert the model variables to lightning data is needed. In general, lightning is triggered by large electric charge originated from graupel collisions with strong updraft. Therefore, we investigated a relationship between the lightning observation data and the model graupel data. First, we performed a 30-second-update, 100-m-mesh SCALE-LETKF (Miyoshi et al. 2016, Lien et al. 2017) experiment with every 30-second Phased Array Weather Radar at Osaka University (Ushio et al. 2014), and we created every 30-second model data. For the lightning data, we calculated every 30-second lightning frequency per model grid. We investigated a scatter plot of the lightning frequency and the model graupel mixing ratio.

Using all lightning and graupel data, we could not find a clear relationship. However, by applying a criterion on lightning generation (Takahashi 1978), we found a high correlation between the lightning frequency and the graupel mixing ratio. Based on the result, we will develop an observation operator and try to contribute to a severe local rainfall forecast.

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