



## **Prediction of Downbursts Using Machine Learning of Total Lightning and Ground Precipitation Data in Japan**

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In recent years, lightning discharges are expected to be applied to the prediction of extreme weather events. In this study, using total lightning data from the Japan Total Lightning Network (JTLN) and precipitation data from X-band MP radar, machine learning with a Random Forest model was used to successfully classify the occurrence of downbursts in Japan during the duration of thunderclouds. The importance of variables was derived, and it was shown that lightning jump is one of the most important variables for predicting downbursts. This implies that the updrafts inside the clouds are closely related to the occurrence of a significant increase in lightning, followed by a downburst. The prediction accuracy was highest for models that included both lightning and precipitation, followed by lightning-only and precipitation-only models, confirming the importance of data fusion for improving prediction accuracy.