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Surface Pressure Distributions of Downburst and Tornado captured by High Dense Ground Observation Network "POTEKA"

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Meisei developed low-cost compact weather sensor (POTEKA Sta., hereinafter referred to as the POTEKA), which can measure temperature, relative humidity, pressure, sunlight, and rain detection per one minute and achieve higher density weather observation system economically. We installed economical and high dense ground observation network (total 55 stations, 1.5~4 km-mesh) in Gunma, Japan. This paper presents observation of wind gust phenomena around Takasaki city and Maebashi city on 11 August 2013 and tornado in Midori city on 16 September 2013.

Pressure jumps of 1-2 hPa were recorded at POTEKA with one minute resolution, indicating that the temporal high pressure was caused by downburst downflow. Beside, two pressure jump can be found at some stations. The first and second jumps are coincided with gust fronts and down flow of downburst, respectively (Discrimination between downburst and gust-front by the surface dense observation network POTEKA).

In the September 16, tornado occurred in Typhoon passes, and blackout occurred at 2:20(JST). At the point from 1.2km away, surface pressure was decreasing 3hPa in 3 minutes at 1.6km blackout area away (Fig.)

Local weather observation network consisting of POTEKA succeeded in capturing the change of surface pressure caused by gust wind phenomena with unprecedented spatio-temporal resolution, which enables us not only to distinguish between gust fronts and downbursts but also to detect such wind phenomena earlier. The observation network is going to continue in the future to data accumulation.

Keywords: High Dence observation network, Downburst, Tornado