Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

MIS26-P01 Room:Poster Time:April 29 18:15-19:30

Surface Temperature and Pressure Distributions of Downburst 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.

The wind gust occurred from Takasaki thru Maebashi city around 18:00 JST and caused damages to private houses. Temperature changes obtained from POTEKA network show that surface temperature dropped by up to 13.9 deg. C in 12 minutes.

The following figure exhibits the change of sea surface pressure calculated from POTEKA around the gust pathway reported by JMA (Maebashi). Although pressure at Maebashi station increased gradually with 10 minutes resolution, 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).

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.

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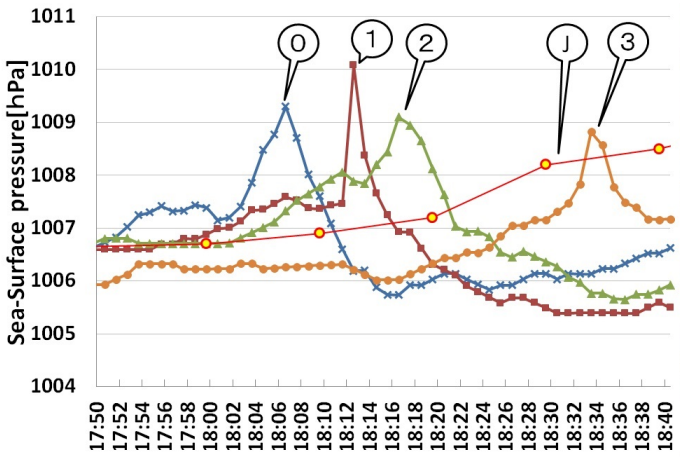
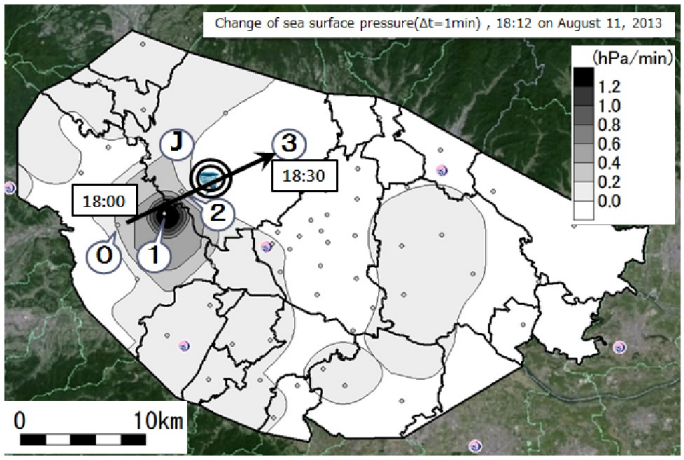
Keywords: high dense ground observation network, Downburst, Gust fronts





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Preliminary Reports of Summer Sprite Observation Campaign at Summit of Mt. Fuji, Japan

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Many investigations of transient luminous events (TLEs) such as sprites and elves have been carried out since the 1990s. However, there are still unsolved issues like the morphologies of sprites. One of approach to investigate this issue is statistical study with collecting many events. In this study, we report a preliminary result of a mountain observation which enables us to observe the TLEs for a long term at the fixed point. The mountain observation was conducted at the summit of Mt. Fuji (3776 meter altitude), Japan, which enables us to detect the TLEs above off the coast of Boso peninsula, Chiba, Japan and the coast of Japan Sea which a large number of summer TLEs and the winter TLEs due to energetic positive cloud-to-lighting occurs. In particular, the altitude of the summit is located over the summer cloud covering the wide regions, so that the distant TLEs can be observed and low pressure and clean air yield better color images of TLEs. Moreover, the lower cost operation is possible, comparing with than the aerial and balloon measurement.

In the summer of 2013, we detected several events of TLEs with sensitive black-and-while CCD cameras at the fixed point for one month and with the color single-lens reflex camera. We will show the detailed analysis in the presentation. Such a mountain observation gives us a high chance to detect low-altitude blue-jets and starters and a 360-degree view from the isolated mountain, Mt. Fuji, also gives us a high change to detect a number of TLEs. In this presentation, we show the results of sprite images taken at the summit of Mt. Fuji on Aug. 2, 2014.

Keywords: Sprite, Lightning, TLEs

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Development of polarimetric 2-D phased array weather radar using minimum mean square error method

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We have been developing a polarimetric 2-D phased array weather radar which detects small scale phenomena such as tornadoes and downbursts. In this paper, we compare Beam Former method (BF), which is a conventional method in Digital Beam Forming signal processing of array antenna, with Minimum Mean Square Error method (MMSE), which is our proposed method, and discuss simulation results estimated by each method. In BF, antenna pattern is uniform and unique in the radar system, and its sidelobe level is high. As a result, if there are obstacles, for example high building, or very heavy rain area, the observation results of array antenna is imprecision in the region near them. In contrast, we can turn the null-point to interference wave direction at the same time we turn the mainlobe to the desired signal direction in MMSE.

Keywords: phased array radar, MMSE