

Characteristics of Hailstorms on a Synoptic and Meso Scale in July 1979-2008, in Gunma Prefecture, the Eastern Japan.

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1. Introduction

Hailstorm is one of serious damage in agricultural products and structures in Japan. In Gunma prefecture, hailstorm is the most frequent disaster observed in Japan. In July 2008, two hailstorms observed in Gunma.

In this study analyzed synoptic climate mechanism of 34 hailstorms were in July during the years of 1979-2008 in Gunma.

2. Data

JRA-25 re-analyzed data (temperature, equivalent potential temperature, geo potential height, wind velocity and direction at 850, 500, 300 hPa layer).

JMA-AMeDAS data (temperature, wind velocity and direction).

JMA-weather chart (surface, upper level).

3. Analyze methods

1. Synoptic atmospheric condition at hailstorm analyzed from JRA-25 data, printed for distribution map of temperature, equivalent potential temperature, geo potential height, wind velocity and direction at 850, 500, 300 hPa.

2. Variation near ground surface temperature and wind system in Hailstorm damaged area analyzed on the basis of JMA-AMeDAS data.

4. Result and Discussion

In the Synoptic scale, warm air of the low level is necessary condition for hailstorm, according to all of the 34 events. Cold airflow, cold vortex, troughs, fronts of the high level are main factors of hailstorm combined by more than the two factors. When cold airflow does not exist, fronts are confirmed in the hailstorm factor.

When atmospheric instability from equivalent potential temperature indicates positive, atmospheric condition is unstable, 33/34 events. That is explained to near all case of hailstorm was unstable atmospheric condition. Furthermore, instability is over 10, which are 17 cases. It is confirmed that atmospheric condition of hailstorm observed is very unstable.

On a Meso scale, convergence was recognized over the hailstorm damaged area of wind from Kashima-nada coast, Kujyu-kuri coast, Tokyo bay at the hailstorm occurred time. Increasing temperature were observed 1 hour before hailstorm.

Figure: Distribution map of equivalent potential temperature (the 850-hPa-500-hPa), at the remarkable case.

