

Synoptic and dynamic characteristics of selected hailstorms over the area of Cyprus and their impact on the agricultural economy

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Hail is a hazardous weather element always resulting from thunderstorm activity. The development of a thunderstorm is a consequence of thermal instability; alternatively, thunderstorms occur in the presence of a frontal depression. Thunderstorms do not always produce hail of adequate size to reach the ground. However, in the cases of hail reaching the ground, a variety of problems can be anticipated, spanning over a large range of human activities. Many of these problems are directly connected to the agricultural economy of a region, since hailstorms can straightforwardly destroy crops and plantations. In the present study, the hail events which have resulted in compensations by the Agricultural Insurance Organization of Cyprus during a ten-year period, from 1996 until 2005, are examined. These hail events are grouped into two clusters, the “instability cluster” and the “frontal depression cluster”. For the “instability cluster” several thermodynamic indices were calculated, using the 1200UTC data from Athalassa radiosonde station in Cyprus. For the “frontal depression cluster” the characteristics of the associated synoptic situation were examined and the fields of a lower tropospheric stability index, relative vorticity and divergence of the horizontal wind vector were calculated. The NCEP/NCAR global analyses for 0000UTC, with a grid of 2.5 x 2.5 degrees were used in order to perform the necessary mathematical calculations. The calculations cover the area bounded by the meridians 20 degrees West and 50 degrees East and the parallel circles 20 degrees and 65 degrees North. Frequencies of hail events were also calculated in order to identify geographical areas which are often hit by hail storms, while an attempt was made to relate the impact on the agricultural economy and the type of hailstorm. The above synoptic and dynamic characteristics and the thermodynamic instability indices of the day before, the day of occurrence of the hail event and those of the day after were listed, in order to create a useful forecasting tool for local weather forecasters and for further research.