Plinius Conference Abstracts,
Vol. 11, Plinius11-72, 2009
11th Plinius Conference on Mediterranean Storms

Case study: A severe hailstorm and strong downbursts over northeastern Slovenia on June 16th 2009

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Introduction

A strong isolated storm complex with bow echo feature crossed northeastern Slovenia in the late afternoon hours and caused extensive damage due to severe wind gusts near 30m/s, excessive rainfalls and large hail.

Synoptic situation

On June 16th 2009, an upper-level ridge persists over southern Europe while a positively tilted short-wave trough, connected to a complex deep trough over northern Europe, crosses central Europe. Accompanied by this trough, a cold front is extending southwestwards towards the Alps. A relatively strong jet steak wraps around the trough axis and creates strong shear environment which overlaps with a narrow band of unstable airmass present ahead of the coming frontal boundary. Behind this trough/front over central Europe, a high pressure area is developing with stable conditions. Over Slovenia, strong surface heating was on going through the day but lack of near-surface convergence zones, limited moisture and strong capping inversion surpressed any storm initiation in the afternoon.

Presentation of research

This case study will go through a research of damaging bow echo which caused extensive damage due to severe winds, excessive rainfalls and large hail over much of northeastern Slovenia. Numerous trees were down or uprooted and numerous roofs were blown off or were seriously damaged due to severe wind gusts near or exceeding 30m/s. At first stages, when an isolated severe storm entered Slovenia, it had classic high precipitation supercell features while it transformed into a powerful bow echo later on. Very large hail up to 6cm in diameter was first observed in southeast Austria and near the border with Slovenia, while later on the main threat was very strong wind gusts and intense rainfalls. This research paper will show a detailed analysis of the synoptic situation including analysis of satellite, radar and surface observations. Radar imagery clearly showed isolated storm trailing along the near-surface frontal boundary as a bow echo and also satellite imagery showed signs of extremely severe storm as overshooting tops, “cold ring” and “U-shape” features were observed.

References

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