



## Synoptic and Mesoscale Investigation of Ice Storms in Bulgaria

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This paper presents the results from an investigation of the synoptic and mesoscale structure of severe freezing rain and freezing drizzle events (ice storms) in Bulgaria in the period 1969 – 2002. Gridded data from ERA40 reanalysis has been used, evaluating the local state of the atmosphere with a focus on the specific factors relevant for the events locally. Synoptic maps at different pressure levels (1000, 850, 700 and 500 hPa) for different meteorological parameters (geopotential, air temperature, wind, vertical velocity and relative advection) before and during the events have been produced for the ten most severe cases.

Spatial attention has been paid to the assessment of the vertical thermodynamic profiles above the places with freezing precipitations, that allows to discriminate between the two different mechanisms of their formation – the classical one with melting layer aloft (typical for freezing rains) and the “collision-coalescence” mechanism or warm rain (typical for freezing drizzles). In order to overcome the lack of measured data (there is only one place in Bulgaria with sounding – Sofia, which is located far away from the threatened zones) information about the air temperature at the main pressure levels from ERA40 has been used and the dew point temperature has been recalculated from the relative humidity. The reconstructed vertical temperatures profiles have been produced for each grid point in North Bulgaria, firstly for the investigated ten most severe ice storms and then for all freezing rain and freezing drizzle SYNOP reports. In such a way the following characteristics have been determined for different locations: the type of the mechanism, the depths of the melting and the freezing layers and the air temperatures at their upper and bottom borders.

The results will be tested using other reanalysis datasets and ensemble forecast data in order to develop an early warning system.