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A climatology of freezing precipitation over the Ukraine and Moldova

I. Khomenko

Odessa State Environmental University, Atmosphere Physics, Odessa, Ukraine (innchom@mail.ru)

Freezing precipitation (FP), namely freezing rain (FR) and freezing drizzle (FZ), causes a number of harmful effects to various branches of economic activity. Thus, FP may increase the risk of road traffic accidents, air and rail crashes, lead to closures of airports, roads and hence human and economic losses. Moreover, FP may result in power cut for a long period, and industry, thus business and the public may be paralyzed due to loss of energy, telecommunication breakdowns, inaccessible roads, etc.

In this study conditions for FR and FZ in 10 airports the Ukraine and Moldova are examined on the base of the hourly surface observations and radiosounding for the 2001 to 2008 period.

The occurrence frequency of FP varies in a wide range: from 0.02 to 4.50 % and strongly depends on local circulations and climate conditions. A maximum monthly mean occurrence frequency corresponds to Lugansk located in the Donetsk ridge (4.50% in December). Both types of precipitation – freezing rain (FR) and freezing drizzle (FZ) – are geographically distributed: for southern and central Ukraine a predominant type is the FR, except the Crimean Mountains, and for the northern part of the Ukraine a predominant type is the FZ.

Statistical characteristics are obtained of FP episode durations and its occurrence frequency depending on surface temperature, wind, and cloud base height.

The “classical mechanism” of FP generation (stratification of “warm nose” type in the cloud layer) is rare (on averaged, 10%), but frequency of the “classical mechanism” increases from north to south. On the contrary, stratification of “all cold” type dominates, this type normally generates FZ. That is, FP from cold clouds is typical for Ukraine. Almost all (90 to 100%) soundings under FP reveal the temperature inversion layers within the lower 3 km.