



## **Forecasting freezing rain: tools, experiences and case studies**

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Freezing rain is a relatively complex physical and meteorological phenomenon, and has always presented a major challenge in the operational weather forecasting. It is relatively rare (occurring in average once a year in Croatia), but it is extremely dangerous and with often unexpected and unpredictable impact. Furthermore, in 2014 Croatia, Slovenia and Hungary experienced a catastrophic event of unexpectedly heavy freezing rain, that caused temporal collapse of traffic and energy system, and damages estimated by 300 million Euro. This brought the attention of forecasters in the Croatian Hydrological and Meteorological Service (DHMZ) even more.

This paper presents recent developments and experiences in freezing rain operational forecasting. The major tool used recently is the new 'precipitation type' product provided by ECMWF, and so far with overall very good performance, in terms of occurrence, affected area and intensity. It is accompanied by other diagnostic tool defined in Forecasting department. Several recent cases will be presented in detail, with associated synoptic situation, and experiences and forecast performance will be discussed.

Last significant case, in February/March 2018, was a classical school case of freezing rain, with strong anticyclone and cold air over the continent, and with a Mediterranean cyclone approaching from the south, delivering warm and moist air. The whole event lasted one day, and was almost perfectly forecasted by ECMWF model. Appropriate warnings were issued (red in Metealarm), but surprisingly no excessive damage was reported in the end.

Although forecasts are in general becoming more reliable and accurate, and timely warnings are issued, still a major uncertainty is connected with the expected impact of the event.