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Snowfall induced severe pile-ups in southern Finland on 17 March 2005

I. Juga and M. Hippi
Finnish Meteorological Institute, Meteorological Research, Helsinki, Finland (ilkka.juga@fmi.fi)

Weather has a great impact on road traffic and several studies have shown that accident risk increases especially during wintry weather conditions. Heavy snowfall, rain or sleet on an icy road surface and formation of hoar frost can make the driving conditions hazardous. Poor visibility, caused by snowfall or dense fog can increase the accident risk significantly and severe pile-ups on highways are possible. The risk for accidents increases, when many drivers can't adjust their speed to the worsening driving conditions even though the hazard is visible.

This study presents a severe pile-up case that occurred in southern Finland near Helsinki city on Thursday 17 March 2005. Before this occasion, cold and clear weather prevailed for many days and the driving conditions were mostly fair. On 17 March a low pressure was approaching southern Finland from west. Light snowfall reached the Helsinki metropolitan area early in the morning and it was followed by a band of dense snowfall. During the rush hours, just before 0800 h, pile-ups occurred on four separate highways near Helsinki city almost at the same time (within about ten minutes). In total, almost 300 cars were crashed, 3 persons died and more than 60 persons got injured.

The occurrence of dense snowfall during the rush hours had a great impact on driving conditions. The drivers heading towards Helsinki from north or northeast drove at first in clear, dry conditions, with only local light snowfall. But the sudden worsening of weather (and visibility) was a surprise for many although warnings for poor driving conditions were issued the previous evening on radio and TV. In addition to this, automatic vehicle speed measurements showed that the mean speed that morning was only a few km/h lower than on a normal day.

When studying the weather situation, it appeared that near the surface there was a thin layer of cold air (2 m temperature being -5...-8 degrees) and warmer air above it. In this kind of situation super cooled water can exist in the lower troposphere, and this was also supported by dual-polarization radar observations. This fact might have had a positive impact on the slipperiness of the roads, although freezing drizzle was mainly observed only just after the passage of the dense snowfall and occurrence of the crashes.

Due to low surface temperature, preventative anti-icing with salting could not be carried out early that morning (except for the western part of the area). So the snow got packed on the road surface by traffic, causing slippery conditions. In a case like this, real-time warning methods and changing speed limits could be the main way to prevent massive accidents. Dense observation network consisting of road weather observations (including visibility) and radar data should be utilized in the real-time warnings. Dense snowfall is a substantial risk for traffic on highways and severe pile-ups have occurred lately for example in Czech Republic and Austria (during March 2008).