

ABSTRACT

Winter road slipperiness can be a problem for road transportation in all areas where the road surface temperature may fall below 0°C and much effort is spent to prevent slippery road conditions. Road slipperiness develops during different weather situations and the frequency and characteristics of road slipperiness are dependent on both local and microclimate. The relationship between weather and road slipperiness is complicated since several different variables are involved in the development process. The complexity of the process also affects the distribution of road slipperiness since the variables vary differently with local and microclimatological conditions.

This study has developed and used a road slipperiness classification which defines weather situations when winter road slipperiness can develop. The classification is designed to use data from the Swedish Road Weather Information System as input. This system includes 670 field stations distributed throughout Sweden. Data from stations in the southern part of Sweden was classified and used to describe the spatial and temporal distribution of road climate.

The result showed that several different types of road slipperiness frequently develop during all months, from October until April. Most frequent of the investigated types were snowfall on a frozen road surface, strong formation of hoarfrost and hoarfrost and low visibility. The road slipperiness classification was also used to develop a tool for investigations of accident risk on slippery road conditions. The result showed that there was an increased risk for traffic accident on slippery road conditions, even in areas where winter road maintenance is performed. Largest accident risk occurred at situations with rain or sleet on a frozen road surface. Another result showed that during the part of night, when there is lowered winter road maintenance activity, the accident risk during slippery road conditions increased even more. Two major conclusions are drawn from the thesis: The development and distribution of road slipperiness is complex due to variations in road climate and several different slipperiness types frequently develop in Sweden. The method presented in this thesis can be used to further investigate the relationships between slipperiness and local parameters.

The winter road maintenance alone cannot completely prevent all traffic accidents on slippery road conditions. To improve road safety during situations with slipperiness, the drivers must be informed about the situation. The information would benefit from using an objective and standardised description of the prevailing road conditions as the road slipperiness classification developed in this thesis.

Key words: Winter, Road climatology, Road slipperiness, Traffic accidents, Winter road maintenance, Local climate