

Weather phenomena most harmful to transport in Europe now identified

Precipitation in its various forms causes the most damage

With climate change, the occurrence of extreme weather phenomena in Europe is expected to increase. The EWENT research project headed by VTT Technical Research Centre of Finland is exploring the harmful impact of weather phenomena on transport in the EU. No previous studies have been conducted on this scale.

Weather is a major factor in traffic flow and safety. Sudden and harmful weather phenomena such as storms and flash floods can, in a worst-case scenario, paralyse an entire transport system and cause serious financial and human losses.

With climate change, the occurrence of extreme weather phenomena in Europe is expected to increase. More information on these phenomena and their impacts is needed in order to minimise or prevent damage caused by them. The international research project *Extreme Weather Impacts on European Networks of Transport* (EWENT) headed by VTT is exploring the impacts of extreme weather phenomena on various forms of transport: road traffic, non-vehicular traffic, rail, aviation, and shipping at sea and on inland waterways. The aim is to determine which weather phenomena are the most harmful for transport and what the costs of their impacts might be in the EU. The research is focusing on atmospheric phenomena which are more severe than normal and which may pose a danger to traffic and transportation in particular. This is to say that the research excludes tsunamis and earthquakes, for instance, as they are natural disasters rather than weather phenomena.

The impacts of weather phenomena are being explored in five climatic zones: the Mediterranean climatic zone, the Alpine climatic zone, the maritime and temperate climatic zones in central Europe, and the Scandinavian climatic zone, which also includes Finland. This division is based on data from the European Severe Storms Laboratory. The determination of which weather phenomena are the most harmful is being made on the basis of an extensive dataset, analysing phenomena by the harmfulness of their impacts. The principal outcome of the first phase of the EWENT project is the determination and classification of parameters describing the severity of weather types. The researchers analysed more than 150 scientific and professional studies of weather phenomena and damage caused by them, and more than 200 media reports of extreme weather phenomena.

The findings show that it is precipitation in its various forms that causes the most damage to transport. This is true in all parts of Europe and for all forms of transport. For example, a heavy snowfall complicates road traffic, rail transport and airport operations regardless of where in Europe it occurs. The only differences are in how efficiently this problem can be resolved and how well unexpected weather conditions are prepared for with sufficient availability of maintenance equipment, for instance. Heavy rain causes flash flooding, which disrupts transport connections, inhibits inland waterway traffic and damages earth structures such as road, bridge and rail embankments.

High winds are bad for aviation in particular, but shipping and rail transports are also affected by them. Thunderstorms cause disruption mainly when lightning strikes incapacitate traffic control systems. Rail transports and aviation are particularly susceptible to this, as they require traffic control systems to be fully operational all the time.

VTT and the Finnish Meteorological Institute are currently analysing long-term changes in the probability of extreme weather phenomena, to 2070. These results will be completed in the summer. Also, VTT and the German Aerospace Centre DLR are studying the impacts of the now identified weather phenomena on the annual number of accidents and on time delays in various forms of transport. Both studies are component studies of the EWENT project.

The EWENT project also involves the World Meteorological Organisation (WMO), the Institute of Transport Economics (TØI) in Norway, the European Severe Storms Laboratory in Germany, the inland waterways management and development company 'via donau' in Austria, and Foreca Consulting Oy in Finland. The project began in 2009 and will continue until spring 2012. It is being funded by the European Commission and VTT.

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Link to the results of the first phase: [Extreme weather impacts on transport systems](#) Link to the website of the EWENT project: <http://ewent.vtt.fi/index.htm>