EWENT

Extreme weather impacts on European networks of transport

Seventh framework programme | Transports, call ID FPT7-TPT-2008-RTD-1

The EWENT project addresses the European Union (EU) policies and strategies related to climate change, with a particular focus on extreme weather impacts on the EU transportation system.

EWENT Work Package 2: Probabilities of Adverse Weather Affecting Transport in Europe – Climatology and Scenarios up to the 2050s

The full version of the EWENT D2.1 report is available at: http://hdl.handle.net/10138/28592

The main objective of WP2 is to estimate the probability of extreme weather in changing climate by providing:

- **The first European climatology of extreme weather events relevant to the transport system;**
- **Estimates of changes in the frequency of adverse weather events affecting transport.**

The WP2 deliverable provides the first comprehensive climatology of the adverse and extreme weather events affecting the European transport system by estimating the frequency (or probability) of phenomena for the present climate (1971-2000) and an overview of the projected changes in some of these extremes in the future climate until the 2050s. The analysis of the relevant weather phenomena takes into account the ranking and impact threshold values defined from the viewpoint of different transport modes and infrastructure within EWENT WP1.

The analyzed phenomena are wind, snow, blizzard, heavy precipitation, cold spell and heat wave. In addition, reduced visibility conditions determined by fog and dust events, small-scale phenomena affecting the transport system, such as thunderstorms, lightning, large hail and tornadoes and events damaging infrastructure of the transport system, have been considered.

Frequency and probability analysis of past and present extremes was performed using observational and atmospheric reanalysis data. Future changes in the probability of severe events were assessed based on regional climate model simulations produced in the FP6 ENSEMBLES project (http://www.ensembles-eu.org/).

To facilitate the assessment of impacts and consequences of extreme phenomena on a continental level, the WP2 Deliverable introduces a **regionalization of the European extreme phenomena, defining the climate zones with similarities in extreme phenomena.**

Highlights of climatology of extremes in the present climate:

The European transport system has to cope with a large variety of extreme weather occurring with different probabilities and intensity across Europe. However, based on the probability analyses, regions with similarities can be defined. Characteristic phenomena impacting different European regions are:

- Northern European region: snowfall and cold spells;
- Maritime region: extreme winds, floods;
- Mediterranean region: heat waves;
- Alpine region: snowfall, extreme winds and heavy precipitation;
- Temperate Central and Eastern European regions are characterized by sporadic occurrence of several types of extreme weather rather than any particular weather phenomena.

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For more info please access the EWENT official website: http://ewent.vtt.fi. To see the report "Probabilities of adverse weather affecting transport in Europe" please access the EWENT website: http://virtual.vtt.fi/virtual/ewent/index.htm. Contacts: Dr. Pekka Leviäkangas, VTT - Transport & Logistics Systems, Finland, pekka.leviakangas@vtt.fi; Dr. Heikki Tuomenvirta, FMI, Heikki.Tuomenvirta@fmi.fi; Mr. Dimitar Ivanov, WMO, divanov@wmo.int

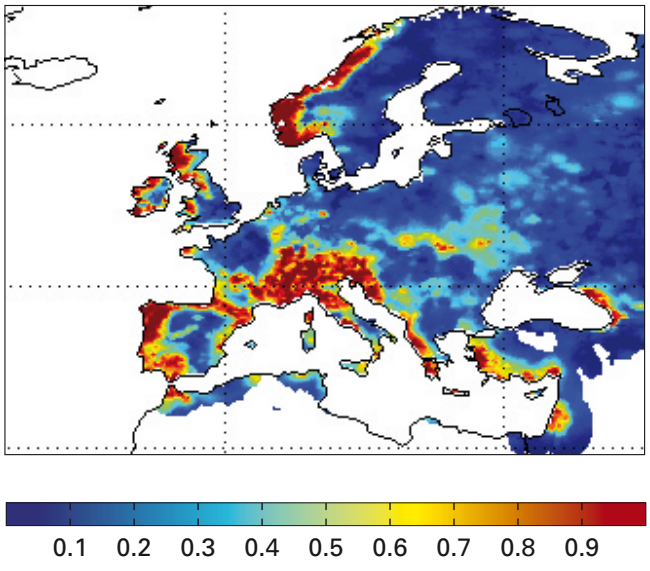
With regard to visibility conditions, long-lasting dense fog conditions have became less frequent at some of the main European airports during the past thirty years or so.

Highlights of changes of extremes in the projected climate of the 2050s:

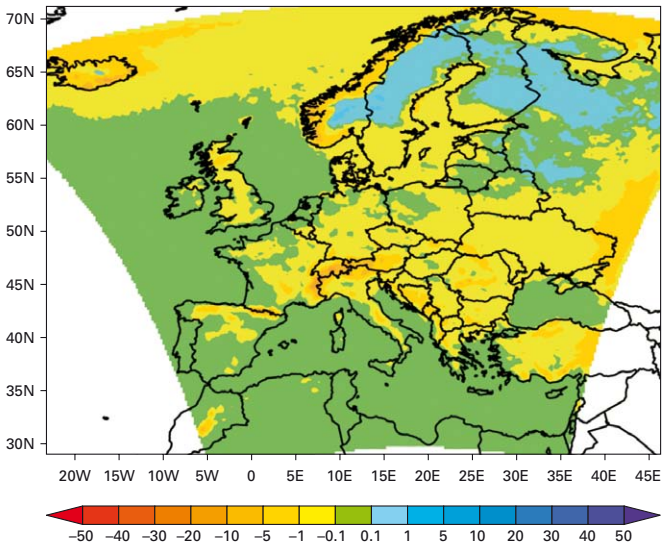
- Extreme heat events (≥32 °C) are likely to intensify, being more accentuated in South Europe, by 30-40 days/year;
- The probability of snow events tends to decrease over most of Europe. However, heavy snowfall cases (≥10 cm/day) are not expected to decrease and may slightly increase over parts of Scandinavia;
- Signals in changes of heavy rainfall and extreme wind intensity are somewhat inconsistent among the models.

WP2 Deliverable provides tables of changes in probability of extreme phenomena by the 2020s and 2050s for selected airports, port, rail and road nodes and transport corridors.

The projected changes as well as large natural variability in weather extremes on the transportation network will have impacts of both signs. The decline of extreme cold and snowfall over most of the continent implies a positive impact on road, rail, inland water and air transportation, e.g., by reducing snow removal. During summer, especially in those countries which already experience high temperatures, further warming implies needs for **improvements in the heat tolerance of the transport system**. Similarly, increases in heavy precipitation (including heavy snowfall in the North) events and/or wind extremes need to be taken into account in the planning of future transport systems.



Probability of the annual-maximum five-day precipitation total exceeding 100 mm in the present climate based on E-OBS data



Multi-model mean of changes in annual snowfall days exceeding 10 cm/day from the time period 1971-2000 to the period 2041-2070 based on six RCM simulations