

# Bracing for summer thunderstorms

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Railways and public transport systems are particularly vulnerable to thunderstorms. But early warning remains a challenge, which makes it hard for operators to take adequate measures

With summertime and heat waves approaching, [thunderstorms](#) are

becoming more frequent again. Recently several regions in Europe were hit by devastating thunderstorms along with strong winds, lightning strikes, hail and flash floods.

France and Germany were the most affected with reports of several fatalities. Floods swept through entire towns and cities, blocking roads and railways.

The trouble is that "extreme thunderstorms are becoming more frequent due to climate change," says Matthias Mather, head of environmental management at the German National Railway company Deutsche Bahn in Berlin.

Measures have already been taken such as cutting down large trees in places along railways considered possible black spots that were particularly hard hit during past extreme weather events, he explains. But while railway operators in Germany are quite well prepared for floods, "we still do not have an appropriate concept for lightning," he adds.

It is true that meteorological information providers can give reasonably accurate warnings on large-scale synoptic storms over time scales of a few hours, says Chris Baker, professor at the Birmingham Centre for Railway Research and Education at the University of Birmingham, UK. But "thunderstorms are much more difficult to predict because of their small spatial and time scales – although we can predict the weather conditions that may or may not lead to thunderstorms," he says. This makes it hard for railway operators to put operational measures into place in due time.

Of course, if there are urgent warnings of severe weather, trains are usually stopped at the next station, Mather says. But the lead times for such measures "are necessarily quite long, over periods of a few hours or more," Baker points out.

A 24-hour warning is needed in order to be in a reasonable state of preparedness. For emergency situations, a 2-hour warning is required to brace for the event to come, Mather adds. In his view, railway operators would thus benefit from more precise forecasting and warnings in time and space.

Today, most up-to-date thunderstorm forecasting is based on a so-called ingredient-based methodology, according to Tomas Pucik, researcher at the European Severe Storms Laboratory in Wessling, Germany.

"If well-known weather ingredients are present, there is a high probability of a severe thunderstorm within a certain region," he explains. In this case, weather experts can issue a general warning for a larger area several hours to days ahead.

However, only when a storm starts developing, can scientists assess how severe it might get. They track the route of the storm and thus predict on time scales of minutes, which region will be affected next. This forecast is based on data including radar or satellite observations. Of course, "the problem with these warnings is that they may not give enough lead-time," says Pucik.

As part of the EU-project [RAIN](#), Pucik and colleagues have therefore analysed past events, such as a [severe thunderstorm](#) in North-western Germany in June 2014, where six people were killed and tens of thousands of toppling and uprooted trees blocked railway tracks and damaged their overhead lines.

As a lesson from this incident "we recommend spreading the idea of ingredient forecasting as this is still a relatively new topic," Pucik stresses. Better detection networks would help increase the lead-time of more precise warnings, he adds.

Indeed, "more precise warnings could be obtained from weather radar," Baker agrees. "But the issue would be how these warnings could be used to implement train restrictions over very short time scales without causing massive disruption," he says.

In the future, it is also important to look at the wider surroundings affected by thunderstorms, Mather maintains. For example, "floods often occur in entirely different areas than the thunderstorm itself", he concludes.

Provided by Youris.com

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