



Weather impact forecasting using MOGREPS with socially- and geographically-derived vulnerability and exposure datasets

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Hazardous weather has a major impact on health and safety and on the economy in the UK and other countries. This has renewed efforts within the Met Office to develop a system that can predict weather related impacts, extending the Office's ability to warn the public and business sectors of potential weather related hazards. Ultimately the prediction of both an impending weather hazard and its potential for impact will allow concise decision making to implement mitigation strategies.

A diagnostic tool has been developed for the UK transport network, which focuses on quantifying the risk of specific vehicle types overturning in strong winds or being disrupted due to heavy snow. The impacts to those using the network are then quantified in terms of journey delay times and number of people affected. For this tool to be effective it requires vulnerability and exposure datasets to be combined with the probability of hazardous weather occurring. Probabilities are obtained from MOGREPS (Met Office Global and Regional Ensemble Prediction System), while vulnerability is a combined field which determines the varying structural and geographical attributes of each kilometre segment of motorway route. A segment's attributes influence the likelihood of that location having weather related impacts, and the severity of these impacts. The exposure field accounts for the changes in traffic flow by vehicle type, day of the week and time of the day, and increases risk of disruption if the route has high traffic flows while reducing the risk in low traffic flow areas.

The model has been shown to be useful in the Met Office Operations Centre where it is used as a support tool for issuing weather warnings. However, verification of the output has been difficult due to the lack of severe wind gust events over the trial period and the difficulty in obtaining accurate impact verification information. The Highways Agency is now on board, both receiving the model's output in their Operations Centre and also providing information on weather related impacts, including bridge closures and vehicle incidents, which will be incorporated into the verification system.