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## **Modelling winter storm impacts on insured claim ratios of residential buildings in German administrative districts**

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Severe winter storms are one of the most damaging natural hazards for European residential buildings. Previous studies mainly focused on the loss ratio (loss value / total insured sum) as a monetary value for damages. In this study the focus is on the claim ratio (number of claims / number of contracts), which is derived from a storm loss dataset provided by the German Insurance Association. Due to its magnitude, the claim ratio might be a more intuitive parameter for the use in impact-based warnings than the loss ratio.

In a first step, loss ratios and claim ratios in German administrative districts are compared to investigate differences and similarities between the two variables. While there is no significant change in the ratio between claim ratio and loss ratio with increasing wind speeds, a tendency for lower loss ratios in urban areas can be confirmed.

In a second step, a generalized linear model for daily claim ratios is developed using daily maximum wind gust (ERA5) and different non-meteorological indicators for vulnerability and exposure as predictor variables. The non-meteorological predictors are derived from the Census 2011. They include information about the district-average construction years, the number of apartments per buildings and others to get a better understanding of these factors concerning the number of buildings affected by windstorms. The modelling procedure is divided into two steps. First, a logistic regression model is used to model the probability claim ratios larger than zero. Second, generalized linear models with different link functions are compared regarding their ability to predict claim ratios larger than zero. In a cross-validation setting a criteria for model selection is implemented and the models of both steps are verified. Both steps show an improvement over the climatological forecast and in both cases the addition of data for vulnerability and exposure leads to a decrease of the mean squared error.