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Modelling European winter wind storm losses in current and future climate

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The insured natural catastrophe losses due to atmospheric hazards have increased steadily over the last 30 years, namely by about a factor of 8 to ˜20 bn USD per year in the years 2000-2004. Potential factors contributing to this rise are found in the economic, geographic and demographic sectors and the attendent climate change. The relative degree to which the loss increase can be attributed to these factors has not yet been quantified.

The focus of this study is on European winter storms. According to insurance models, an insured storm loss in the order of some 7 bn USD can currently be expected to occur in Europe about once every ten years, and one of 35 bn USD once every 200 years. However it is highly desirable to derive a more dynamically-based estimate on the expected future loss potentials and to quantify wind storm losses on a realistic European-wide property insurance portfolio (distribution of insured values) in the current climate and under changing climatic conditions. A combined analysis of both wind changes and changes in losses is important, since it is not straightforward that potentially increasing wind intensity and/or frequency in a warmer climate will lead to increasing losses. The loss amount of a particular storm is shown to depend among other factors on its path and its absolute force. It is relevant (i) to determine whether a storm affects a region with a high concentration of values or passes over fairly sparcely populated territory, (ii) to what extent and within which intervals the wind intensity is changed, as small changes in hazard intensity in sensitive regions can trigger substantial increases in damages (due to a non-linear relationship).

Several studies have investigated the changing cyclone behaviour in climate model

runs, and some derived from that a rough estimate of expected insurance losses. The present study is one of the first to couple the output from a climate model to a state-of-the-art insurance loss model. This interdisciplinary approach combines meteorological and insurance aspects of storms. The wind storm information is derived from the gust fields of a range of available regional climate model runs over Europe, both for current (1960-1990) and future (2070-2100) climate. The storm information is then used in Swiss Re's quasi-operational storm loss model on a market portfolio. Together this yields a dynamically-derived estimate of current and expected losses on the European scale, and countrywise. The methodology and results are discussed and a comparison to a cyclone climatology is also presented.