



Exposure Modelling and Disaggregation for Insurance Flood Risk Assessment in China

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Floods are the prime natural disaster in China, and have also been the costliest natural disasters in the Asia-Pacific region over the last hundred years.

For the international (re-)insurance industry, the absence of a national scale flood catastrophe model for China is hampering efforts to assess flood risk, calculate the adequacy of contracts and, generally, navigate in this highly regulated market. A reliable view of risk requires a better understanding of the insured values in order to

- identify risk hotspots
- adjust disproportionately risky portfolios
- identify business opportunities
- calculate capital requirements.

For this purposes it is necessary to

- disaggregate insurance portfolios with imprecise location information
- account for location uncertainty by developing appropriate sampling approaches
- assess the flood risk of (re-)insurance portfolios by combining disaggregated portfolio risk information and high resolution hazard information (flood event scenarios, hazard maps).

We use a detailed national scale exposure (capital stock) model, specifically developed for the needs of economic and insurance related catastrophe risk assessment. This model is based on previous studies like the PhD thesis of Daniell (2014). We use the exposure model to augment the spatial information of insurance portfolios by means of disaggregation. This allows us to bring together insurance exposure with detailed hazard information in order to obtain a realistic picture of portfolio level flood risk.

In this work we present the exposure model method and approaches for the disaggregation of insured values and risk sampling as well as weighting schemes for residential, commercial, and industrial exposure.

We apply our data and methods to the province of Guangdong and validate the results using public data (e.g. OSM), third party information (e.g. industrial parks) and historic losses.