Engineering Risk Analysis Group
Prof. Dr Daniel Straub

MSc thesis or Study project proposal

Investigation of the influence of static and dynamic natural hazard risk factors on the shape of the loss exceedance curve

Motivation and Objectives

In quantitative risk analysis of natural hazards, the general aim is to approximate the area underneath the loss exceedance curve (also risk curve) to obtain an estimate of risk, i.e. the annual expected losses. In many practical applications, the risk estimate is based on only few scenarios. In these cases, a good prior understanding of what the general shape of the loss exceedance curve might look like can help select suitable scenarios to obtain the best possible estimate of overall risk.

To increase our understanding of how different static or dynamic risk factors affect the resulting shape of the loss exceedance curve, you will set up a simple (possibly hypothetical) case study that can be used to systematically investigate the influence of variations in these factors. Risk factors are influencing factors linked to the emergence of hazards (e.g., meteorological conditions, area characteristics such as slope, vegetation etc.), exposure (e.g. asset types, locations and values) or vulnerability (e.g. mitigation measures, resistance of exposed assets to the hazard etc.).

Methodology

The workflow for the project is intended as follows:

- Familiarize yourself with literature on the development of loss exceedance curves incl. hazard modelling and risk modelling methodologies.
- Review and classify important risk factors to be investigated in the case study.
- Set up a RAMMS model and risk model for a simple case study.
- Analyze the effect of varying influencing factors on the loss exceedance curve.
- Describe/Quantify the influence of different types of risk factors.

Requirements

You should have

- Strong analytical skills and a background in natural hazard risk analysis.
- Good command of MATLAB or Python
- Familiarity with hazard modelling methodologies
- Knowledge of RAMMS is beneficial

Starting date: Flexible, as soon as possible

Supervised by

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