

Towards Performance-Driven Monitoring and Early Warning Systems for Induced Seismicity

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Abstract

Earthquake early warning systems coupled with non-standard monitoring approaches can prove as valuable tools for mitigating the risk associated with induced earthquakes. These solutions might include advanced sensors with a number of functions, such as implementing a performance-based on-site early warning and rapid response system for infrastructure but also monitoring the structural response of buildings and infrastructure in real time.

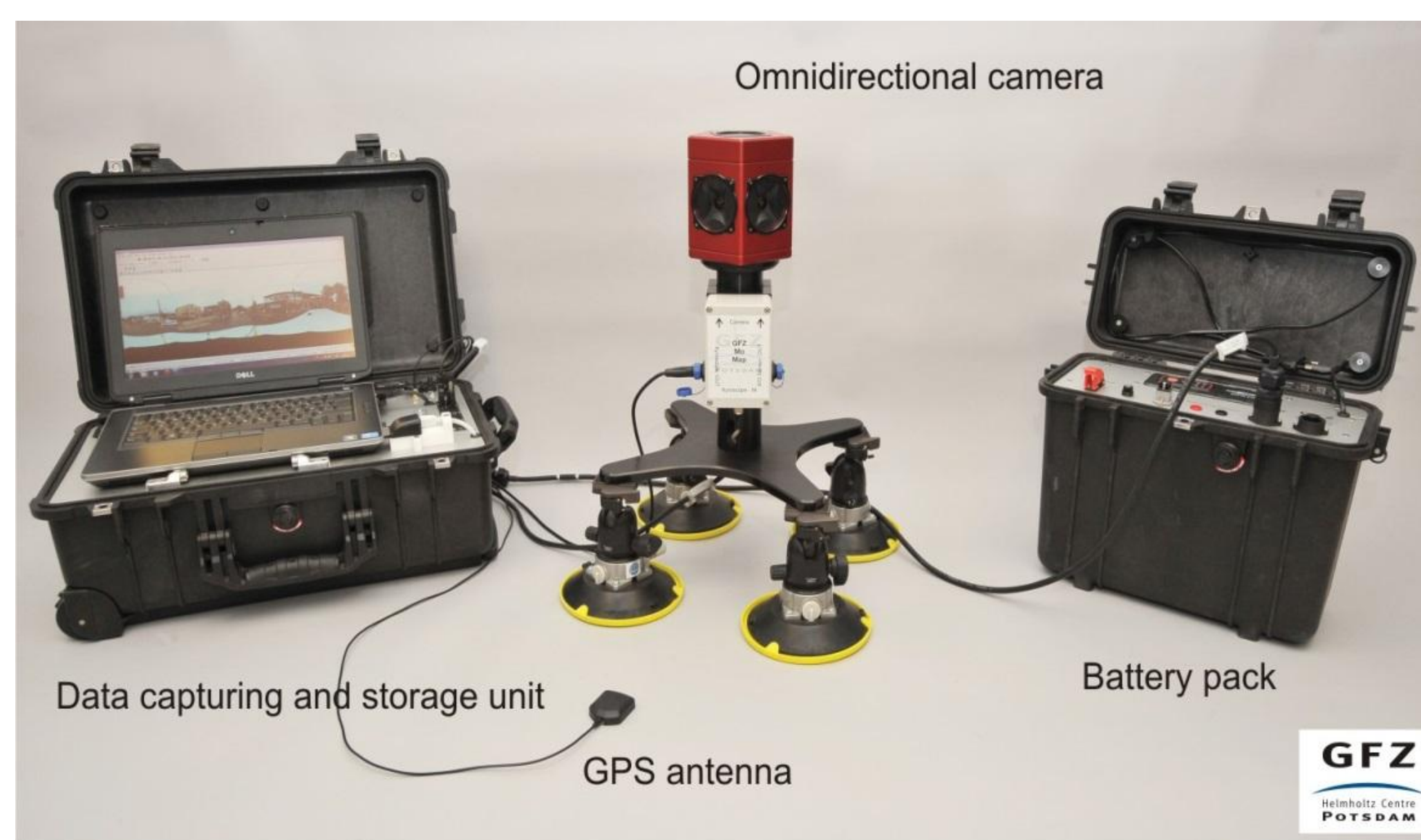
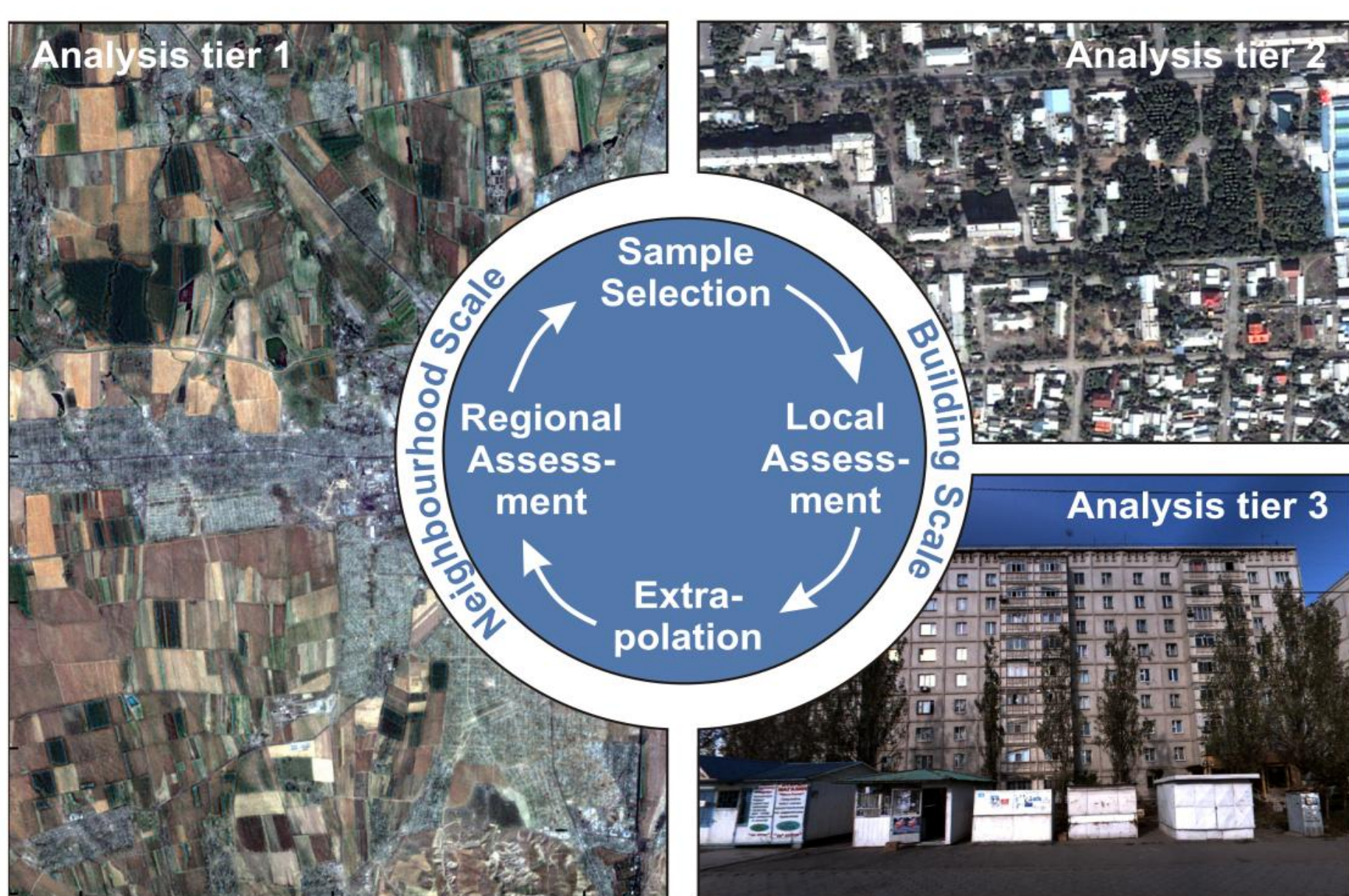
Introduction

The ultimate objective of any effective program for the management of induced seismicity must be to limit the consequent seismic risk in real time. Towards this goal, the exposure and the vulnerability should be defined. Regarding exposure coupling remote sensing with in-situ imaging can be optimized over broad areas for the characterization of the built environment.

Multiscale Exposure Estimation

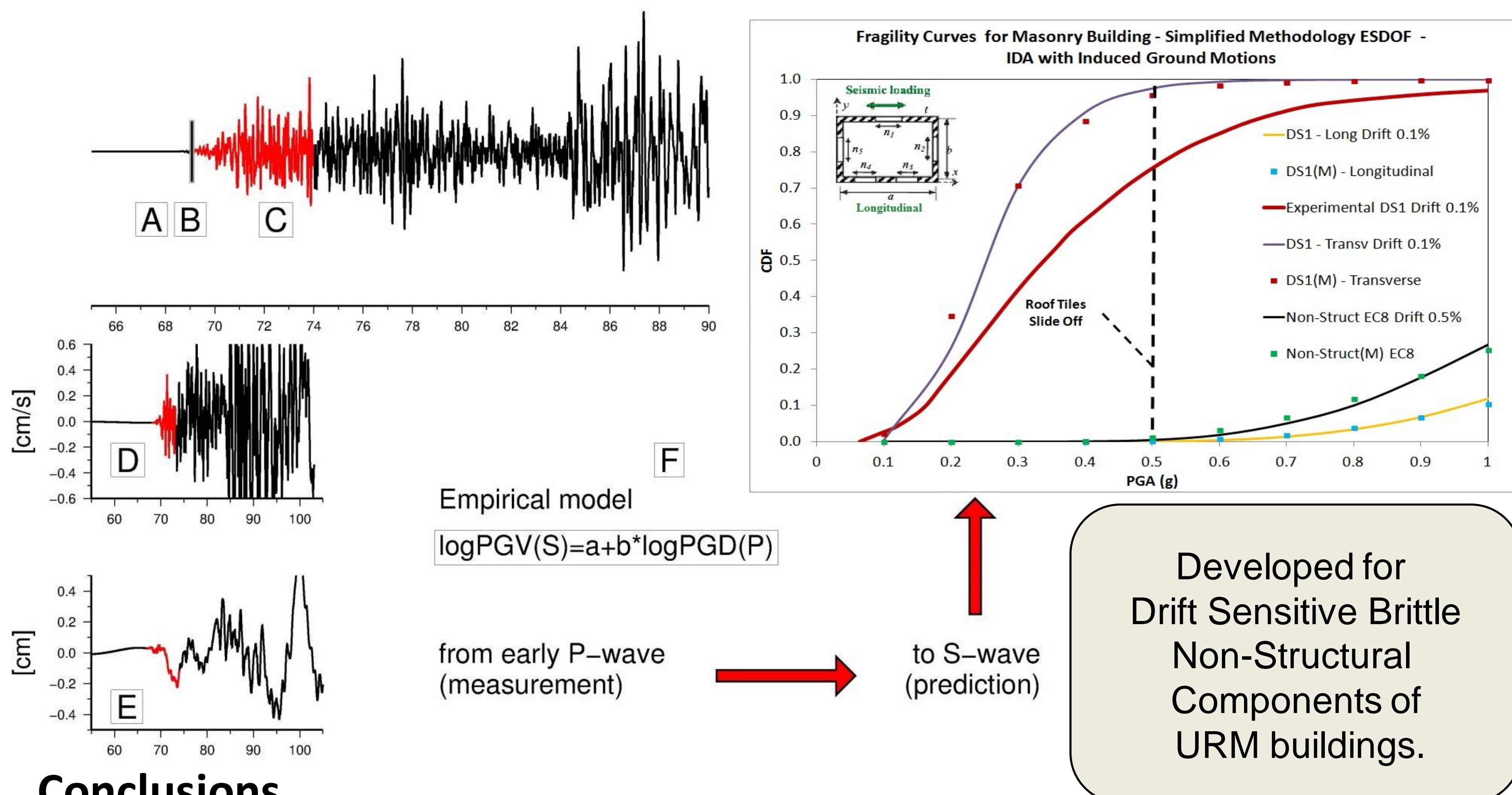
GFZ-MOMA MOBILE Mapping system

RRVS Remote Rapid Visual Scanning



Seismic Vulnerability

In order to adopt damage forecasts (performance) determined by probabilistic approaches, suitable fragility curves are necessary. Based on the performance level an alert is designated according to pre-defined thresholds for acceptable levels of motion. Therefore, it is important to incorporate the fragility in an already developed on-site early warning and rapid damage forecasting system (Parolai et al. 2015). The exposure estimation dictates that traditional or historic masonry structures occur in large populations near the operation platforms in remote and less populated areas. A simple performance assessment model (Vamvatsikos et al. 2016) is adopted in order to address the need for preliminary assessment tools for this class of structures. The objective is to be able to rapidly identify buildings and their non structural components that are at higher risk in the event of an induced earthquake.



MP-Wise (Multi-Parameter Wireless Sensing System)

Conclusions

This study presented a performance-based on-site early warning and rapid response system for infrastructure and after reviewing the existing protocols for evaluating the fragility, a new proposal is made for analytical fragility curves for non structural components of masonry buildings that have been developed for the seismic demands generally imposed upon linear and slightly nonlinear systems of single and multiple degrees of freedom which is the case for induced seismicity demands.

References

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