EGU General Assembly 2024

EGU24-15914, updated on 20 May 2024
https://doi.org/10.5194/egusphere-egu24-15914
EGU General Assembly 2024


# Machine Learning Estimator for Ground-Shaking maps

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The Machine Learning Estimator for Ground Shaking Maps (MLESmaps) harnesses the ground shaking inference capability of Machine Learning (ML) models trained on physics-informed earthquake simulations. It infers intensity measures, such as RotD50, seconds after a significant earthquake has occurred given its magnitude and location.

Our methodology incorporates both offline and online phases in a comprehensive workflow. It begins with the generation of a synthetic training data set, progresses through the extraction of predictor characteristics, proceeds to the validation and learning stages, and yields a learned inference model.

MLESmap results can complement empirical Ground Motion Models (GMMs), in particular in data-poor areas, to assess post-earthquake hazards rapidly and accurately, potentially improving disaster response in earthquake-prone regions. Learned models incorporate physical features such as directivity, topography, or resonance at a speed comparable to that of the empirical GMMs.

In this work, we present an overview of the MLESmap methodology and its application to two distinct study areas: southern California and southern Iceland