Project name: MODULATE

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Consortium

Partners

Bureau de recherches géologiques et minières (BRGM), Project Coordinator

University of Patras

Centrale Supélec

Géodynamique et Structure

École nationale supérieure de techniques avancées (ENSTA)

MODULATE

Modeling long period ground motions and assessment of their effects on large-scale infrastructures

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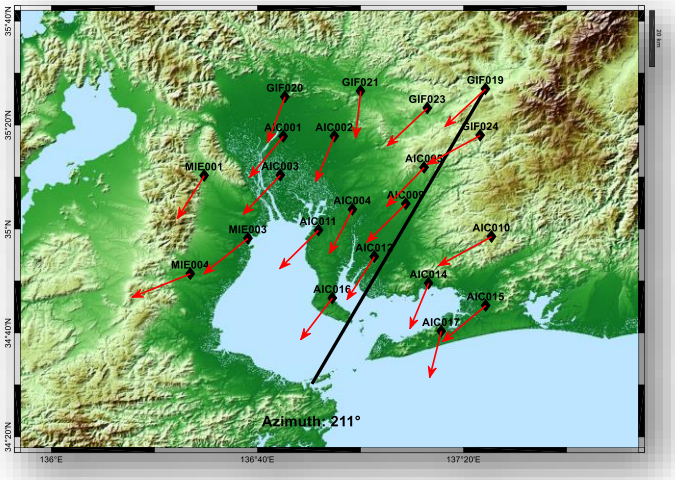
PROJET FINANCÉ PAR L'ANR - PROJECT FUNDED BY THE ANR

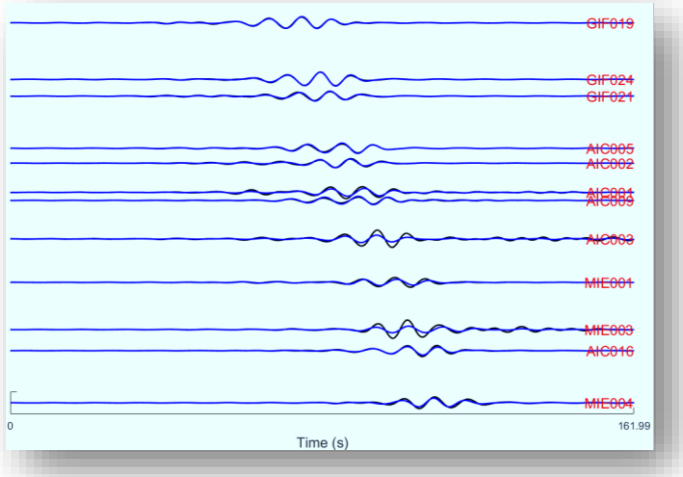
Overview

MODULATE is a research project financed by the Agence National de la Recherche (ANR), and coordinated by the Bureau de Recherches Géologiques et Minières (BRGM). The project aims at developing a methodology based on the physics of surface waves, to describe the evolution of the spectral content of the ground motion at a site located in a sedimentary basin. The stochastic model of long period ground motion is to be superimposed to standard simulations of body waves to assess the performance-based reliability of large-scale structures such as high-rise buildings, long-span bridges and liquid-storage tanks. A key objective of the project is the development of tools and guidelines to be used by the earthquake engineering community for more resilient designs of large-scale infrastructures.

Objectives

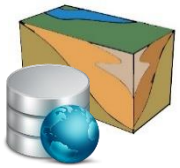
- Systematic study of surface waves characteristics: dispersion, non-stationarity, duration, etc.
- Develop a stochastic model for long-period ground motion linked to the physical parameters of sedimentary basins and the seismic input.
- Implement the stochastic model to generate synthetic broadband ground motion.
- Evaluate the seismic performance of large-scale infrastructures excited by generated broadband ground motion.



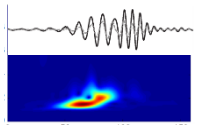


Rayleigh waves at Nagoya basin, Japan, extracted from seismograms of the Mw 6.8 Chuetsu-Oki earthquake.

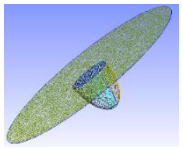
Strategy



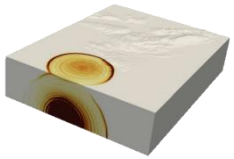
Compilation of a database of well recorded events which generated surface waves



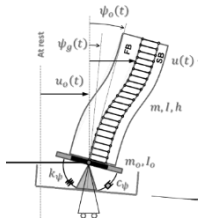
Surface wave extraction and development of a stochastic model of broadband ground motion



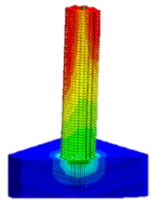
Simulations in 3D canonical basins to study surface wave generation and propagation



3D numerical simulations at specific sites to test the proposed stochastic model



Structural analyses of surrogate models to identify critical configurations



Structural analysis of 3D models of real structures to assess their seismic performance

Development of tools and recommendations for the robust design of large-scale infraestructures.

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