

Normative Contributions for Seismic Action (WP18)

Research Activities by POLIMI and INGV-Milano teams - Tasks 2, 3 and 4

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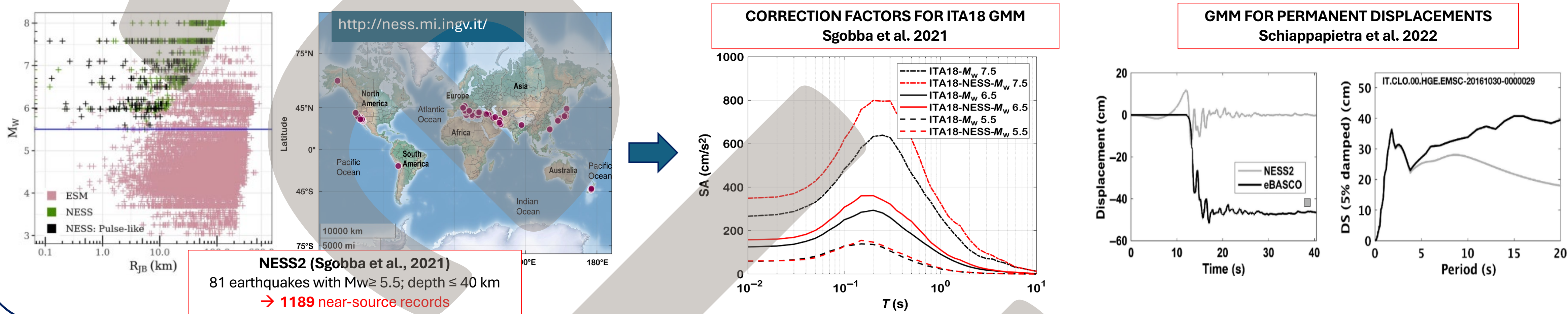
INTRODUCTION: CHARACTERIZATION OF EARTHQUAKE GROUND MOTION IN NEAR SOURCE CONDITIONS

It is well known that ground motions in the proximity of the source of an earthquake can have significantly different features than those recorded at large distances, in terms of amplitude, duration and frequency content, as well as in terms of vertical-to-horizontal ratios of spectral accelerations. Accounting for such features, which may adversely affect the seismic performance of different types of structures, is crucial for improving the definition of seismic action in near-source conditions.

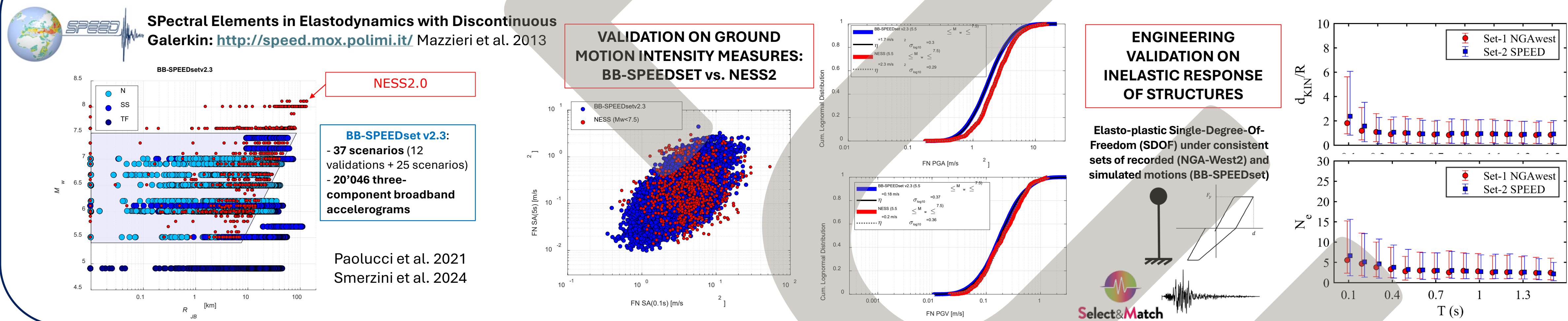
To achieve this objective, research activities of WP18 of DPC-ReLuis Projects have boosted the following advancements:

- (A) Construction of a **database of near-source earthquake records (NESS2.0)** and **improvement of empirical ground motion models** for near-source effects
- (B) Generation and validation of a **database of broadband ground motions from 3D physics-based numerical simulations (BB-SPEEDSET2.3)**
- (C) Proposal of an update of the **design spectra for the vertical component of seismic action**
- (D) Investigation of new criteria for definition of the **design earthquake**
- (E) Improvement of the **tools for selection and scaling** of spectrum-compatible ground motions

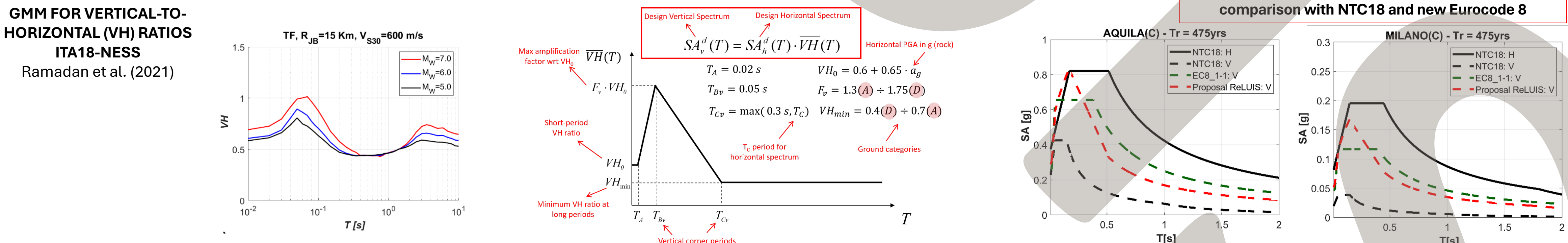
(A) NESS2.0 DATASET AND IMPROVEMENT OF GROUND MOTION MODELS (GMM) IN NEAR-SOURCE CONDITIONS



(B) BB-SPEEDSET (v2.3): A VALIDATED DATASET OF GROUND MOTIONS FROM 3D PHYSICS-BASED NUMERICAL SIMULATIONS



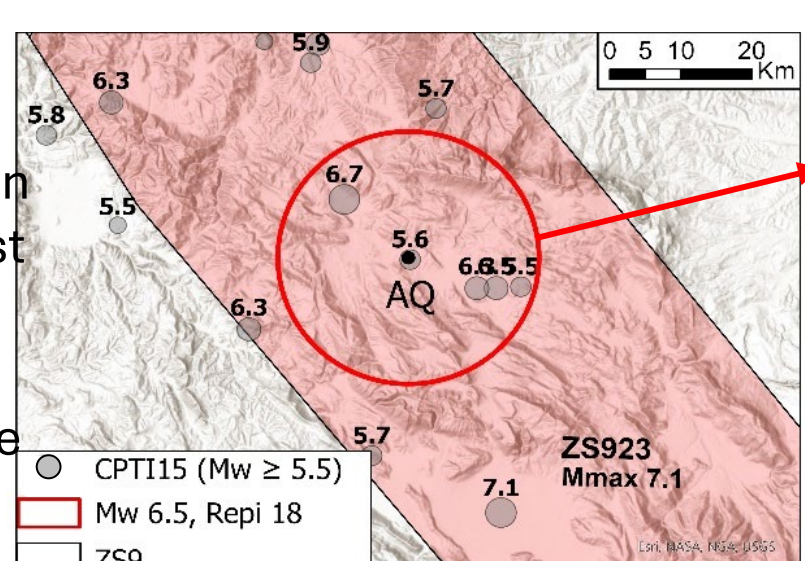
(C) PROPOSAL OF AN UPDATE OF THE VERTICAL DESIGN SPECTRA



(D) BEST-MATCHING SCENARIO EARTHQUAKE (BMSE)

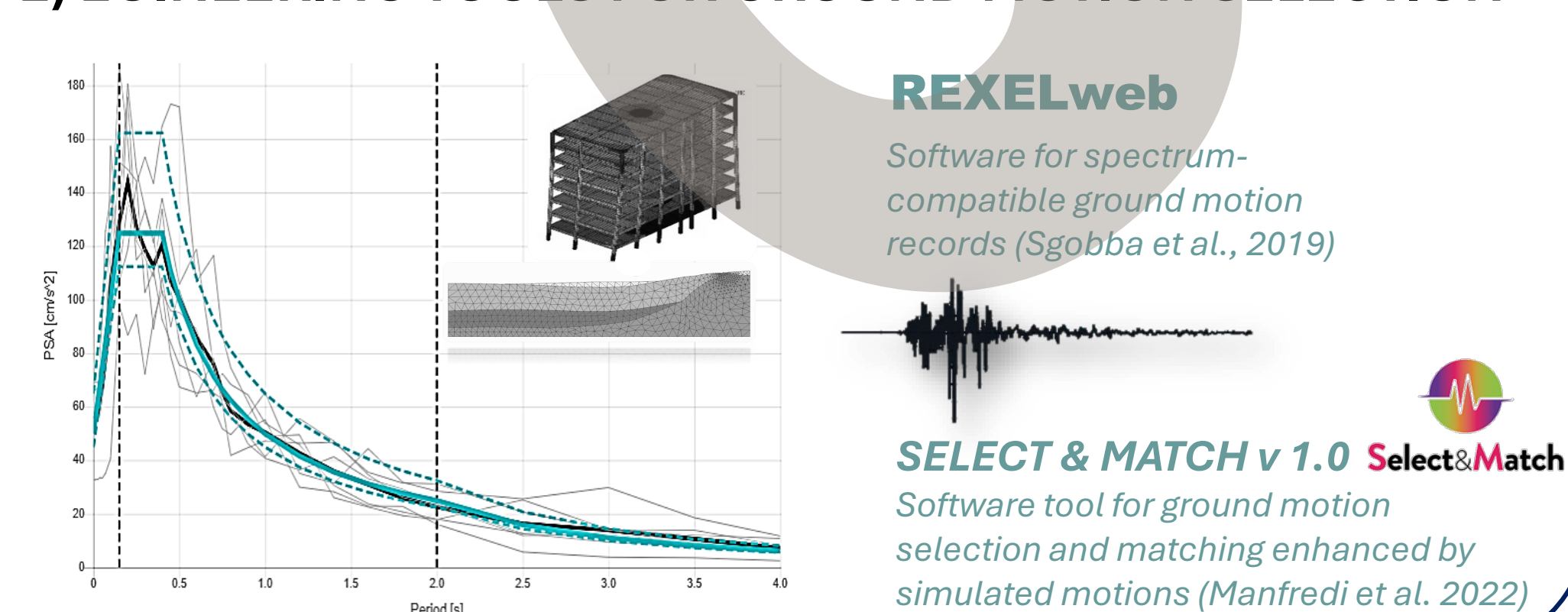
Paolucci et al. 2024

BMSE is defined by the magnitude-distance (M_w - R) pair with median ground motion that best approximates the Uniform Hazard Spectrum at a given site in a broad period range



E) ENGINEERING TOOLS FOR GROUND MOTION SELECTION

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