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Fourier-domain ground motion prediction model for rapid earthquake hazard scenario calculation

Laura Cataldi[1*], Valerio Poggi[1], Stefano Parolai[1,2], Matteo Picozzi[1]

[1]National Institute of Oceanography and Applied Geophysics - OGS, Udine, Italy, [2]University of Trieste, Trieste, Italy
[*]lcataldi@ogs.it

The rapid estimation of source parameters such as seismic moment can help to better constrain near real-time ground motion scenario generation, in the effort to improve post-event seismic impact scenarios. In particular, predicted ground motion results can be iteratively refined based on the latest and most accurate data available.
Among the many possible methods to infer the properties of the earthquake source from seismic signals, we selected parametric spectral inversion to calibrate an analytical Fourier-domain spectral model for the Northeast Italy region, to be used as a case study. The coverage and synergies of several regional networks in this area ensure good data coverage with the possibility of fast data acquisition through web service distribution. This calibration step mainly focuses on constraining the path parameters describing the regional attenuation and the site amplification functions.
The generated regional model is then used in an automated procedure to estimate the source spectrum immediately after each new event in the area. The procedure provides near real-time estimates of source parameters. This fast and reliable estimation of seismic source parameters can then be used to obtain robust shaking estimates that can be integrated into the impact assessment process.