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Ground motion simulation in the Grenoble valley using empirical and numerical Green's functions

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The ability of the empirical Green's functions (EGFs) method to simulate ground motion, including site effects, is now well established. Nevertheless it remains often difficult to assess low-frequency ground motion (< 0.5-1 Hz), owing to the low signal-to-noise ratio of the EGFs. Therefore we propose to combine the EGFs method with numerical simulations : (1) we generate a set of numerical Green's functions with a 3D spectral element method; (2) we compute hybrid Green's functions by summing both empirical and numerical Green's functions in the time domain; (3) we sum up the hybrid Green's functions according to a k^{-2} slip model.

We use the abovementionned simulation technique to perform broad-band (0-40 Hz) ground motion predictions in the Grenoble basin, including variability assessement. The hypothesized scenario is a M_W 5.5 earthquake occuring on the Belledonne fault about 20 km south of the Grenoble city. Ground motion variability is directly derived from the kinematic model parameter uncertainties by means of the Latin Hypercube Sampling method.