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Small earthquakes summation for a better estimation of the seismic hazard in the south-east of France

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In the past, the south-east of France has been strucked by many moderate sized earthquakes ($5.5<Mw<6.5$). Two of them caused large destructions and human loss: the Nissart earthquake (1564) that occurred in the backcountry of Nice and the Ligurian earthquake (1887, M˜6.2) that occurred offshore of the Italian Ligurian coast. Today, the French Riviera is characterised by a low seismic activity, but the risk that such events happen again still exists. For this reason, we simulate the ground motions that could be produced by two moderate size earthquakes in the French Riviera: a magnitude 5.7 onshore earthquake (10 km to the north of Nice) and a magnitude 6.3 offshore earthquake (25 km to the south of Nice). The ground motions are obtained by summing the recordings of a small earthquake with time delays randomly distributed over the source duration. Each of these small earthquakes is regarded as an empirical Green's function. By a proper choice of summation parameters, our method produces a multitude of accelerograms which, on average, are exactly in agreement with the w-2 model in the frequency domain. Only specification of seismic moment and stress drop is required for the simulated target event.

The simulations obtained point out three important points: the strong amplification effects in some sites in the city of Nice, the importance of the ground motion potentially produced by a magnitude 5.7 onshore earthquake and the major role played by the stress drop value of the potential earthquake.

In order to obtain a continuous map of simulated accelerations, we test the possibility to extrapolate simulations on soft soil from simulations obtained on bedrock, using a 1D transfer function which takes into account the subsoil medium. Our results are also compared with those obtained by the Risk-Ue project and with paraseismic rules.