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Comparison of numerical predictions of 3D ground motion in the Alpine Valley of Grenoble, France

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The validation (or benchmarking) of numerical methods of 3D seismic wave propagation has been recognized recently as an important step for strong ground motion estimations. With the objective of contributing to this effort, we proposed a ground motion prediction test (or benchmark) during the 2006 ESG meeting held in Grenoble.

The benchmark consisted in computing the seismic response of the 'Y'-shaped Grenoble valley to (i) two local earthquakes (M<=3) for which recordings were avalaible; and (ii) two local hypothetical events (M=6) occuring on the so-called Belledonne Border Fault (BBF) [1]. We received a total of 18 contributions from 14 different groups; 7 of these use 3D methods, among which 3 could handle surface topography, the other half comprises predictions based upon 1D (2 contributions), 2D (4 contributions) and empirical Green's function (EGF) (3 contributions) methods. Maximal frequency analysed ranged between 2.5 Hz for 3D calculations and 40 Hz for EGF predictions.

We present a detailed comparison of the different predictions using raw indicators (e.g. peak values of ground velocity and acceleration, Fourier spectra, site over reference spectral ratios, ...) as well as sophisticated misfit criteria based upon previous works [2,3]. The comparisons reveal that three 3D predictions (out of 7) show a remarkable fit and allow to identify a 3D reference solution to the problem. We further discuss the importance of 3D effects, non-linear rheology and or surface topography on the estimation of ground motion in Grenoble valley.

References:

[1] Thouvenot F. et al., The Belledonne Border Fault: identification of an active seis-

mic strike-slip fault in the western Alps, Geophys. J. Int., 155 (1), p. 174-192, 2003.

[2] Anderson J., Quantitative measure of the goodness-of-fit of synthetic seismograms, proceedings of the 13th World Conference on Earthquake Engineering, Vancouver, paper \#243, 2004.

[3] Kristekova M. et al., Misfit Criteria for Quantitative Comparison of Seismograms, Bull. Seism. Soc. Am., in press, 2006.