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Validation of teleseismic inversion of the 2004 Les Saintes, Lesser Antilles, earthquake (Mw6.3) from 3D finite-difference forward modeling

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The 2004 Les Saintes earthquake was a shallow damaging earthquake in French Lesser Antilles. It occured within the overriding plate of the westward lesser Antilles subduction zone, where the Atlantic oceanic crust subducts beneath the Caribbean plate. In the French Lesser Antilles, seismic networks have been greatly developped (Centre de Donnée Sismique des Antilles). Nevertheless the geological structure is not yet well known. The subduction context, the islands' topography and bathymetry with the existence of the ocean, gives a horizontal variation of the superficial structure. The structure at depth is usually assumed to be a 1D stratified layers model. In order to obtain a stable solution of the source parameters on a finite fault plane we first obtain a point source solution and then carry out an inversion analysis to obtain a slip history on the finite source model from the broadband teleseismic data (distances are around 30-90 degrees; P and SH waveforms). Next we simulate the seismic wave propagation generated by the obtained finite source model in the 3D medium using a finite difference (FD) method for comparing the synthetic and observed seismograms at distances less than 80 km mainly observed in Guadeloupe. Our preliminary inversion result infers the existance of an asperity in the northern part of the fault, namely closer to Guadeloupe. We discuss whether the near-field data can be explained by this teleseismic source solution, or some regional path and site effects.