The PROCEDURE of MOS computation

1. Maximum Credible Earthquake (MCE): It is defined for each of Seismic Zones (SZ) and associated to a Typical Fault (TF).
2. Credible rupture parameters: The MCE is modeled as a rectangular fault plane. 30 realization of stochastic slip distribution (Mai and Beroza 2003). Here we show the MCE and TF of the Colfiorito composite source earthquake.
3. Ground shaking computation: The site response (PSA) for a given MCE and TF is computed at the site and for a given MCE and TF.
4. Hybrid broadband: computation of the at the site and for a given MCE and TF.
5. Broadband ground motion scenario computed for a single fault (TF).
6. Portfolio of TFs in the MR4: The number of TFs associated to the SZ, amplitude spectra for deterministic Low Frequency and stochastic High Frequency seismic hazard effects are required at intermediate frequency, where high values of shaking occur.
7. Montecarlo analysis: A profile of a given grid surrounding the TF.
8. MOS map: the TF floats along the SZ and we allow the shake map to "float" as well and pick the maximum shaking at each point of the grid surrounding the SZ.

Obtained adopted for the region of Italy for the 2009 (Mw 6.3) L'Aquila earthquake (white star) occurred within SZ ITA4095. Left panel shows a zoom-in of HF MOS map surrounding the earthquake.

The High Frequency scenario predicts (0.56-0.63 g) higher levels of PGA than those measured during the quake (0.49-0.6 g). However the PGA map (Pericolosità sismica di riferimento per il territorio nazionale, Ordinanza PCM del 20 marzo 2003) presents at the A.G.U. Fall Meeting 2008, San Francisco (CA-USA), December 2008.

When taking into account the broadband frequency content (from Low to High frequency), ground shaking reveals the complexity of the rupture process. We can observe that the process of merging a deterministic LF with a stochastic HF waveforms is not a trivial task several parameters need to be tuned in. For this reason we have checked carefully the seismogenic potential and constant rise time and the BBoS matching frequencies. The BB resulting ground shaking map might have spurious spots that are not observed.

Conclusions & Outlook

- We have used a "kriging technique" to interpolate the Broad Band MOS map and we can see an underlying simple regular directivity pattern which is overlain by same high/low ground-motion variations.
- We are ready to calculate the BB MOS maps for Italy, making simple assumptions to group the Typical Faults and reduce computational costs.
- We need to improve and solve some technical problems in the automatic procedure for the MCE.

References


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