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Simplified Scheme for the Kinematic Inversion of the Rupture Process: Application to Mexican Earthquakes.

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Aiming to obtain some information about the rupture process of intermediate to great earthquakes, many waveform inversion schemes have been proposed. Usual methods involve several subfaults on the fault plane to obtain a detailed image of the kinematic rupture process. On the other hand, it has been questioned the resolution over obtained paramters on the inversion process. In the literature contradictory results can be found for the same earthquake, using different schemes. For this reason, recently, simplified schemes of the rupture process have been proposed, while not providing details it can recover their main characteristics.

In this work we propose a modification of the Cotton & Campillo (1995) inversion scheme, while unlike considering the problem as a "rupture process tomographic inversion", we invert the main characteristics assuming simplified geometries (ellipses).

Based on the work quoted, the direct problem is reparameterized including one or two ellipses in which the maximum displacement is distributed. For the first ellipse, the position of the center within the fault plane, the major and minor semi-axis are inverted. For the second one we invert the position with respect to the first ellipse and the two semi-axis.

To avoid the linearization of the problem, we use a simulated annealing scheme for inversion. When there is not enough evidence of the proper fault plane, we perform an inversion for the two nodal planes published to solve the ambiguity between the auxiliary plane and the fault plane that a point source inversion schemes involve.

We tested our method for the well studied earthquake September 30th 1999 Oaxaca (Mw=7.5) (e.g. Hernandez et al., 2001) which is one of the intraslab earthquakes within the Northamerican Plate of moderate magnitude and well recorded.

The scheme is evaluated as well with the data generated by the "Escenario 2011" framework for an hypothetical earthquake in Guerrero, Mexico. Results will give us the opportunity to evaluate their later routinary implementation to the earthquakes occurring within Mexico.