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# Joint Source Inversion of DInSAR and GPS data of the 2009 L'Aquila Earthquake by fully 3D Finite Element Modeling

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The L'Aquila earthquake (Mw 6.3) occurred on April 6th at 01:32 UTC in the Central Appennines at a depth of about 9 km and was felt all over the central Italy. The main shock was preceded by a long seismic sequence started several months before and was followed by thousands of aftershocks.

In this work we present a fully 3D Finite Element inverse analysis to retrieve the slip distribution on the fault plane for the L'Aquila earthquake. Finite Element computed Green functions were implemented in a linear joint inversion scheme of interferometric and geodetic co-seismic deformation data. The key feature of our approach is the definition of a realistic complex three-dimensional model, based on a high resolution hexahedral mesh and accounting for topographic reliefs and rheological heterogeneities deduced from local tomography. The element horizontal size is biased from 150 m to 1-2 km using the paving meshing algorithm in combination with an appropriate adaptive sizing function.

The seismic source geometry has been modeled following the best solution proposed by Atzori & Antonioli 2011, where an original adapting algorithm is used to automatically retrieve the optimized fault subdivision, based on the model resolution matrix, resulting in a variable size patch fault model.