



Comparison of strain fields in Italy calculated using new GPS and historical seismicity data

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Geodesy and seismicity offer different, complementary views of the active tectonics of a region and can bring important information about its seismic behaviour. In this work, we calculated and compared in a systematic way the deformation fields in terms of strain rate, using new GPS data and historical seismicity record in Italy.

A dense GPS permanent network in Italy, composed by more than 70 stations, allows the calculation of a detailed deformation field. The geodetic deformation field used in this work has been based on GPS permanent stations with very stable time series, lasting from 2 to 14 years.

Dividing the studied region into triangular areas, the stress tensor at the barycentre of each triangle can be evaluated from the horizontal velocities at the vertices.

In case of small strains and rotations, the velocity gradient tensor based on geodetic estimations can be decomposed into its symmetric and antisymmetric components, originating, respectively, a pair of strain rate eigenvalues/eigenvectors and a rotation rate, providing a measure of deformation within a given region.

The crustal deformation has been also estimated for each area by means of the summation of moment tensors. On the basis of the historical earthquake catalogue we calculated the Gutenberg- Richter distribution, and its uncertainties using a Monte Carlo simulation method. We calculated the full deformation strain rate tensor by Kostrov's formula, using the distribution of known focal mechanism of the regions. The uncertainties have been systematically incorporated.

The use of seismicity rate in conjunction with GPS stable velocity solutions could help to have a step ahead in seismic hazard assessment of Italy.