Stress map of Italy update: new breakout data in southern Apennines

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INTRODUCTION OF THE AREA

Map of moment tensor solutions included in the Italian CMT dataset from 1977 to Present. The centroid moment tensors are also drawn: black triangle, thrust fault; short thick, normal fault; arrow, strike-slip fault; no symbol, undetermined fault.

ABSTRACT

Here we present an updated stress map of Italy focusing on southern Apennines. The Apennines are a thrust and fold belt NE-SW verging characterized by a prevalent extensional tectonic regime. Along the northern front of the belt, from the Po Plain to the Adriatic offshore, compression is still active, whereas in its southern part it seems ended. Indeed, this area is well known as one of the most seismic zones in Italy: it is characterized by strong earthquakes in the past whose focal mechanisms depict an ongoing extensional tectonic regime with T-axis about NE-SW oriented. This regime is also evidenced by active faults, borehole breakout and geodetic data. Within this frame, the external area of the Apenninic belt (foredeep and Apulian foreland) shows minor seismicity and a prevailing strike-slip tectonics. We have analysed 46 new deep well data to better constrain the state of stress along the southern Apennines belt and foredeep. New borehole breakouts have been inferred from wells with depths ranging between 1400 and 5500 m. Some of these wells are located along the Val d’Agri basin and show a prevalent NE-SW Shmin direction very consistent with previous results. The most reliable data confirm the general trend of the present-day stress in southern Apennines but they also evidence the possible influence of local structures on stress field.

RELATED PRESENTATIONS

- Oral presentation by Barba et al.; Session IV - Thursday 16th h. 11:30 “Stress field modeling in the Southern Apennines (Italy) by using new borehole data”
- Poster presentation by Pierdominici and Mariucci: PI-4 - Wednesday 15th “Active stress field around San Gregorio Magno 1 well (southern Apennines, Italy)”

NEW DATA SUMMARY

46 boreholes analysed available logs down to 5541 m depth

9 quality B 11 quality C 11 quality D 15 quality E

ACTIVE STRESS FIELD IN SOUTHERN APENNINES

Analysis of the "Tyrrhenian area"

New data: 150 km

New wells average scaled by well quality wells n. 9 Shmin = N48E+/-36˚ Q = B

Analysis of the "Adriatic area"

New data: 50 km

Total new data: 144 km

New wells average scaled by well quality wells n. 9 Shmin = N36E+/-27˚ Q = D

Analysis of the "Central sector"

New data: 50 km

Total new data: 150 km

New wells average scaled by well quality wells n. 8 Shmin = N45E+/-27˚ Q = D

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