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New Insights on active Stress Field in Italy and its Implications with Tectonics

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Active stress field in Italy is quite well-known but in detail it lacks a univocal interpretation in some areas of both orientations and magnitudes. We analyzed new deep boreholes and compared the results of stress analysis with the active faults crossed by or near the wells to estimate the influence of different structures on well data. In some cases, gently or abrupt changes in the stress directions have been observed along the well in the vicinity of a tectonic structure. In areas where tectonic structures are unknown, these stress changes observed in other boreholes can support other kind of evidence in identifying and characterizing active faults.

We also present results on stress magnitudes inferred from leak-off tests in oil wells (more than two hundreds new data, kindly provided by ENI S.p.A). We calculated the values of the principal stress axis at depths ranging from about 200m to 5000m and analysed them considering the leak-off data uncertainties. Then we compared the results to the horizontal stress orientations from borehole breakout analysis and from other geophysical and geological stress indicators and interpreted them within the different tectonic framework.

Finally, we analyzed the pictures of stress regime at different depths speculating about the reasons of regime changes that are observed in some areas. The active stress field depicted by the new analysis shows, at regional scale, a general agreement with strain data (geodesy and seismic anisotropy) although some interesting characteristics arise at local scale.