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Geodetic constraints to the evaluation of the Tagus Valley seismic risk

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Several historical records support the occurrence in the Lisbon area of a number of significant earthquakes. This is the case of the 1909, 1531 and 1344 events. Recently, some authors reinterpreted historical data concerning the 1755 earthquake (an event that together with the associated tsunami almost destroyed Lisbon), suggesting that it also implied rupture along the so-called Tagus Valley Fault. They concluded that this fault is exposed to strong shaking (M 6.5 to 7) every 200 years, which has strong implications in the evaluation of the seismic hazard.

The Tagus Valley Fault is located about 300 km north of the Nubia-Eurasia plate boundary. While historical data seem to support a high level of seismic risk, it has now a much moderated seismicity as it is depicted by the national seismological network. In addition, it has been the subject of several GPS surveys that were unable to detect any significant displacement field.

In this paper, we reprocess all available continuously-operating GPS stations in the SW Iberia. The derived relative velocity field is used to compute the amount of lithospheric shortening that can be related with seismogenesis in the so-called Tagus Valley Fault. Finally, we discuss its implications in terms of seismic hazard.