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# Mantle earthquakes beneath the South Iberia continental margin and Gulf of Cadiz – constraints from an onshore-offshore seismological network

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## Abstract

The Gulf of Cadiz and the passive continental margin of southern Iberia to the west of the Strait of Gibraltar locally accommodate the presently ongoing convergence between Africa and Eurasia by widespread, rather diffusive, seismic activity. Seismicity of the northern Gulf of Cadiz was derived from an amphibious seismological network, including 24 temporary marine offshore stations, besides the permanent networks in Portugal, Spain, and Morocco. During the 6 month of the offshore network operation, in total 86 local earthquakes were located at six or more offshore stations with the majority of earthquakes occurring to the southwest of Iberia and along the Algarve continental margin off southern Iberia. The distribution of events along the Algarve margin mimics features reported for the Atlantic passive continental margins of both South and North America. Focal mechanisms at the Portimão Bank support that seismically active areas are associated with compression. Similar stress patterns are reported for the east coast of South and North America. However, while earthquakes along the American east coast occur at crustal levels, earthquakes in the northern Gulf of Cadiz occur both in the lower crust and upper mantle, with the majority of events rupturing within the mantle, including a number of well-located earthquakes beneath crust forming the continent-ocean transition zone. The large number of earthquakes in the mantle might be caused by the unique geological setting, where deformation occurs in cool lithosphere of Mesozoic age. We suggest that seismicity along the Algarve margin is caused by re-activation of pre-existing margin-

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