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Deformation patterns in Canary Islands volcanic area from GNSS data analysis

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We present a study of the deformation pattern along the Canary archipelago through the analysis of continuous GNSS data. We use data spanning 2011–2017 period to retrieve precise horizontal displacements and a broad calculation of the strain. Geodetic data are interpreted in light of the regional tectonics, which is proven to play a key role in the volcanic eruptions that take place in the archipelago. The common-mode component filtering technique is applied to improve the signal-to-noise ratio of the time series of the GNSS daily solutions before retrieving the geodetic velocities. Through a triangular segmentation approach, we retrieve the 2D infinitesimal strain from the velocities along the Canaries and map deformation patterns in various sectors of the volcanic archipelago. We found areas of maximum deformation west of Tenerife, Gran Canaria and Fuerteventura Islands. A sharp change in shear strain between Tenerife and Gran Canaria is recognized, delineating a sector of intense seismicity, which is mostly associated with a well-known major submarine fault that separates the two insular edifices. On this submarine tectonic structure, we have performed a tentative simulation of the horizontal deformation and strain caused by one of the strongest (mbLg 5.2) earthquakes of the region. Our strain analysis supports the possibility that the main tectonic lineaments are being influenced by the regional stress field. Furthermore, the seismic areas between islands seem mainly influenced by the regional tectonic stress, rather than by the local volcanic activity. This is in accordance with the extensional and compressional tectonic regimes, already identified by other authors, which might favour episodes of volcanism in this volcanic archipelago.