Three-dimensional seismic tomography of Arraiolos aftershock sequence (Portugal)

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This study presents preliminary results of P and S velocity structures in three-dimensions obtained after travel time inversion. This work is based on the aftershock sequence of the 4.9 M_L magnitude earthquake which occurred on January 15th, 2018 at 11:51 UTC in Aldeia da Serra (Northeast of Arraiolos, Portugal). The hypocentral location, determined by the Instituto Português do Mar e da Atmosfera (IPMA), has coordinates 38.79 N, 7.93 W and 11 km depth. A sequence of 317 local events were inverted in order to obtain velocity contrast in all directions and relocate accurately these aftershocks (*Borges, et al., 2018, Wachilala et al (2019))*. The inversion of the data was performed by a Local Tomography Software (LOTOS, *Ivan Koulakov, 2009*) which gives the ability to make a simultaneous inversion of the velocity model and seismic event localization. Before inverting real data, we should carry out an evaluation of the model resolution limits by running a synthetic inversion. Thus, several models have been tested to make this resolution analysis. Since the correlation between faults and seismicity is not obvious to observe in the studied region, it is difficult to target the fault responsible for the seismic activity. By inverting travel times of the recorded aftershock sequence, we will be able to obtain a distribution of velocity contrast in all direction. Therefore, the seismogenic zone is going to be identified and related to geological features in order to better understand the tectonic phenomena noticed in the region. Nevertheless, aftershocks were distributed over a narrow zone which led to a poor area resolution. In result of this unfavourable epicentral coverage, the ray distribution was therefore too poor to image the region of interest. That is why additional data (local or regional data and incorporation of later phases) must be added in this study in order to increase the area of interest and obtain more accurate and reliable results.

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