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Mechanism of the ML4.0 25th April 2016 Lacq (SW France) earthquake related to the gas extraction field

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There were 11 earthquakes of magnitude larger than 3.8 in metropolitan France in 2016 according to the available catalogue EMSC. Among them, the ML4.0 25th April 2016 earthquake is suspected to be induced in gas exploitation field of Lacq, south-western France, close to the Pyreneans. The area is briefly covered by French national broad-band and acceleration networks and the data are available from ORFEUS/EIDA (European Integrated Data Achieves, http://www.orfeus-eu.org/data/eida/index.html). In order to understand the mechanism of this earthquake and the state-of-art of the reservoir, it is essential to study the reliability of the focal depth and mechanism. We carry out a moment-tensor inversion using Genetic Algorithm. We select three broad-band stations at distance of about 50 km and applied a bandpass filter between 16 and 32 seconds. Green functions are calculated for the 1D layered structure. We fix the epicenter position determined by RéNaSS (Réseau National de Surveillance Sismique, http://www.renass.unistra.fr) and change the possible focal depths. The inversions show a good convergence to a solution of Mw3.8 indicating EW running normal faulting. This mechanism is consistent with the reservoir geometry of the gas field and may be interpreted as subsidence of the reservoir. However the obtained solution does not fit the nearest station, located a few hundred meters from the epicenter, probably due to lack of the precise epicenter position and/or local structure.