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Emilia 2012 seismic sequence: a triggered crisis?

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The 2012 moderate magnitude seismic sequence recorded in the Padania Plain (Emilia Romagna, Northern Italy) started with two main shocks of magnitude 5.9 and 5.8 on May 20 and 29, respectively. The sequence located on the complex system of thrusts distributed in the shallow crust at the limit of the seismogenetic structure. This area has been characterized by low to moderate seismicity (Rovida et al., 2011). The most recent events occurred in 1956, close to Ferrara, with V-VI MCS degree (De Panfilis, 1959) and in 1986 and 1987, both Mw ca. 4.6 (Rovida et al., 2011). The epicentral area and its neighbouring is the site of gas storage and intensive withdrawal of gas and oil. More than hundreds boreholes for gas and/or oil production are located in the Padania Plain, with large rate of mass extraction. The removing of this mass produces a progressive stress variation at depth which, eventually, could be responsible for earthquakes triggering. A relationship between fluid extraction at crustal depth and associated potential fault slip was proposed by Segall (1989), using a poroelastic solution. Fluid extraction produces a isostatic imbalance and, potentially, reactivation of faults, in which the amount cumulative seismic moment can be empirically related to the mass of extracted fluid. In this study we present a preliminary results of a compared analysis between the energy released during the 2012 Emilia seismic sequence and the temporal stress variation for fluid withdrawal. The analysis is performed to understand the possible correlation between earthquakes occurrence and fluids extraction, also considering the potential faults mechanisms and earthquakes spatial distribution.