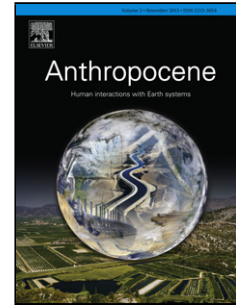


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Anthropogenic seismicity in Italy and its relation to tectonics: State of the art and perspectives

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Abstract

Since hydrofracking is used for shale gas production, human caused seismicity have become a subject of increasing interest. Seismic monitoring is common for earthquakes generated by human operations like mining, reservoir impoundments, hydrocarbon and geothermal production, as well as reinjection of fluids. In Italy the M_w 6.1 Reggio-Emilia earthquake of 20th May 2012 triggered particular interest in anthropogenic seismicity. It also raised the question of whether hydrocarbon exploitation induced variations in crustal stress that influenced the generation of these earthquakes. The Italian government commissioned a technical report compiling cases of documented and hypothesized anthropogenic seismicity. This paper reviews these cases, on the basis of previously published works, and additional new analyses. Three cases of seismicity in Central Italy, occurring close to anthropogenic activities, are: (i) extraction of carbon dioxide (CO₂) from a borehole near Pieve Santo Stefano, (ii) the impoundment of the Montedoglio reservoir and (iii) geothermal energy production at Mt. Amiata. Since the sites are situated in the seismically active area of the Northern Apennines, we illustrate both by standard seismological analysis as well as by modeling to tackle the challenge of discriminating anthropogenic from natural seismicity.

Keywords: triggered/induced seismicity, Italy, CO₂ extraction, geothermal exploitation, reservoir impoundment, Mt. Amiata, Upper Tiber Valley

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