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Geological and seismotectonic characteristics of the broader area of the October 15, 2016, earthquake (Ioannina, Greece)

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This paper examines the seismotectonic setting of the moderate earthquake of October 15, 2016, w=5.3 (or 5.5), in the broader area of Ioannina (Epirus, Greece). In this region the problem of reviewing the geological structure with new and modern methods and techniques, in relation to the geological-seismological evidence of the recent seismic sequence, is addressed. The seismic stimulation of landslides and other soil deformations is also examined. The earthquake is interpreted as indicative of a geotectonic environment of lithospheric compression, which comprises the backbone of Pindos mountain range. It starts from southern Albania and traverses western Greece, in an almost N-S direction. This is a seismically active region with a history of strong and moderate earthquakes, such as these of 1969 (Ms=5.8), 1960 (South Albania, M> 6.5, maximum intensity VIII+) and 1967 (Arta-Ioannina, M = 6.4, maximum intensity IX).
The recent earthquake is associated with a known fault zone as recorded and identified in the Greek Database of Seismogenic Sources (GreDaSS, www.gredass.unife.it). Focal mechanism data indicate that the seismic fault is reverse or high-angle thrust, striking NNW-SSE and dipping to the E. The upper part of Epirus crust (brittle), which have an estimated maximum thickness of 10 km, do not show any significant seismicity. The deeper seismicity of 10-20 km, such as this of the recent earthquake, is caused by deep crustal processes with reverse – high-angle thrust faults. We suggest that the case of this earthquake is peculiar, complex and requires careful study and attention. The precise determination of the seismogenic fault and its dimensions, although not possible to be identified by direct field observations, can be assessed through the study of seismological and geodetic data (GPS, satellite images, stress transfer), as well as its seismic behavior. Field work in the broader area, in combination with instrumental data, can contribute to determine if the activated fault is a secondary fault capable of producing earthquakes in the range of 5.0 to 5.5, such as the earthquake of October 15, 2016, or part (seismogenic segment) of a larger fault or a fault zone of a capacity comparable to the historical earthquakes in the region.