Rupture process of the November 2019 Durrës, Albania, earthquake

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On November 26, 2019, a magnitude 6.4 thrust earthquake struck in the northwestern part of Albania, near Dürres. With a death toll of 51 people, it was reported as the deadliest earthquake of 2019, because of local site effects in the sedimentary layers of the external Albanides and even if the rupture has not reached the surface.

One of the outstanding questions is to determine the causative fault plane of that earthquake since this could have a major impact for regional seismic hazard assessment. Indeed, one east dipping plane coincides with the subduction interface which emerges offshore the coast of Albania, posing a potential tsunami threat if this plane is proven to be active, as suggested by the 1979 Montenegro earthquake (Mw 6.9). The other plane coincides with a shallower west dipping crustal backthrust running inland, thus close to major cities, in particular Tirana. So far, studies using geodetic data (mainly InSAR) have not been able to clearly identify a causative plane due to inherent ambiguity of surface deformation measurements.

In order to attempt answering this question, we investigate in detail the rupture process of this earthquake using a combination of InSAR data (ascending and descending Sentinel 1A tracks), GNSS data (both static and high rate), strong-motion and teleseismic data. Our results show that both planes lead to a similar slip distribution with one major slip patch close to the hypocenter with a peak-slip amplitude of ~1m. The compactness of the source makes it difficult to successfully distinguish the causative fault plane even with such a complete dataset. Precise relocation of aftershocks and possible postseismic relaxation motion could be the only discriminating observations to conclude with certainty on the rupture plane.

Mots-Clés : Albania, Earthquake Rupture, Seismic Hazards, Seismology, Geodesy

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