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New insights on the Apricena Quaternary blind Fault (southern Italy) by high resolution seismic profiling.

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Blind faults pose a major threat in seismic areas and represent a crucial task in earthquake hazard assessment, because they cannot be easily detected by surface geological analyses. Seismic reflection methods, supported by other seismological and geophysical data, are the main tool used to detect active blind fault. However, quality of commercial reflection profiles is often inappropriate to face this issue in Southern Italy mainly because of the extreme structural complexity. Even good-quality profiles seldom bear a resolution and S/N ratio, within 1s TWT, sufficient to achieve detailed structural imaging at shallow depth, which is crucial to document recent activity and assess seismogenic potential of blind faults. These drawbacks can be overcome by high-resolution (HR) seismic reflection surveys. This study deals with HR reflection profiling targeting the Apricena blind Fault (AF), a $\sim$30 km long, WNW trending, S-dipping fault located at the western margin of the Gargano Promontory. The subsurface geometry of the fault, that joins to the East the complex strike-slip Mattinata Fault System (MFS), is constrained by commercial profiles. The fault cuts across the Mesozoic-Tertiary Apulia carbonates and deforms the overlaying Plio-Pleistocene terrigenous sediments, at least up to Middle Pleistocene regressive deposits. Frequent acquisition gaps and an overall low quality hinder the imaging of shallower, more recent sequences, which could assess the hypothesis of recent activity and significant seismogenic potential proposed for the AF on the basis of geomorphic large-scale anomalies and felt reports of the 1627 Capitanata earthquake (Me 6.7).
In order to improve shallow imaging, we acquired three HR SW-NE trending reflection profiles across the AF, in correspondence of the western, central and eastern fault strands. Seismic data were collected by using a HR vibrating seismic source (IVI-Minivib), appropriate for shallow reflection surveys, and an array of receivers consisting of 216, 10 Hz, vertical geophones. Setting the receiver spacing to 5 m and the source interval to 10 m, we recorded dense data within a wide offset range. The results presented here testify the relevance of our approach for detection and understanding of recent behaviour of suspected active blind faults.
Based on commercial seismic reflection data, several authors interpret AF in terms of transtensive tectonics; however our high-resolution profiles might also suggest transpressive kinematics for this splay of Mattinata Fault. However, further geophysical and mesostructural data need to be acquired and interpreted before choosing between the two alternative interpretations.