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New Electrical Resistivity Tomography approach for karst cave characterization: Castello di Lepre karst cave (Marsico Nuovo, Southern Italy).

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Geophysical methods are commonly applied to characterize karst cave. Several geophysical method are used such as electrical resistivity tomography (ERT), gravimetric prospecting (G), ground penetrating radar (GPR) and seismic methods (S), in order to provide information on cave geometry and subsurface geological structure. In detail, in some complex karst systems, each geophysical method can only give partial information if used in normal way due to a low resolution for deep target. In order to reduce uncertainty and avoid misinterpretations based on a normal use of the electrical resistivity tomography method, a new ERT approach has been applied in karst cave Castello di Lepre (Marsico Nuovo, Basilicata region, Italy) located in the Mezo-Cenozoic carbonate substratum of the Monti della Maddalena ridge (Southern Appenines). In detail, a cross-ERT acquisition system was applied in order to improve the resolution on the electrical resistivity distribution on the surrounding geological structure of a karst cave. The cross-ERT system provides a more uniform model resolution vertically, increasing the resolution of the surface resistivity imaging. The usual cross-ERT is made by electrode setting in two or more borehole in order to acquire the resistivity data distribution. In this work the cross-ERT was made between the electrodes located on surface and along a karst cave, in order to obtain an high resolution of the electrical resistivity distributed between the cave and the surface topography. Finally, the acquired cross-ERT is potentially well-suited for imaging fracture zones since electrical current flow in fractured rock is primarily electrolytic via the secondary porosity associated with the fractures.