



Geophysical exploration above cave sites: From measurements to model predictions

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Shallow caves in soluble rocks can be detected from the surface with a variety of geophysical methods. For example, gravity reveals cavities through the negative Bouguer-anomalies associated with the air- or sediment-filled voids. Electrical resistivity imaging senses the different infill of cavities, either high resistivities from air-filled voids or dry soft sediments, or low resistivities from saturated sediments. The georadar can reveal structural information from the boundaries between cave and rock, and from layered sediment filling the passages.

We have surveyed several sites above known shallow karst caves in dolomite and in gypsum with a combination of gravimetry, electrical resistivity imaging, and georadar surveys to detect the signal of the underlying karst objects. We successfully located the caves with at least two of the geophysical methods. Additional information on the structure of the caves could then be revealed by simple two-dimensional forward modelling of selected caves.

We aim to further improve the modelling perspective with the development of a new three-dimensional program tool, which is able to simulate sub-surface voids below a realistic surface located in an aquifer. A first version of this tool will be presented.