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Investigating the shallow Subsurface in the Vicinity of a karstic reactivated Sinkhole in the Depression of "Loussoi" (Peloponnesus, Greece) with Remote Radio Transmitter EM Methods

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The knowledge of the exact position and size of buried karstic sinkholes as well as their reactivation mechanism and thickness of the overburden sediments is an important task for actual and future sustainable karst groundwater protection and management. To ascertain this type of high-vulnerability zones, a karstic area in the northern part of Peloponnesus in Greece was surveyed with the Radiomagnetotelluric (RMT) method combined with the Very Low Frequency-Electromagnetic Gradient (VLF-GRAD) method. This survey took place in the vicinity of a recently reactivated karstic sinkhole, formerly buried and closed by sediments. The results show the efficiency and reliability of those geophysical methods by providing very important information to hydrogeologists concerning the properties of the overlaying sediments and constitute a first step for the complete understanding of those hazardous karstic phenomena.

In particular, the VLF-GRAD data, separate the survey area clearly into a homogeneous and a heterogeneous part concerning the lateral electric resistivity distribution of the ground. Combined with resistivity information from the RMT data, the heterogeneous zone is interpreted as karstified limestone. The sinkhole itself is situated in this zone and its position coincides with the most prominent VLF-GRAD anomaly. Furthermore, resistivity cross sections derived from 1-D and 2-D inversions of the

RMT data suggest underground models explaining well the geological and hydrogeological circumstances for the possibility of a sinkhole development at this particular location.