Geophysical Research Abstracts
Vol. 20, EGU2018-18226, 2018
EGU General Assembly 2018

Shedding light on the complex hydrogeology at the active sinkhole site Münsterdorf, Germany

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Sinkhole formation has been observed on and in the near vicinity of a sports ground at the city of Münsterdorf in northern Germany over the last years. Extensive investigations, including repeat drilling of soil cores and surface geophysical surveys, were performed to understand cavity formation and sinkhole propagation within this closely confined area. As the resulting conceptual site model indicates a governing role of the local hydrogeological regime on these processes, we performed a thorough hydrogeological site characterization; this included high resolution vertical exploration and installation of long term monitoring devices. Direct push based investigations were able to reveal the complexity of the encountered multi-aquifer structures with confined units. Based on the direct push exploration, the design and installation of ground water monitoring devices was adaptively planned and performed, revealing highly diverting ground water flow directions within the hydrogeological units during the investigated period. This hydrogeological investigation strategy proved to be highly advantageous and beneficial over conventional approaches for the refinement of the conceptual site model and to foster understanding of the impact of local effects on sinkhole formation.