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The Münsterdorf sinkhole cluster: Void origin and mechanical failure

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We describe and explore a group of collapse sinkholes located on a sports field in the village of Münsterdorf close to Hamburg in northern Germany. The collapse sinkholes develop since 2004 with a rate of one per year, with sizes between 2-3 m in diameter and 3-5 meter depth, and are aligned to a narrow east-west trending region..

In 20 m depth, cretaceous chalk is present in the area, topped by peri-glacial and glacial deposits.

We summarize hydrological, geodetical, and geophysical data collected and then discuss mechanical concepts for the occurrence of the collapse sinkholes, starting with simple analytical solutions and then expanding to distinct-element modelling. We conclude that dewatering of the area might be an important aspect for the collapse sinkhole development.