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Vulnerability-maps

concepts and techniques

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- the meaning of vulnerability
- concepts of vulnerability maps
- application of geophysical techniques
- field examples





















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sparsely distributed boreholes - interpolation required



\rightarrow Geophysics

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clay content: key parameter for hydraulic and electric conductivity

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can be combined to get a rough relation between electric and hydraulic conductivity (only valid for clayey material)



aquifer vulnerability



aquifer vulnerability



use of resistivity measurements for vulnerability mapping: pulled array survey, University of Aarhus

sandy inclusions in clayey environment: increased aquifer vulnerability



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large scale resistivity mapping by airborne methods





calculation of integrated conductivity down to mean water table or resistivity defined watertable

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integrated conductivity in the Danish-German border area (Padborg/Flensburg)





Conclusions

- groundwater vulnerability maps are of increasing importance for spatial planning and are required by the EC water framework directive
- vulnerability assessment based on hydraulic conductivity can be backed by measured electric conductivities
- airborne techniques enable large scale conductivity measurments