

Georadar: Locating dangerous zones prior to drilling the 57 km long Gotthard Tunnel in Switzerland

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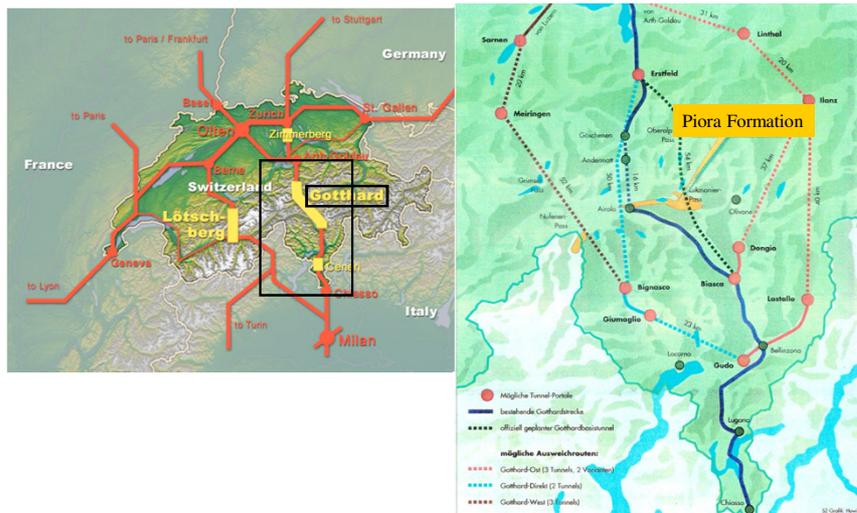


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Location of the „Gotthard“ Tunnel



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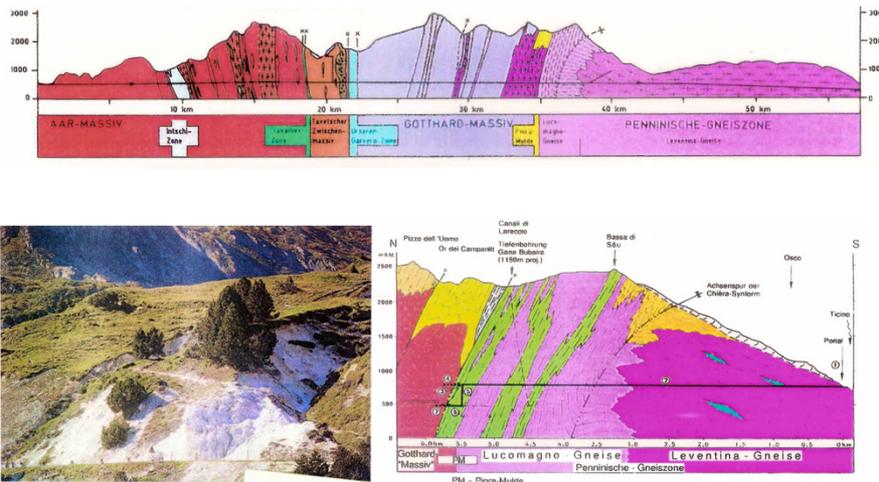
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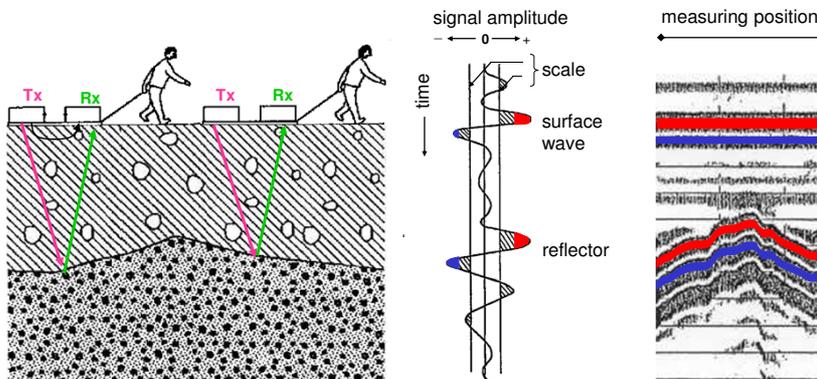
Cut Through on 15 October 2010



Dangerous Geological Formations



Measuring Principle of Ground Penetrating Radar



Principle:

Electromagnetic pulses are emitted by the Transmitter (Tx) and the reflected signal is received by the receiver antenna (Rx).

single signal response

field recording
-> assembled single signals



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Rotary Bit of the Tunnel Boring Machine



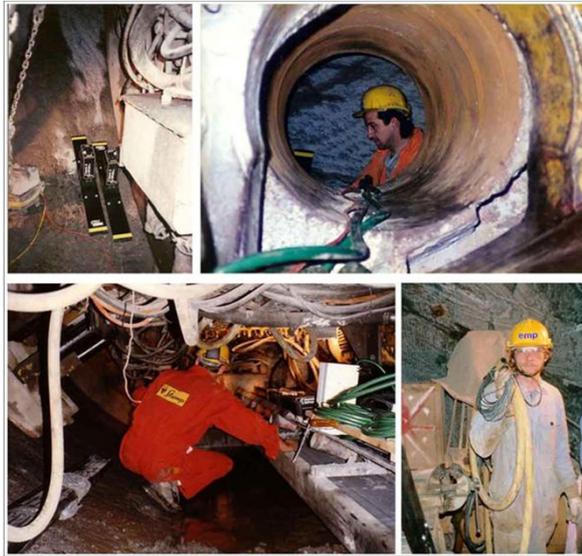
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Passing the GPR Antennas through the Manhole

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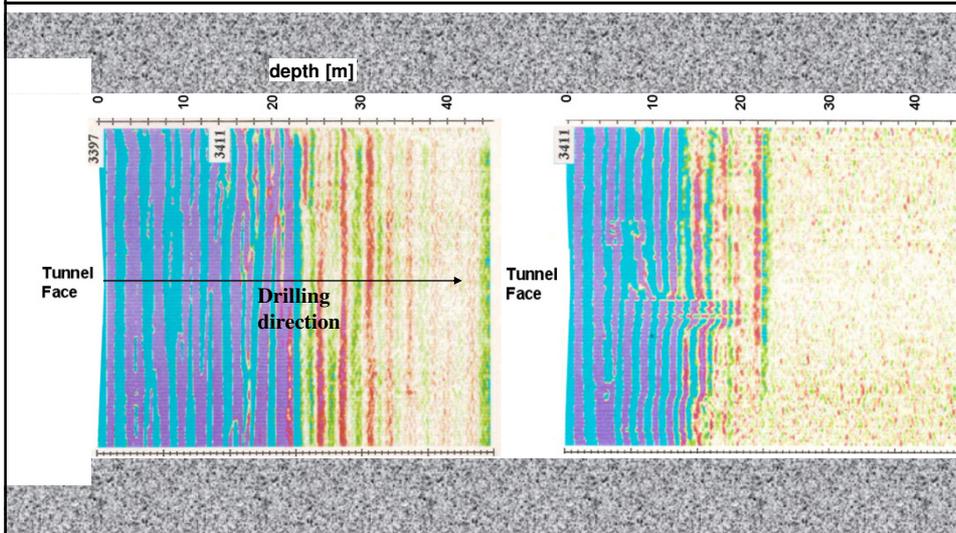
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Results

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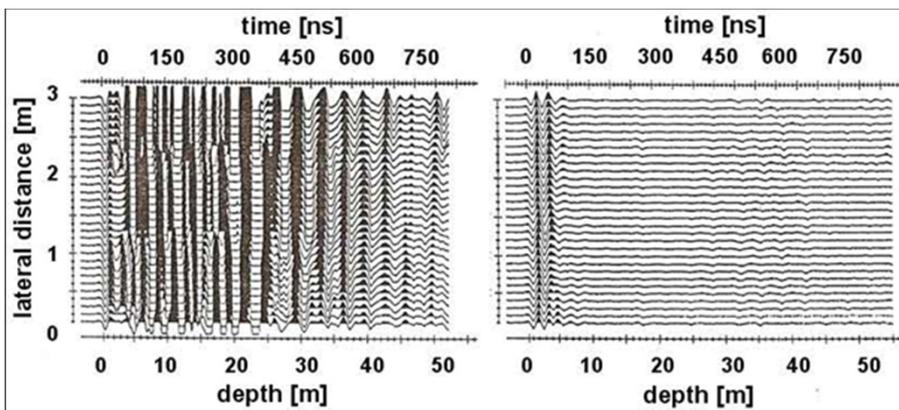


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Good and critical Prognosis



good rock formations

critical rock formations

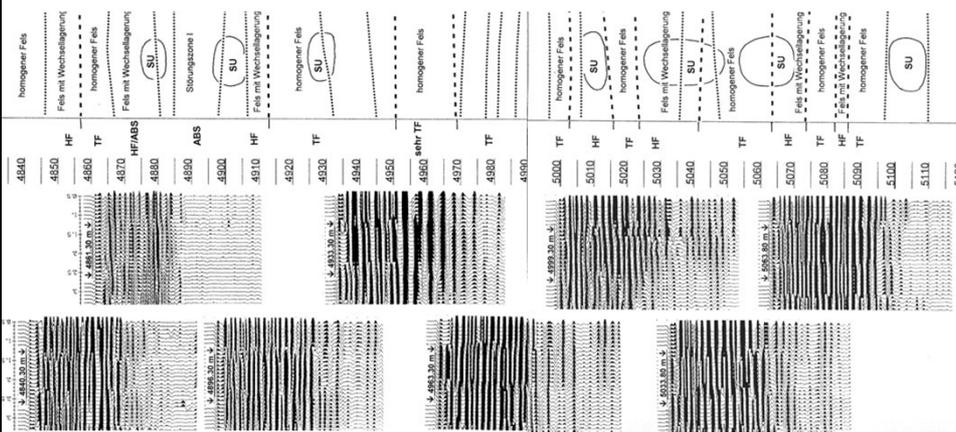


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Series of Georadar Profiles



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Blow-out at Tunnelmeter 5553m

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Summary and conclusion

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- Georadar is a feasible tool for detecting dangerous waterfilled zones in granitic rocks
- It is a very quick method and can be carried out during the check of the drilling bits
- Pilot holes are still necessary for safety reasons. However, the number of pilot holes can be reduced and limited to the critical zones.

**Thank you for listening to
the world in the underground!**



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