# APPLICATION OF GPR IN ASSESSING OF CONCRETE DAM STRUCTURES HEALTH

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EGU General Assembly 2020

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# Introduction

- In this paper an application of GPR in the analysis of concrete structure is presented. Scanning is done as a part of preparation for mitigation works of dam 'Grančarevo'. The goal was to inspect existing small cracks and leakages.

- The dam is arc-shaped concrete dam with double curvatures. It is operational since 1968, and is situated 18km downstream from the wellspring of Trebišnjica river and 17km upstream from the town Trebinje, in Bosnia and Herzegovina.

- Continuous monitoring of dam's construction and surrounding terrain is conducted at over 800 measuring points. In order to determine precise position, geometry and propagation of cracks, this was the first time GPR was used.


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# Introduction

- GPR scanning was done on several important locations: on the crown, downstream face, internal galleries, down- and upstream walls, using antennas with 900 and 400MHz central frequencies.
- Based on scanning results, position and geometry of cracks within the concrete are successfully determined.
- At several locations, zones with higher humidity are noticed. These zones are significant since they present areas of higher priority during mitigation and they are often found in the vicinity of junctions between two concrete segments of the dam.


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# Dam “Grančarevo”

Relative height of the dam is 123m, while its width along the crown is 439m.



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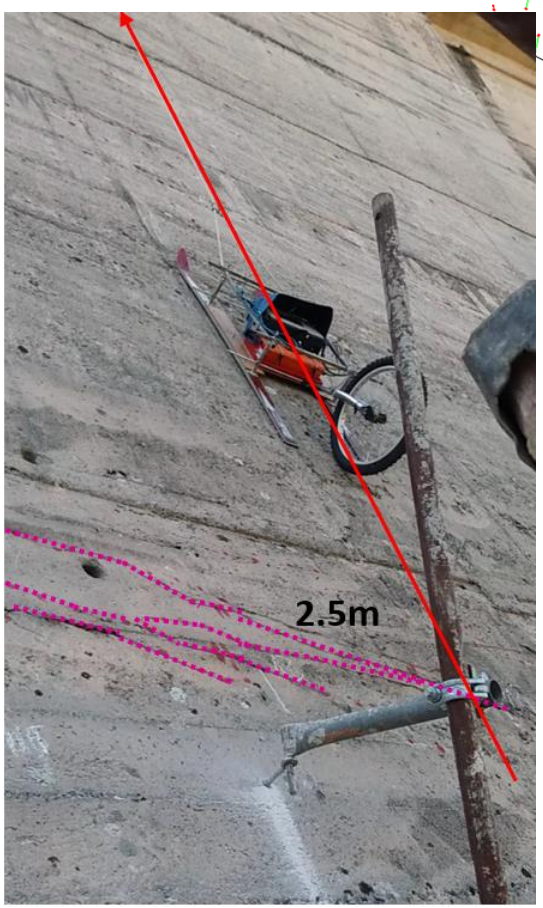
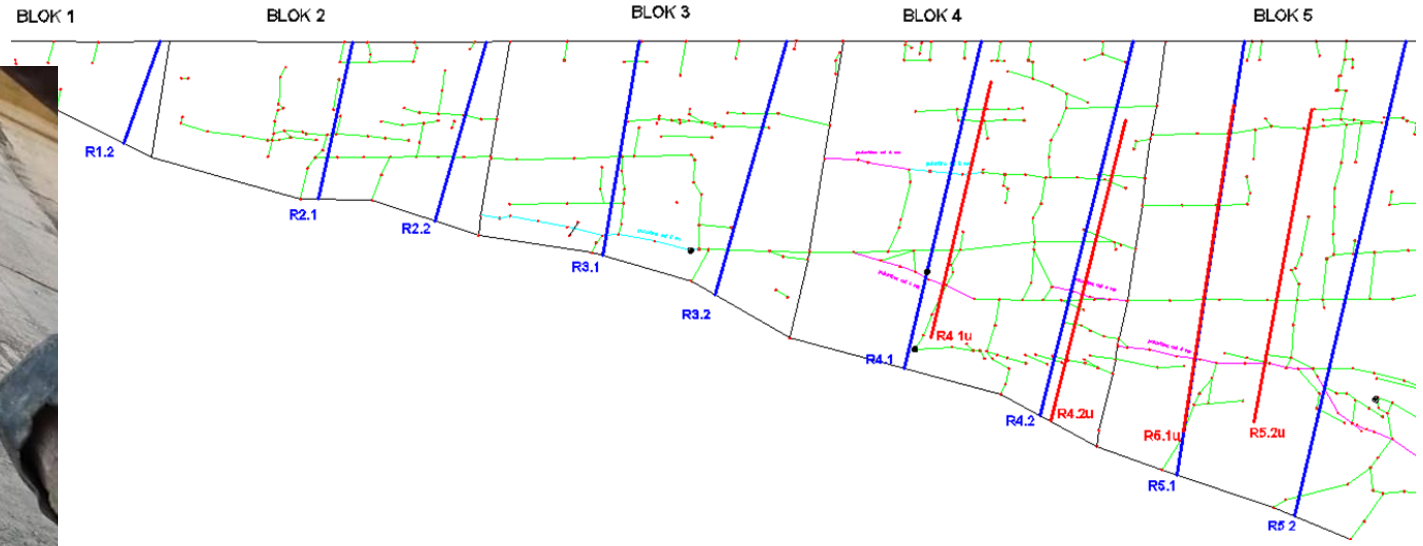
# Vertical profiles

13 vertical profiles were scanned with antennas (400 and 900MHz).



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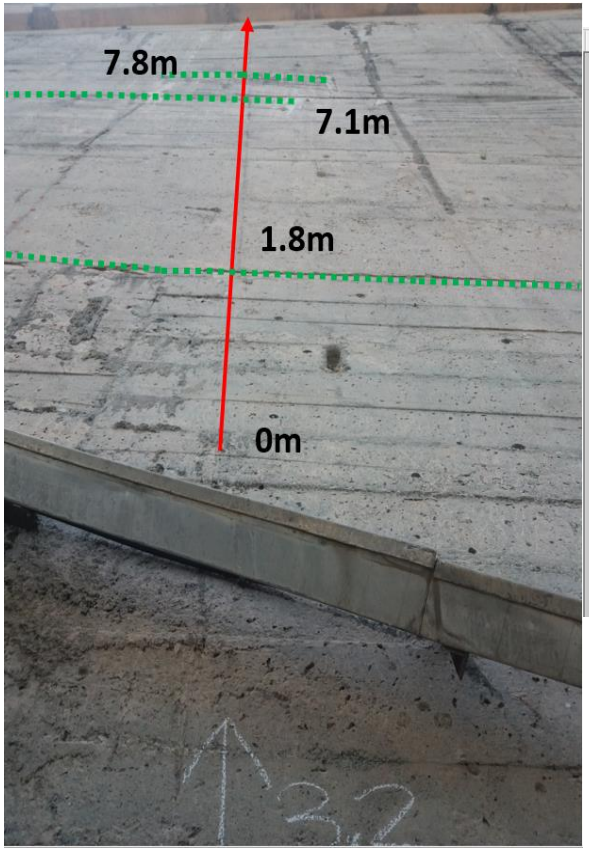
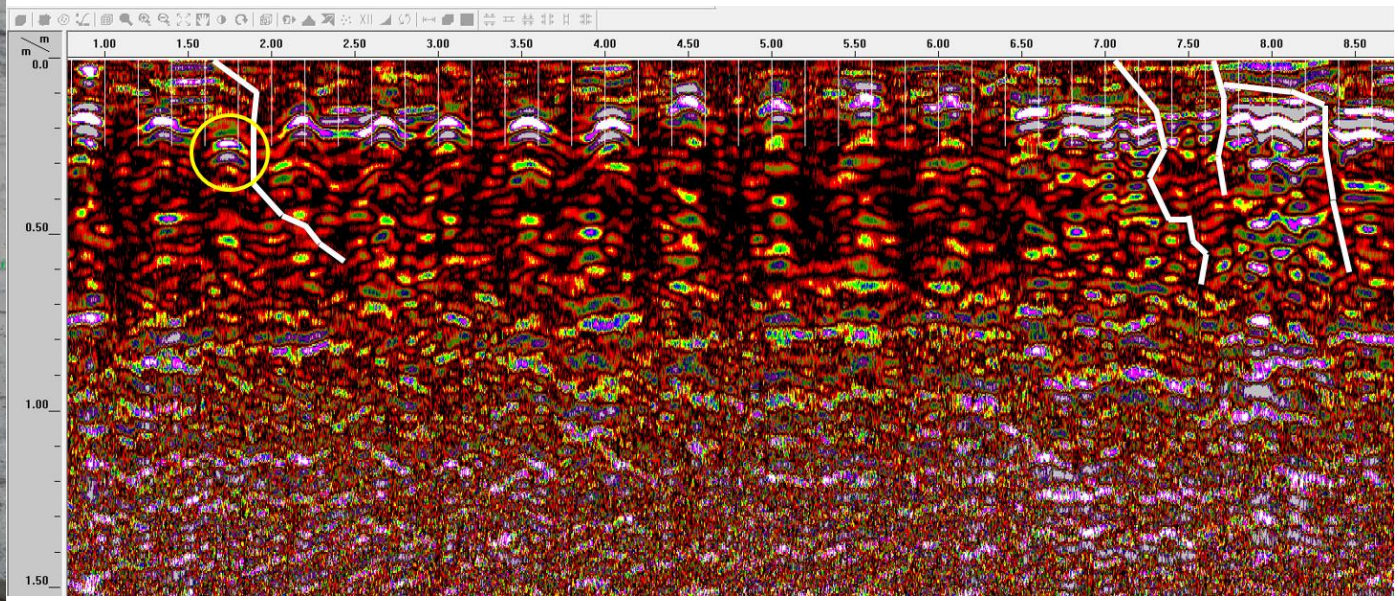
# Vertical profiles

Profile 3.2, 900MHz antenna, 9.2m long



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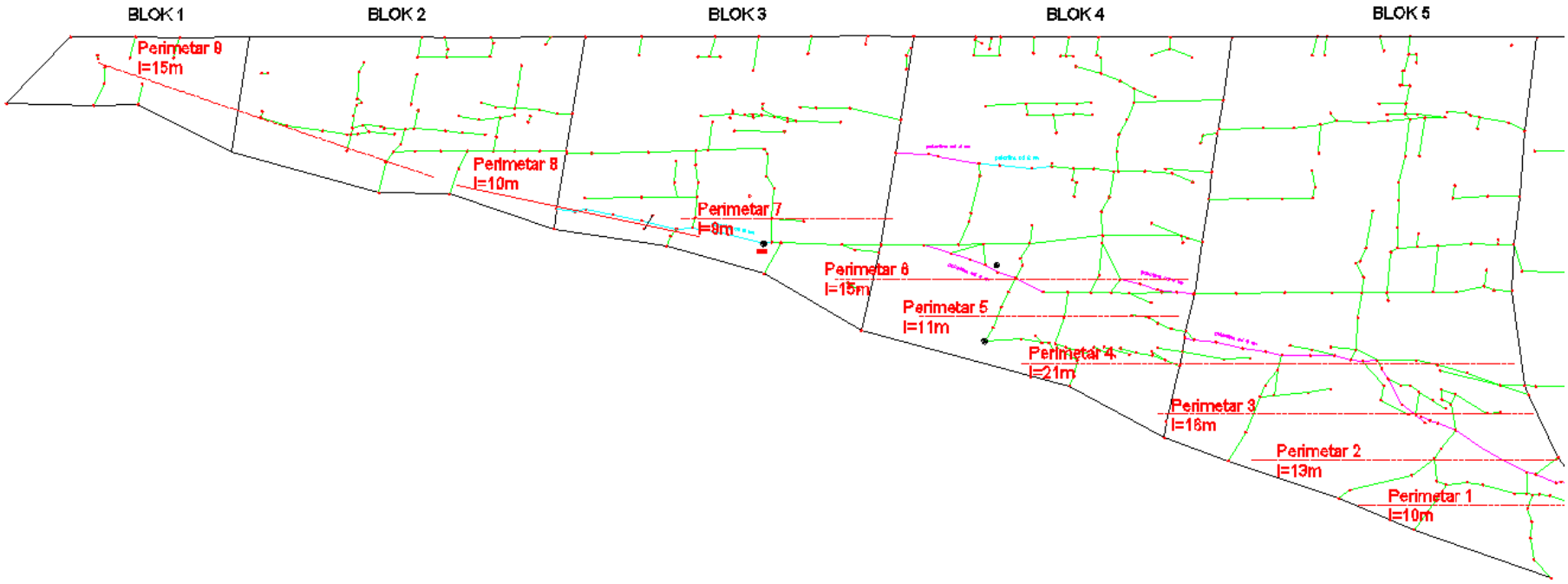
# Horizontal profiles

Layout of horizontal profiles in blocks 1-5.



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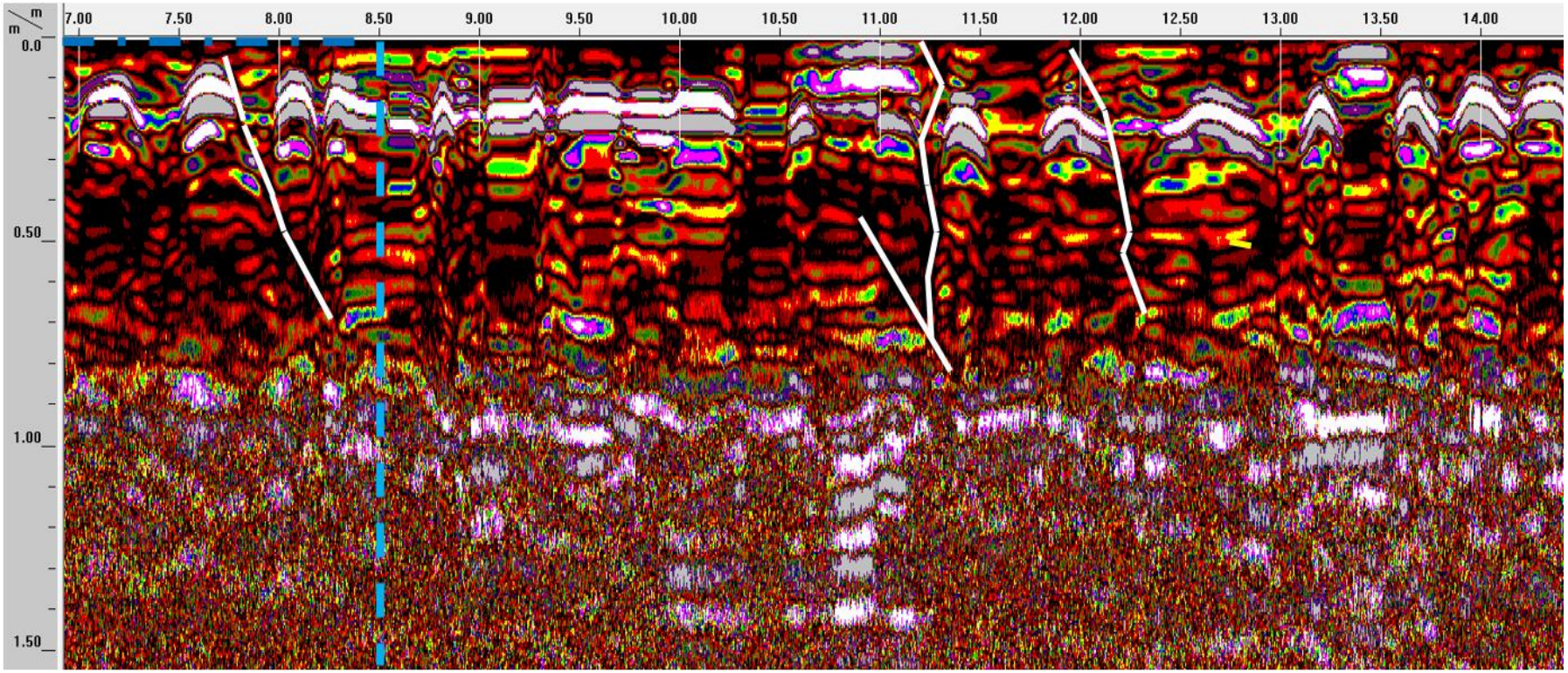
# Horizontal profiles

Horizontal profile (perimeter) 6, 900MHz antenna, 15m long



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# Conclusion

- Large amount of data acquired by using non invasive technique provided a solid foundation for analysis.
- Analysis results reveal the state of internal structure of the dam.
- Survey should be done again to examine the changes and to get better insight in the behavior of the object.
- Obtained results indicate that GPR technology is rather useful tool for structure health monitoring which provides information that are significant in planning mitigation measures and extending a lifetime of a concrete object.


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# Thank you for your attention!



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