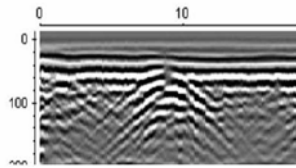


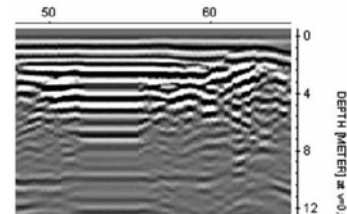




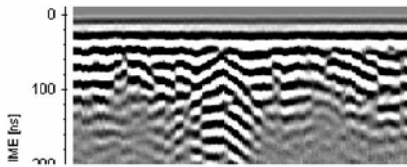
As the RTA antenna is an in-line configuration, the polarization as well as the antenna radiation pattern makes close range detection somewhat more difficult. However, when mapping layers and other non-polarizing targets, especially deeper ones, there is little difference between the two configurations. The differences are shown in the pictures below, both the mapping of an object and the mapping of layers.



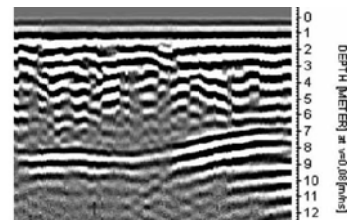
Hyperbola Broad-side



Layer Broad-side



Hyperbola In-Line

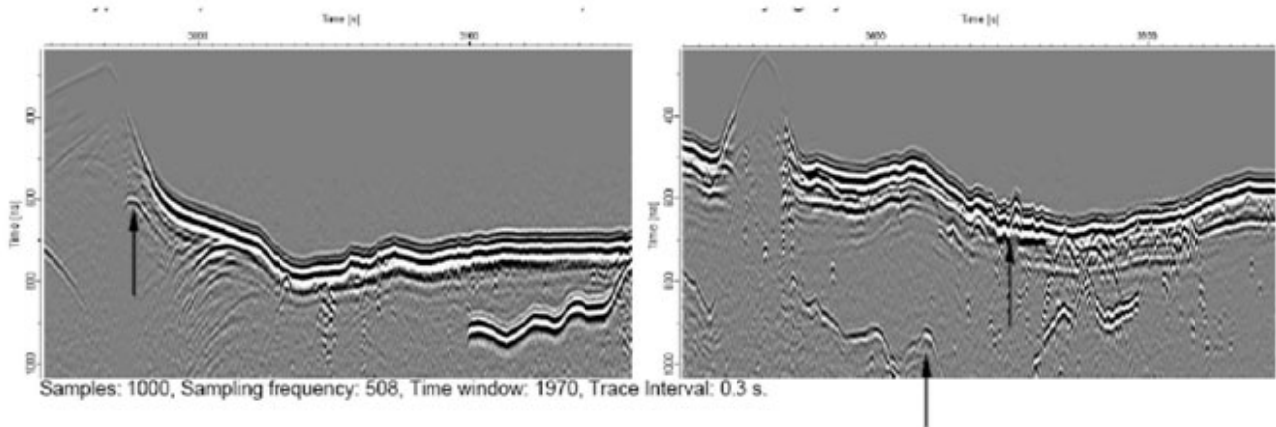


Layer In-Line

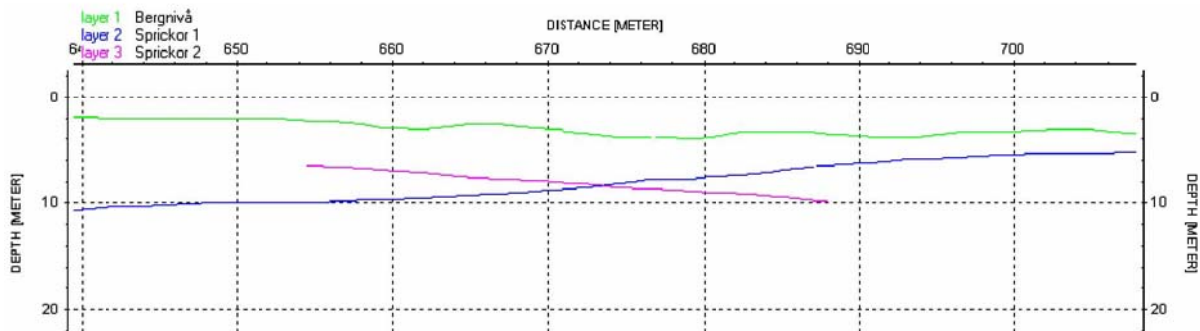
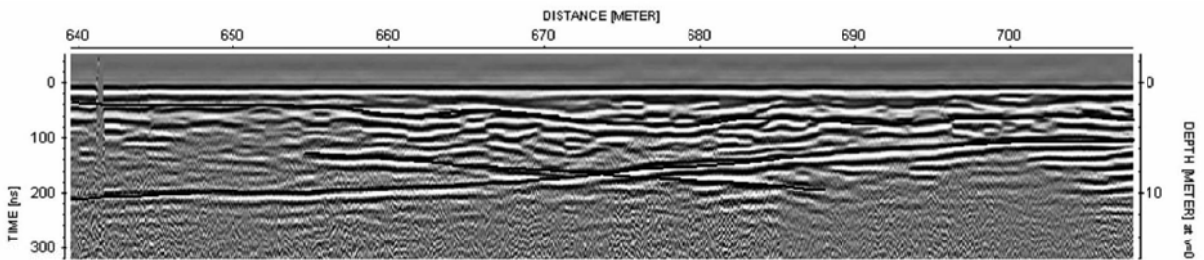
As the RT is an antenna of unshielded type, unwanted noise can also occur in the data, due to the fact that the antenna emits electromagnetic waves in any direction and also receive them from any direction. The noise is most often in the form of air reflections.

## Results

The following results have all been measured with the RAMAC RTC, showing applications of different kinds. Below is a measurement from a lake, aiming at mapping the bottom topography, and also to see if there is any sediment present. In the radar grams the bottom topography is most clearly seen, together with single objects (seen as so called hyperbolas, some of them marked with arrows) and also underlying layers.



In this example the RTC was used to map a thin soil layer on top of the bedrock (bedrock level marked with green line below), and as a result also larger fracture zone with in the bedrock could also be mapped, represented by the two red lines below.

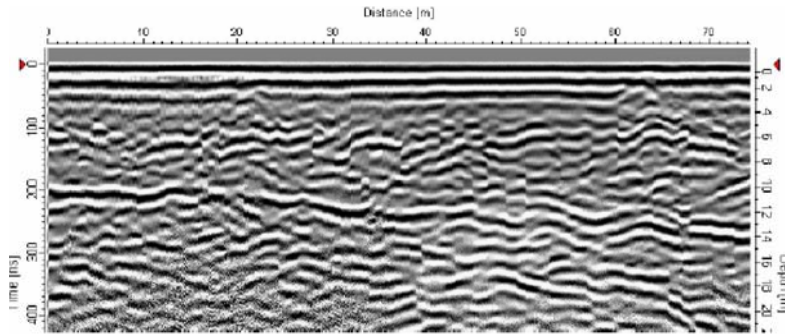


Samples: 408, Sampling frequency: 702, Time window: 581, Trace Interval: 10 cm

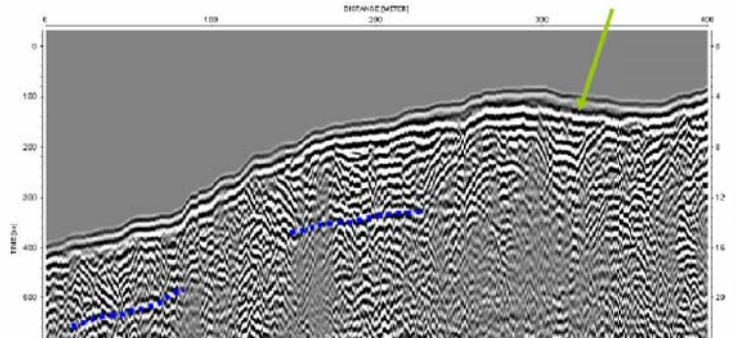
The RTC is quite suitable to map groundwater levels in non-conductive areas. The example below is from a



sandy area, where the groundwater is clearly seen as a slowly dipping surface at approximately 14 m depth.



The last example is a geological mapping of an esker area, where the structure of the ground is quite nicely illustrated by the RTC. See for example the depression marked with an arrow. However, in these areas, with an extensive amount of boulders, the different layer can be hard to distinguish, due to the fact that the hyperbola pattern complicates the picture. Groundwater level is in some parts indicated, while the bedrock surface cannot be seen.



## Conclusions

The RAMAC RTC have showed to be a useful low frequency GPR system for a number of different purposes; geological mapping on ground and lakes, structure mapping of bedrock, groundwater investigations etc.

The system is sufficient in performance of mapping stratigraphy and superior in terms of efficiency in fieldwork, especially in non-cleared forest areas, compared to traditional broadside systems. More over, the RT Antenna is always on ground, which gives a very good coupling of the EM energy into the ground.

In terms of fieldwork efficiency, it can be stated that the RTC in forest can be managed in walking speed or slow walking speed, and on track, in walking speed or vehicle mounted.

The RTC is also simple to freight, as all parts can be stored in an ordinary suitcase and the weight is less than 14 kg.