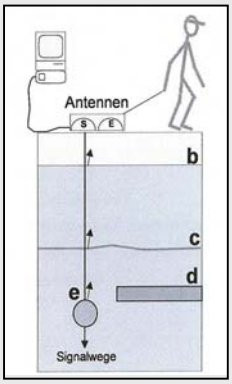
Detection of buried corpses using georadar

M. Graw[1], B. Illich[2] H.-T Haffner[3], S. Fiedler[4]

[1] Institute of Legal Medicine, University of Munich, [2]GGU Karlsruhe, [3]Institute of Legal Medicine, University of Heidelberg, [4]Institute of Soil Science and Land Evaluation, University of Hohenheim

A georadar emits electromagnetic waves into a medium; the expansion of the waves depends on electrical characteristics of the medium into which the waves are emitted. The radar signal spreads out at a constant speed, and is reflected at discontinuities which can be detected using receiver aerials (Fig 1a). As the propagation speed of the waves is known, the duration can be used to calculate the covered distance. The range of the radar in the soil is limited by the absorption (high electrical conductibility) and scattering of the signal (the result of inhomogeneous soil). The range is also affected by the type of granular soil, the amount of dissolved salts and humidity. The signal amplitude is registered at the receiver independently from time as "signal trace". Radargrams, which resemble depth slices, are obtained by stringing the signal traces along the measured distance (Fig 1b). Laminar measurements can be used to calculate maps of higher reflection signals (known as time slices) for any depth. The radar detects reflecting structures, e.g., soil faults, tubes, pits, remains of walls. If their presence cannot be deduced from remains found at the soil surface, the detection of corpses buried in soil or graves is difficult, even when using specially trained sniffer dogs. The georadar (ground penetrating radar, GPR) represents a promising method to overcome these difficulties. We will present the successful application of GPR in the *sanitation of graveyards* and in the elucidation of *2 forensic cases*.



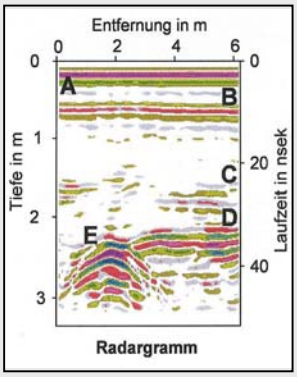
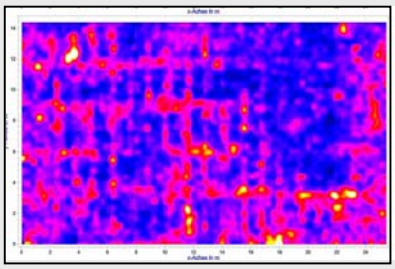


Fig. 1a+b Ground Penetrating Radar (GPR) – The principle

Sanitation of graveyards

(Fig. 2a) For an efficient sanitation it is important, to define the exact position of the graveyards .

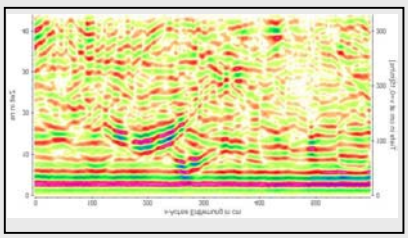


(Fig. 2b) Detection of grave sites: with a georadar we detected in an excavation depth of ca. 1.5m a time slice, the graveyards are displayed in a clear raster.

(Fig. 2c) By opening some of the graveyards during the sanitation it showed that the georadar displayed the correct positions.

Forensic case 1

(Fig. 3a) The police presumed that after a killing the dead body had been disposed in a woodland on the scale of two hectare.

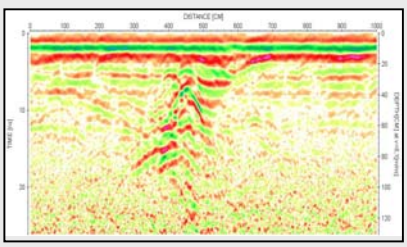


(Fig. 3b) The Radiograms (500 MHz) showed lower reflections. The Physicians diagnosed roots.

(Fig. 3c) Indeed, the only things that were found in excavations were roots. The disposition of the corpse is unclear till today.

Forensic case 2

(Fig. 4a) The suspicion came up that



(Fig. 4b) Radargram of concrete plate using a georadar (900MHz) we found a disturbance

(Fig. 4c) As the concrete plate got opened a hidden female body, suffering a skull trauma on the right side was found.