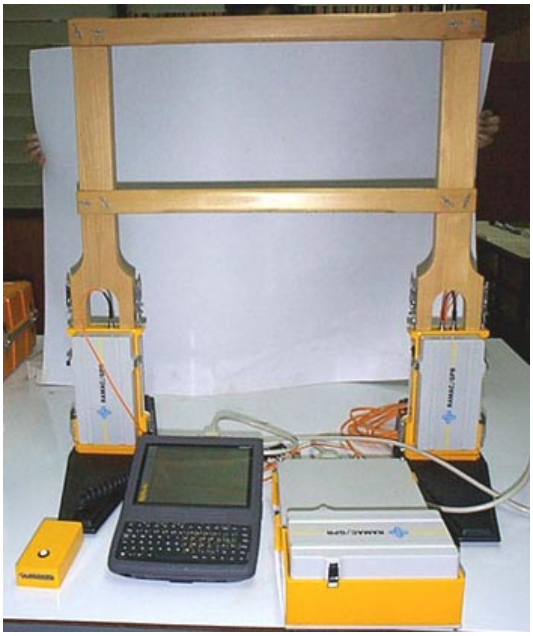
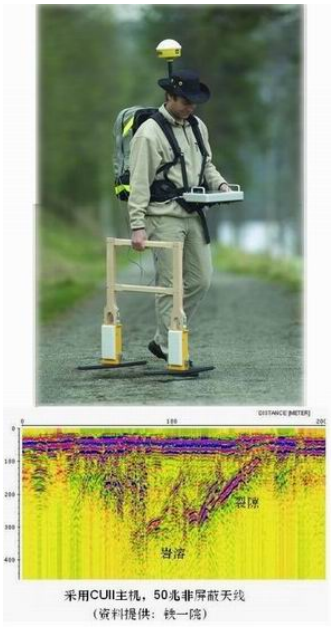
E3 : Data collection and analysis techniques for GPR data

E3.1 Instrumentation

- Frequency range 10 MHZ to 1 GHz
- Low frequencies used for deeper imaging, but with reduced resolution from the longer wavelengths.
- Ground and airborne systems developed

Sensors and Software, PulseEkko-100 system



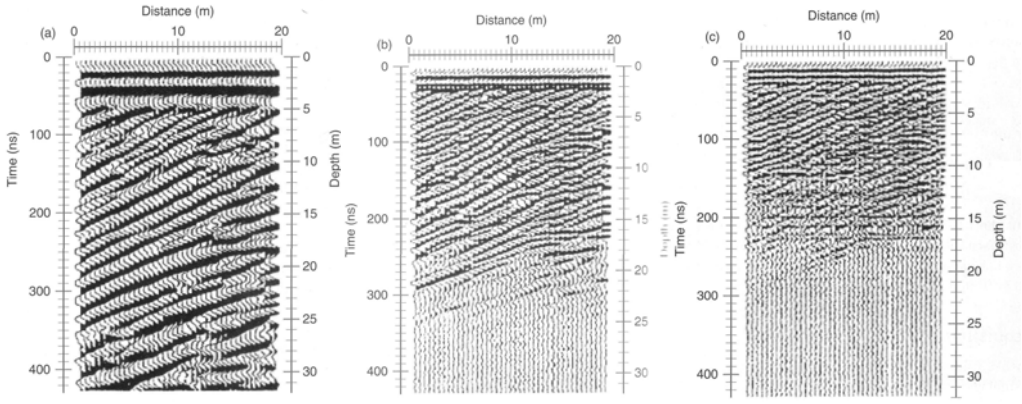


Ramac GPR system

Ramac GPR system mounted in a sled

E3.2 Choice of frequency

- Vertical resolution controlled by frequency.
- Smallest layer that can be detected is a thickness of ¼ wavelength.
- Thus to image small structures a short wavelength is needed.
- However shorter wavelengths require a higher frequency. Since attenuation increases with frequency, this represents a trade-off in terms of resolution and depth of penetration.
- Illustrated in Figure 8.14 (50, 100, 200 MHz)



E3.3 Survey geometry

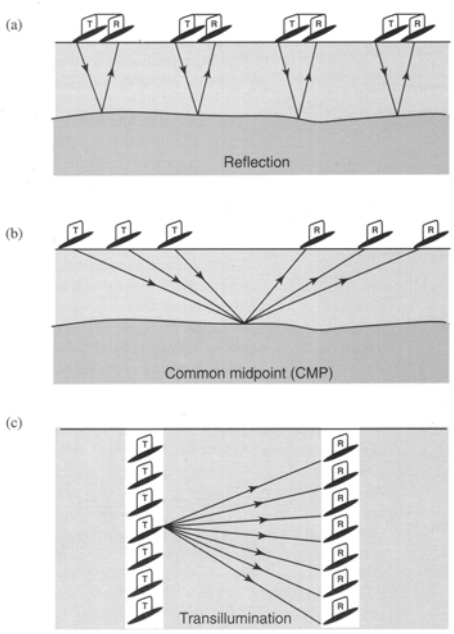


FIGURE 8.15 Some common modes of ground-penetrating radar data acquisition. (a) Reflectio profiling. (b) Common midpoint profiling. (c) Transillumination. (After Annan, 1992.)

E3.4 Velocity analysis

E3.3.1 Walk away test

E3.3.2. Buried object

E3.3.3 Analysis of reflections
See E2 for details