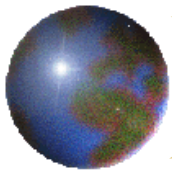
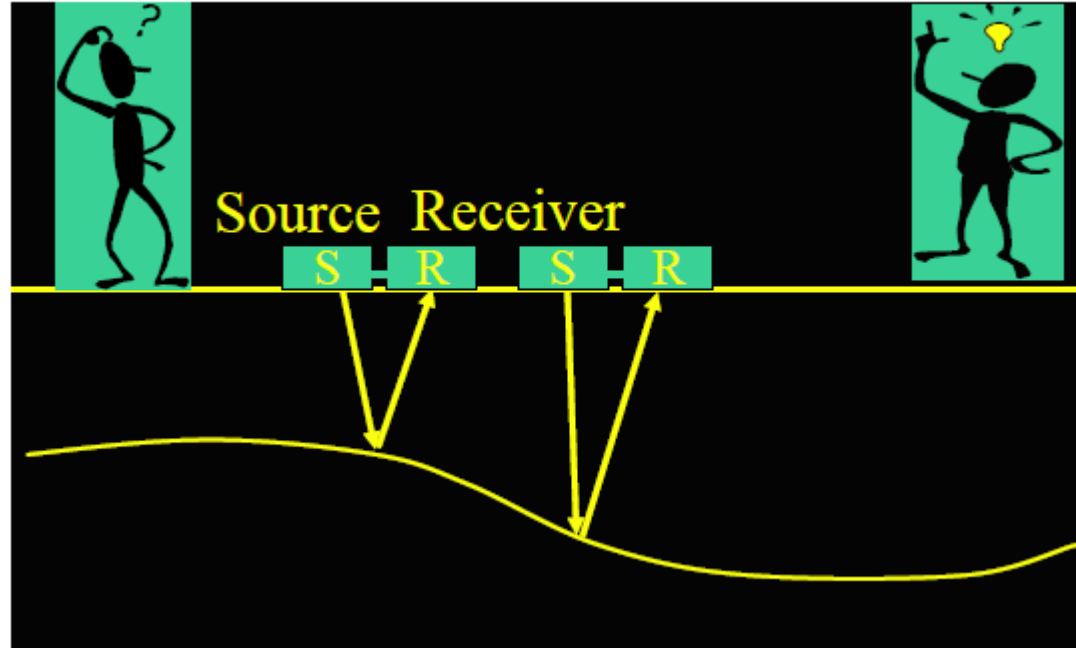


Metódy archeo-geofyzikálneho výskumu Geoelektrické metódy

RNDr. René Putiška, PhD.
Univerzita Komenského Bratislava



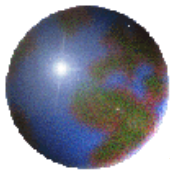
Geofyzikálne meranie: nastroj na získanie obrazu – informácií pod povrchom



meranie

spracovanie

vizualizácia

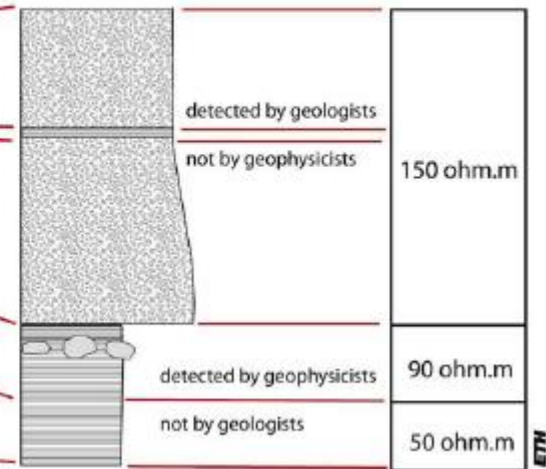


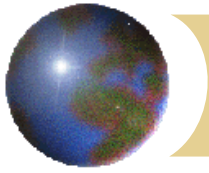
Definícia: model

realita



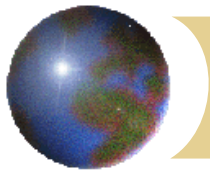
Geofyzikálny model





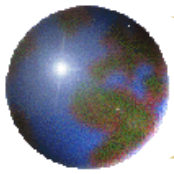
Definícia: kontrast

Ak chceme s geofyzikálnymi metódami charakterizovať rôzne vrstvy musí existovať fyzikálny kontrast (rozdielne fyzikálne vlastnosti)

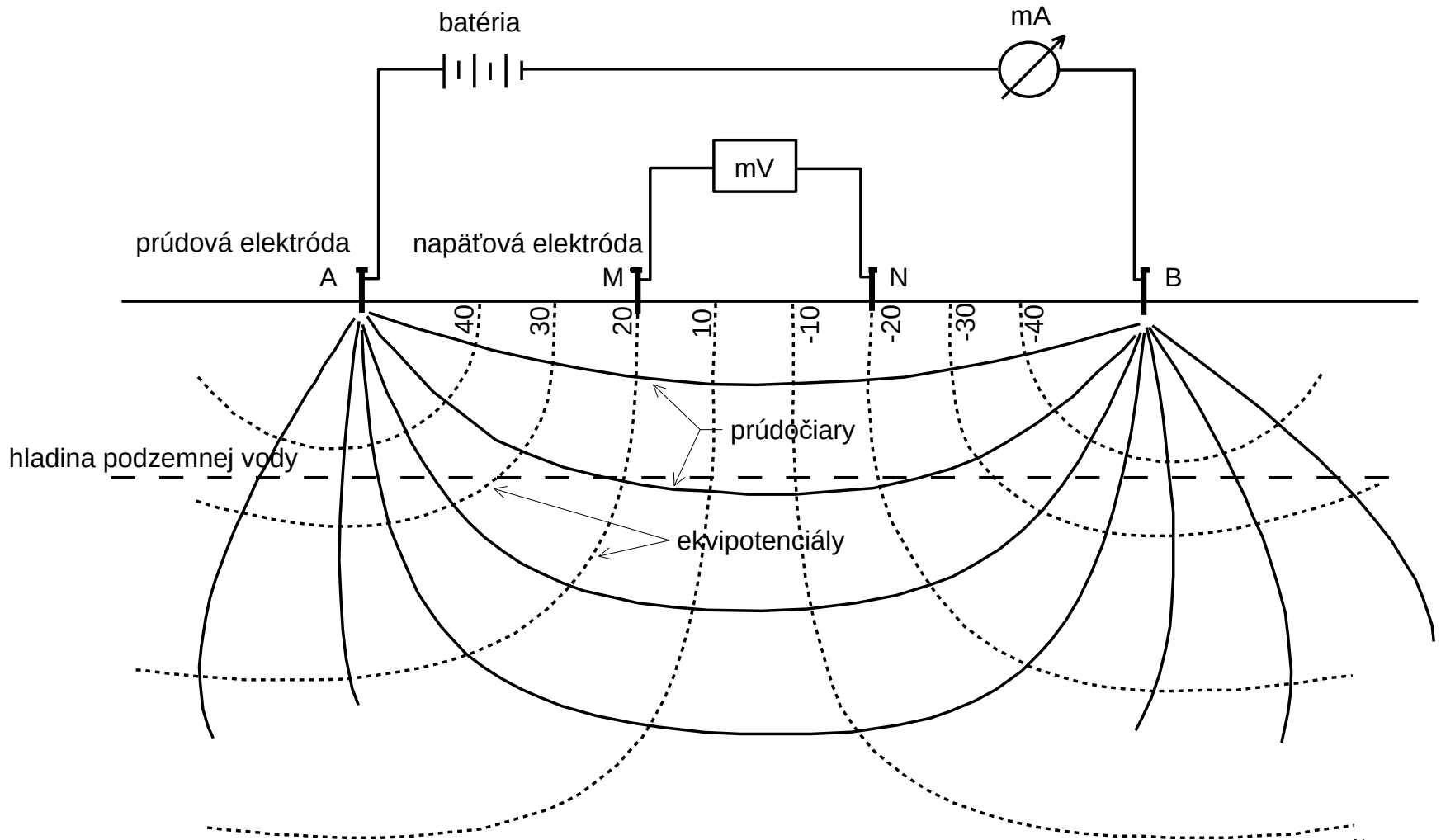


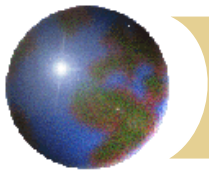
Geoelektrické metódy používané v archeológii

- ✚ Odporové metódy OM (*resistivity methods*)
- ✚ Indukovaná polarizácia (*induced polarization - IP*)
- ✚ Elektromagnetické metódy (*Electromagnetic - EM*)
- ✚ Magnetotelurické metódy (*Magnetotelluric - MT*)



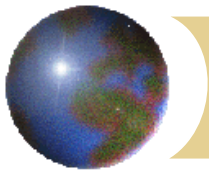
Odporové metódy – základný princíp





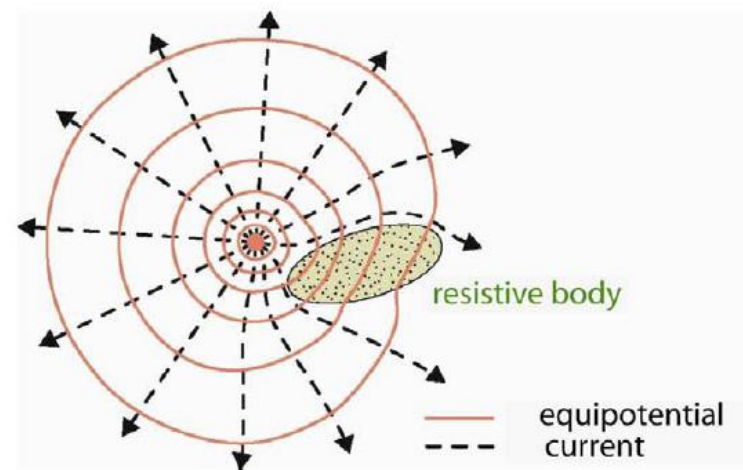
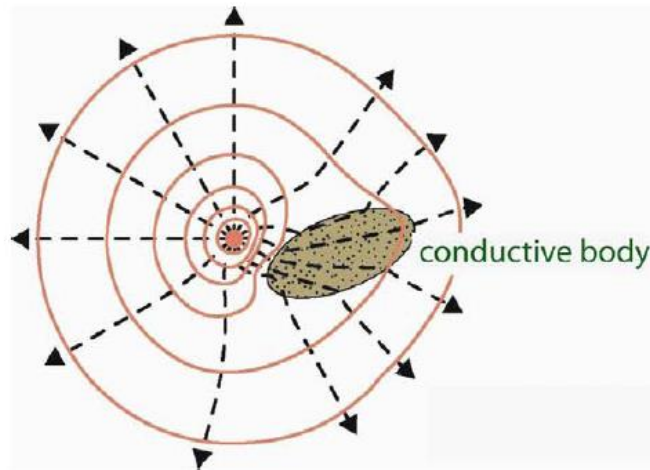
Odporové metódy – základný princíp

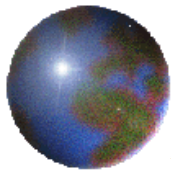
- ✚ Zisťujú merný elektrický odpor prostredia
- ✚ Izočiary elektrického pola nazývame ekvipotenciály elektrického pola – spájajú body s rovnakým potenciálom
- ✚ Napätie je rozdiel dvoch potenciálov
- ✚ Prúdočiary sú kolmé na ekvipotenciály
- ✚ Veľkosť (I) závisí od voľných nosičov a priechodnosti horninového prostredia
- ✚ Zdanlivý merný odpor ρ_z (apparent resistivity ρ_a)
 $\rho_z = k U/I$ kde k je usporiadanie elektród



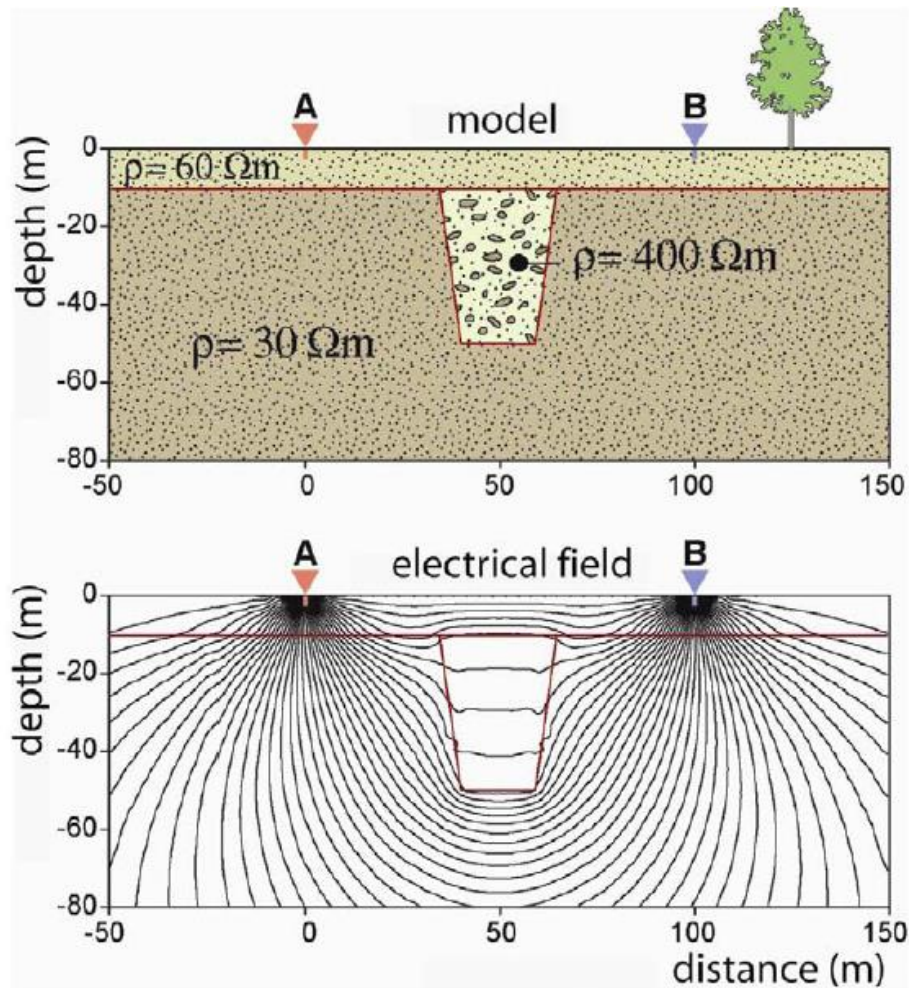
Odporové metódy

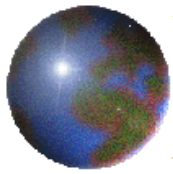
Odporové metódy sa používajú na štúdium horizontálnych a vertikálnych zmien odporových vlastností hornín a materiálov pod zemským povrchom.



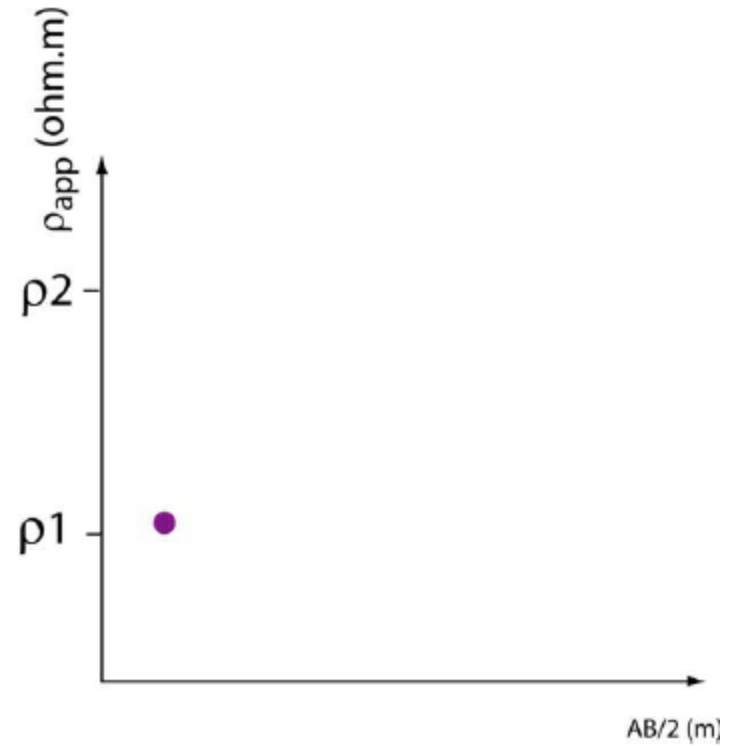
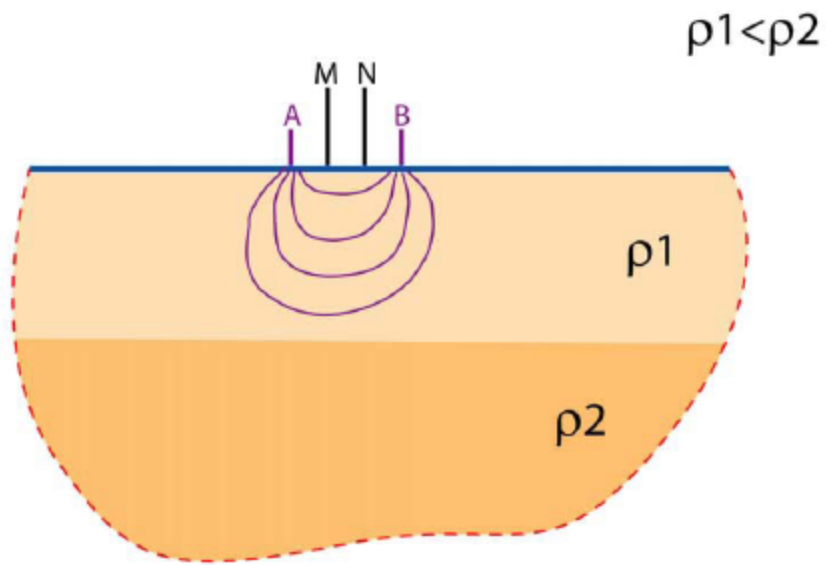


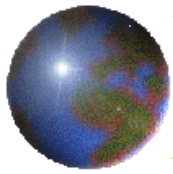
Distribúcia prúdu



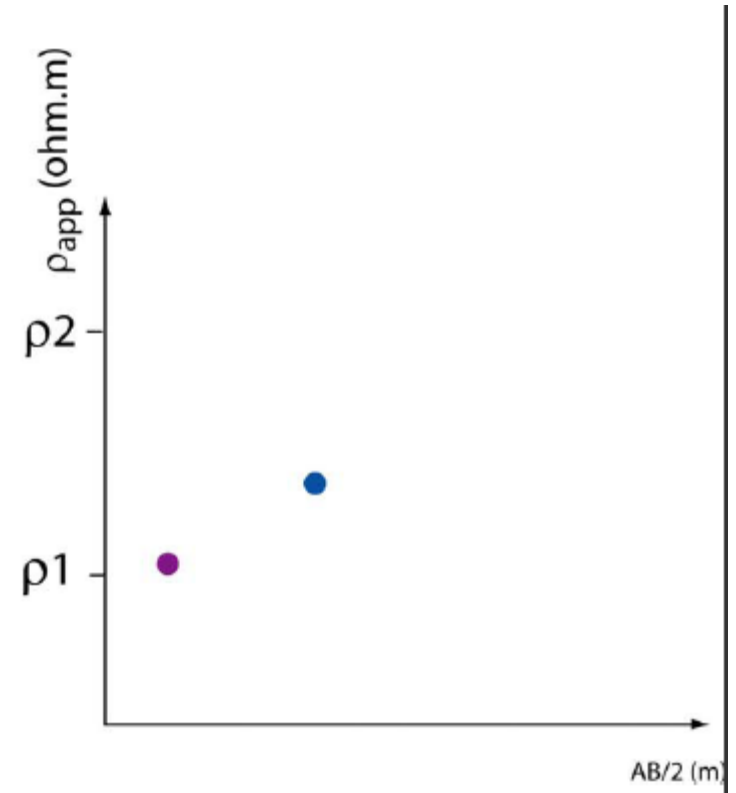
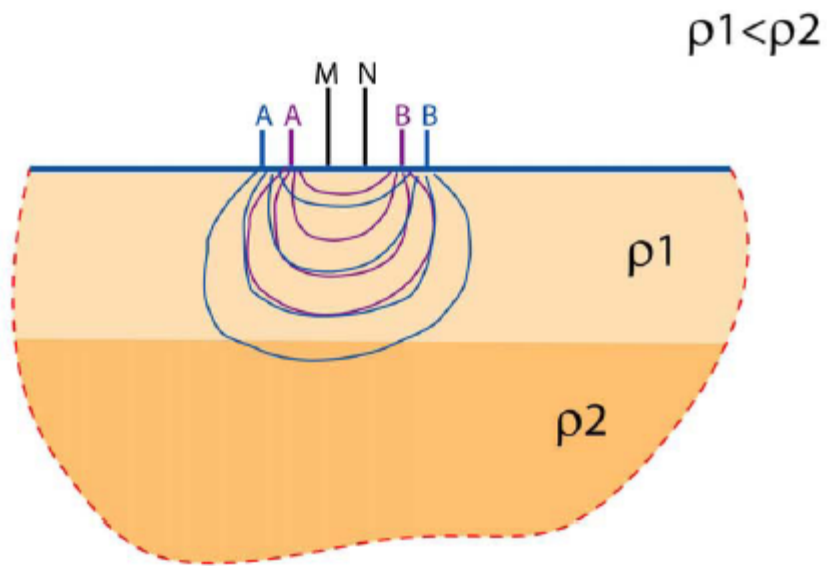


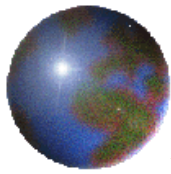
VES (I)



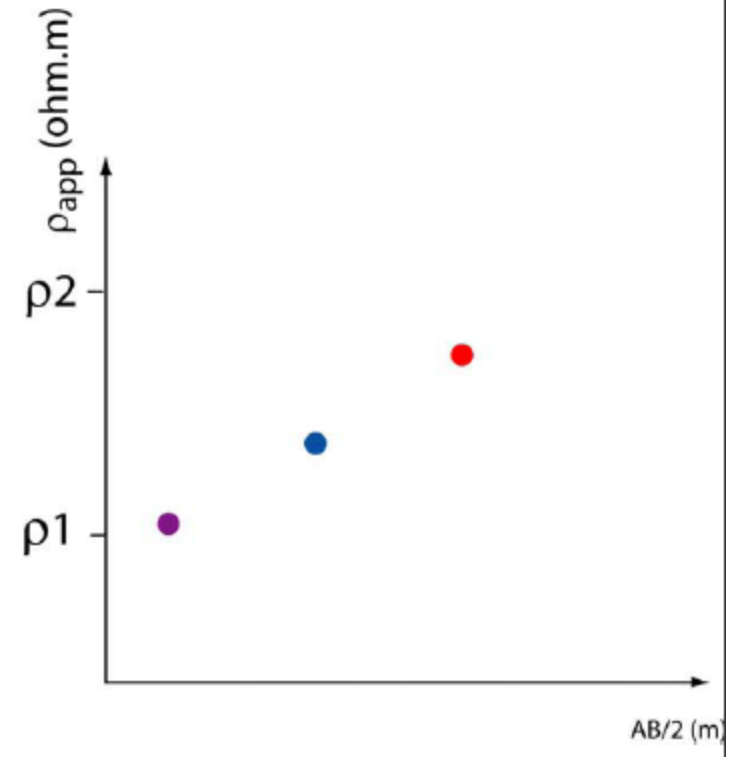
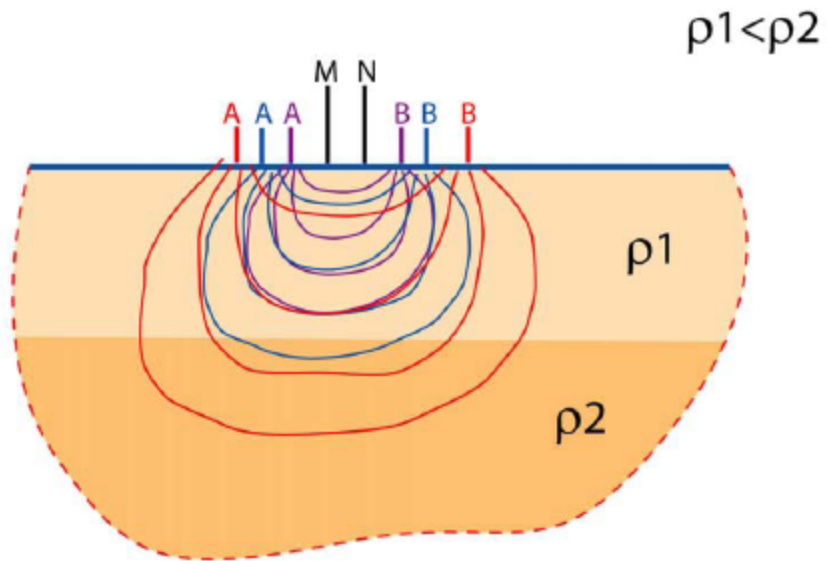


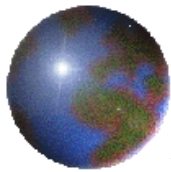
VES (II)



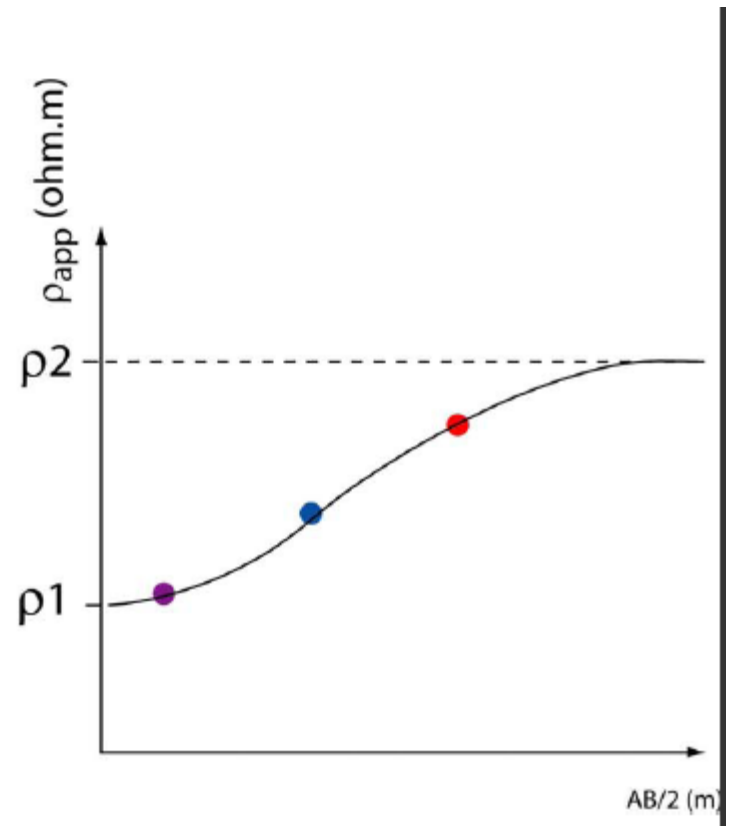
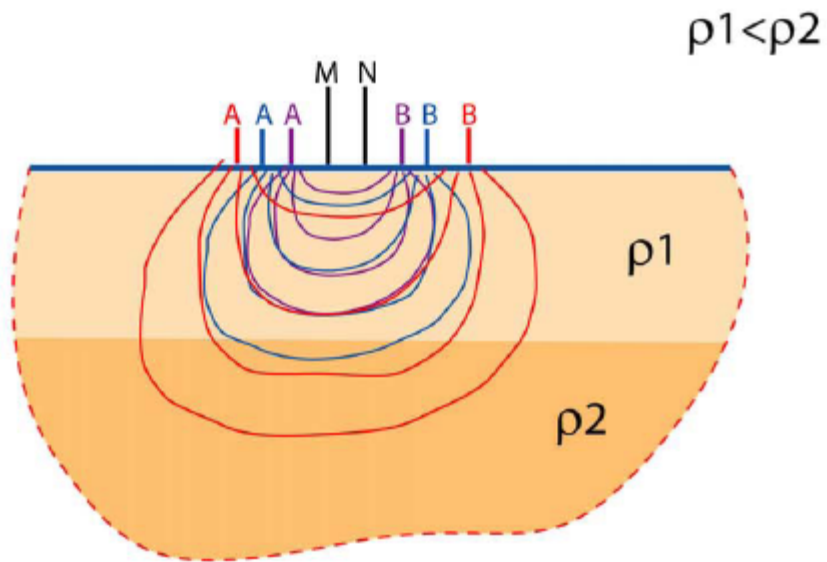


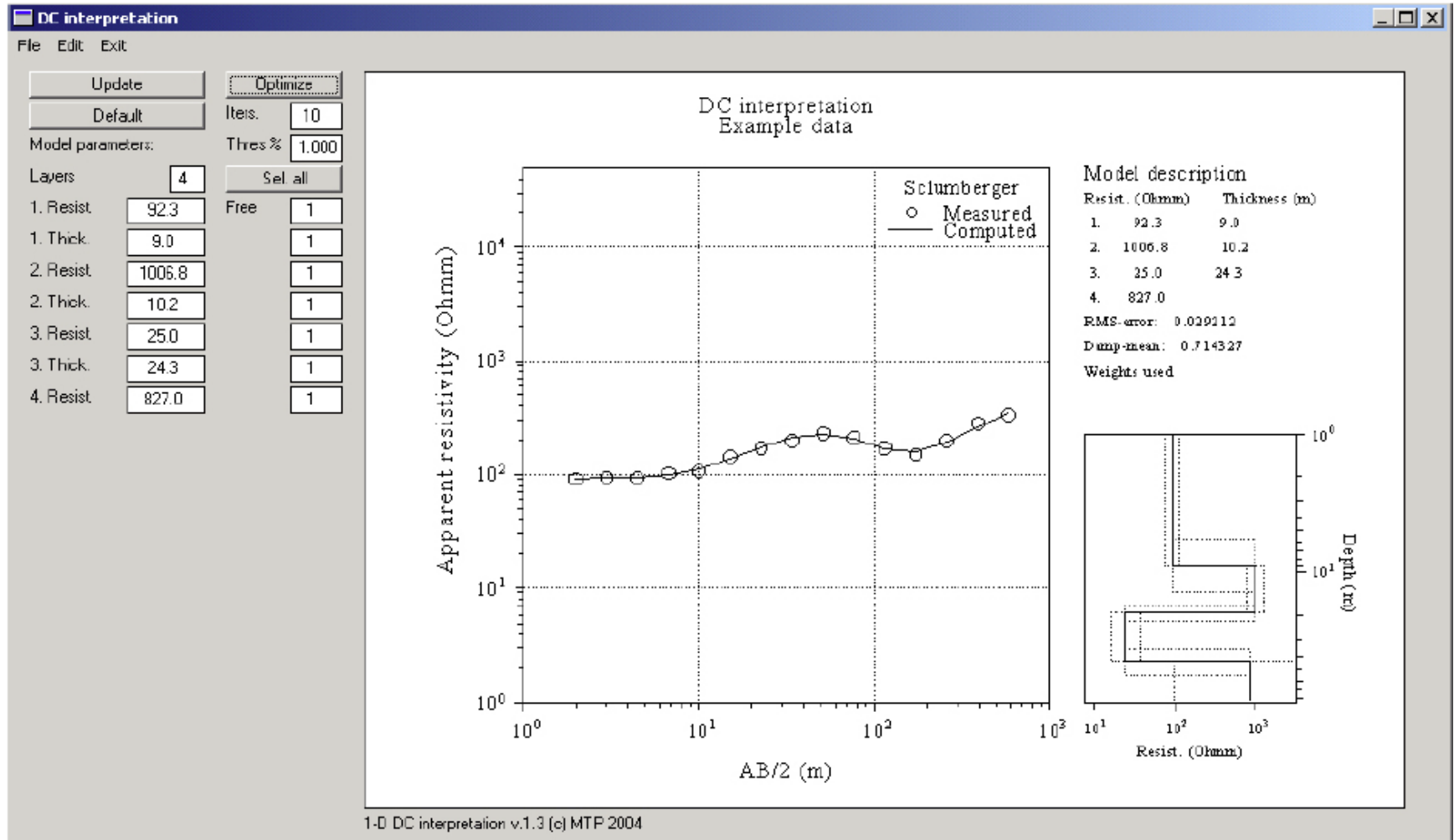
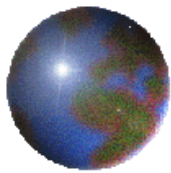
VES (III)

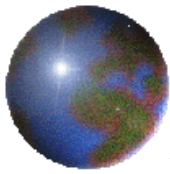




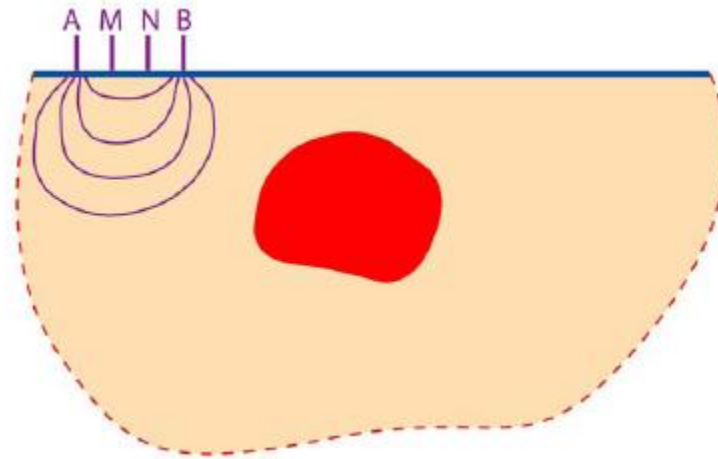
VES (IV)

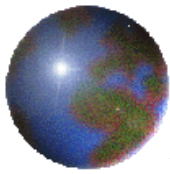




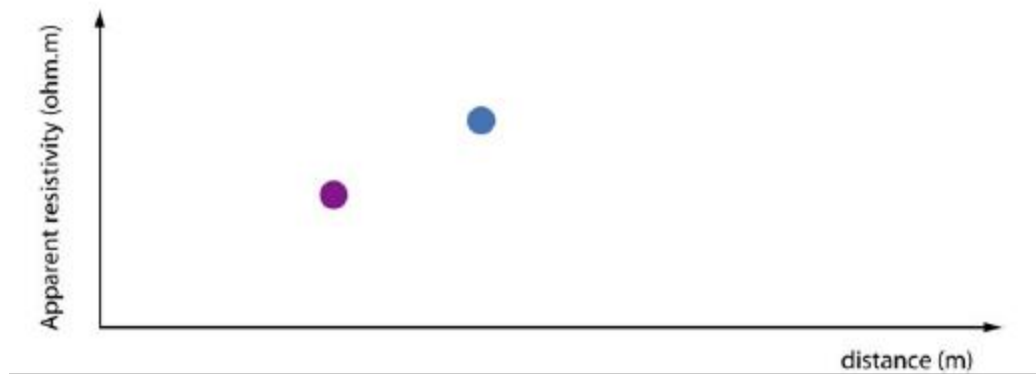
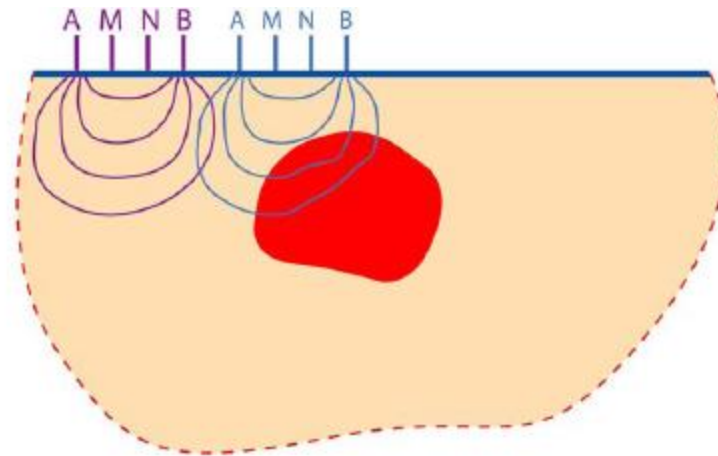


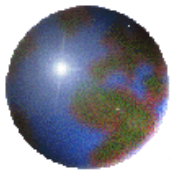
HP (I)



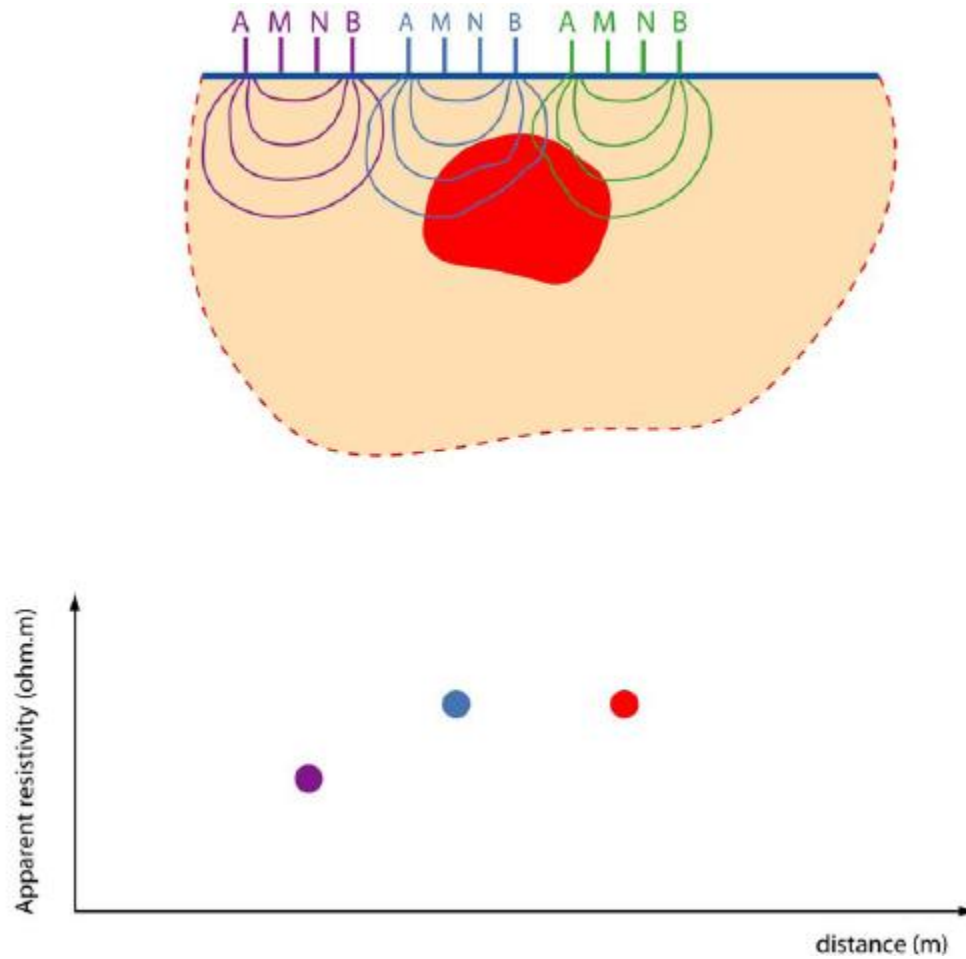


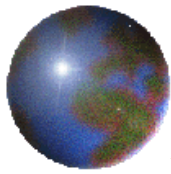
HP (II)



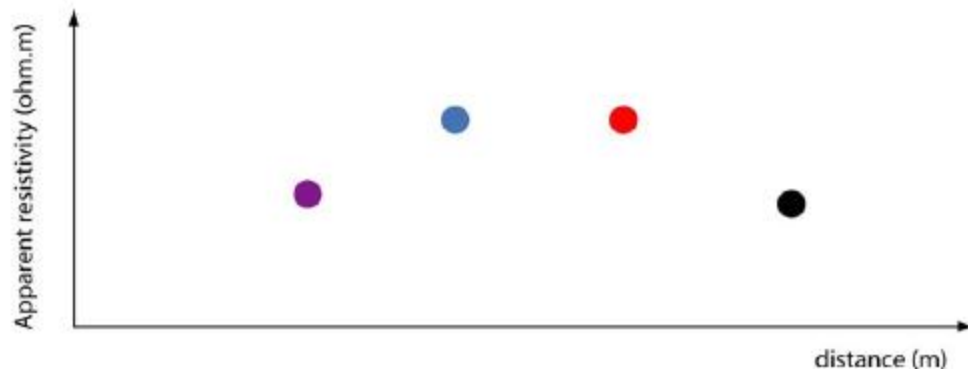
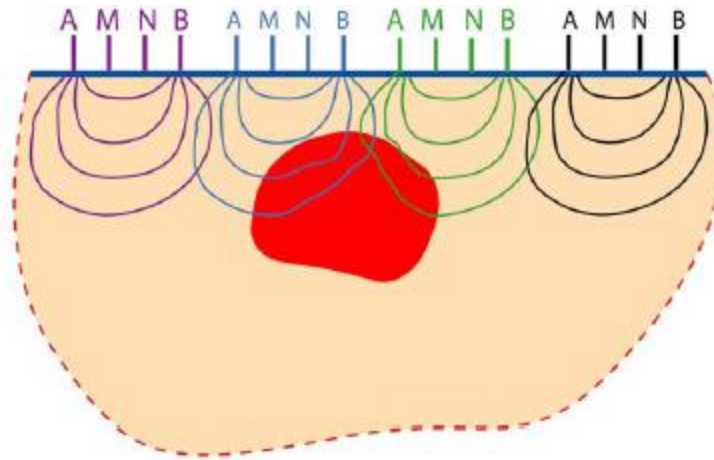


HP (III)

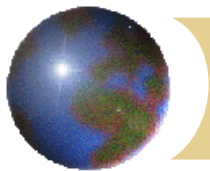




HP (IV)



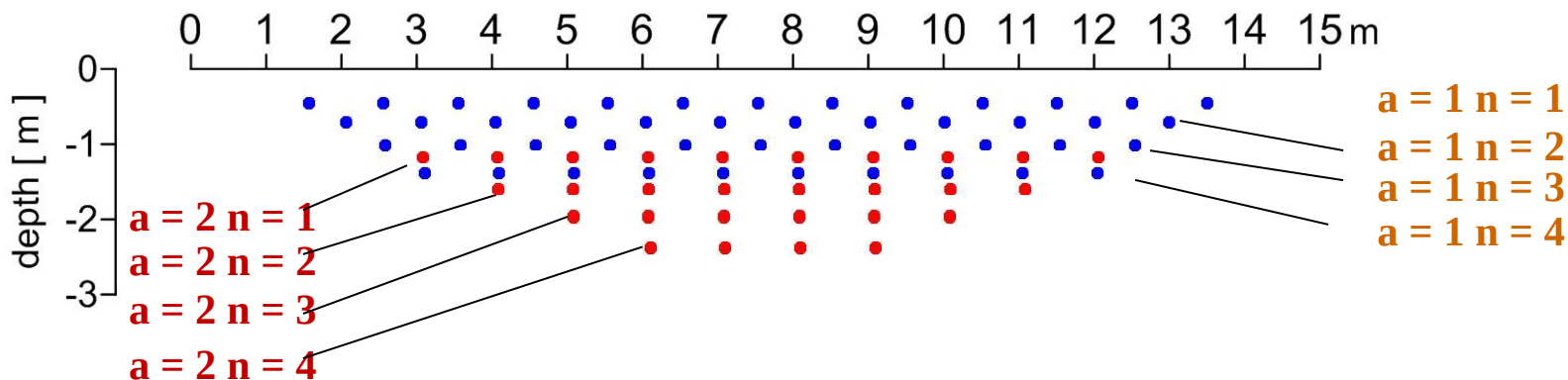
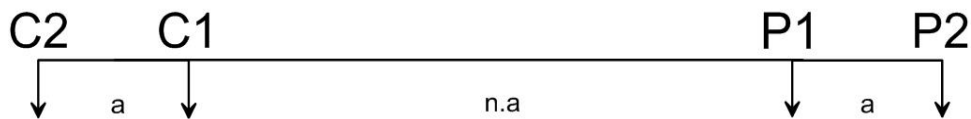




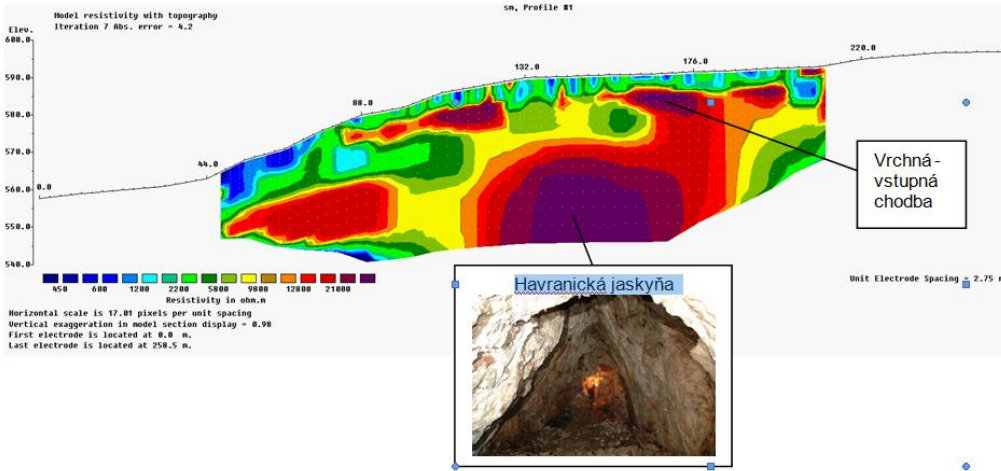
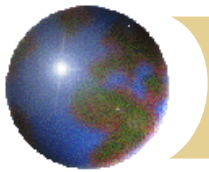
System merania metódou ERT

2D meranie

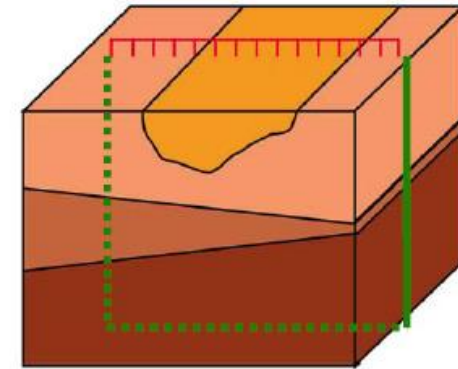
Elektródové usporiadanie
dipól - dipól



- kombináciou rôznych hodnôt parametrov „a“ a „n“
môžeme získať vysokú hustotu informácie

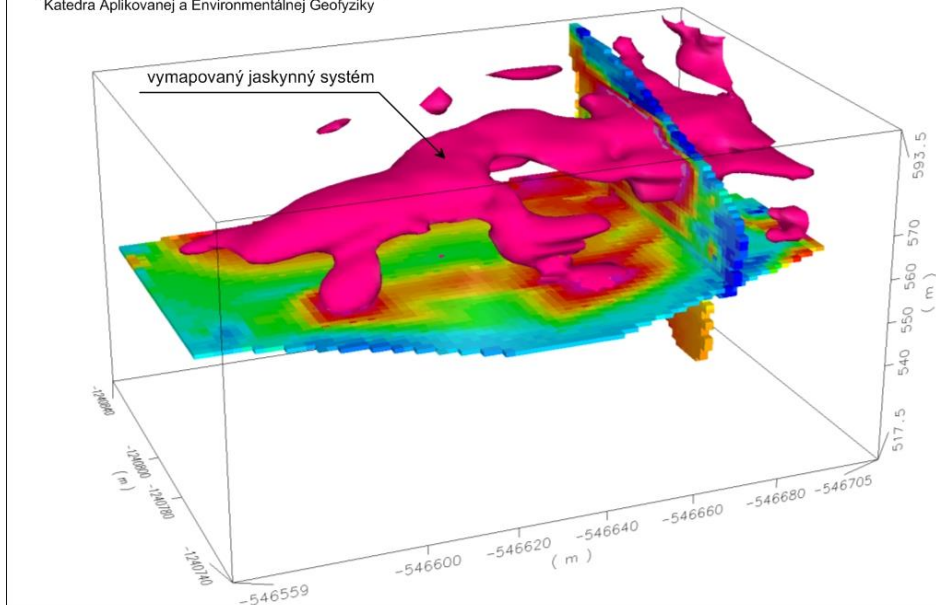


2D

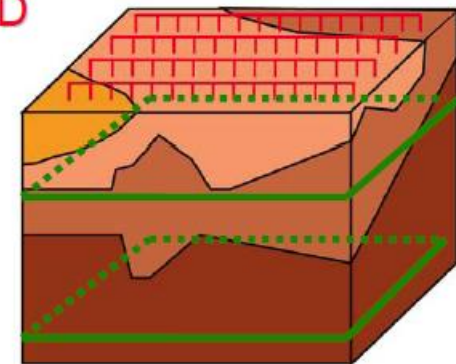


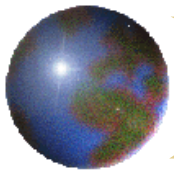
Výsledky 3D elektrickej tomografie

Vypracoval: RNDr. René Putiška PhD., Mgr. Ivan Dostál
Katedra Aplikovanej a Environmentálnej Geofyziky



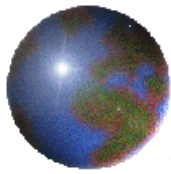
3D

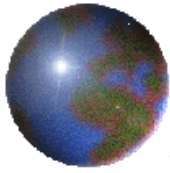


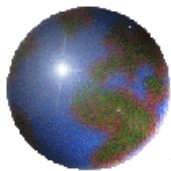


Aparatúra ARES

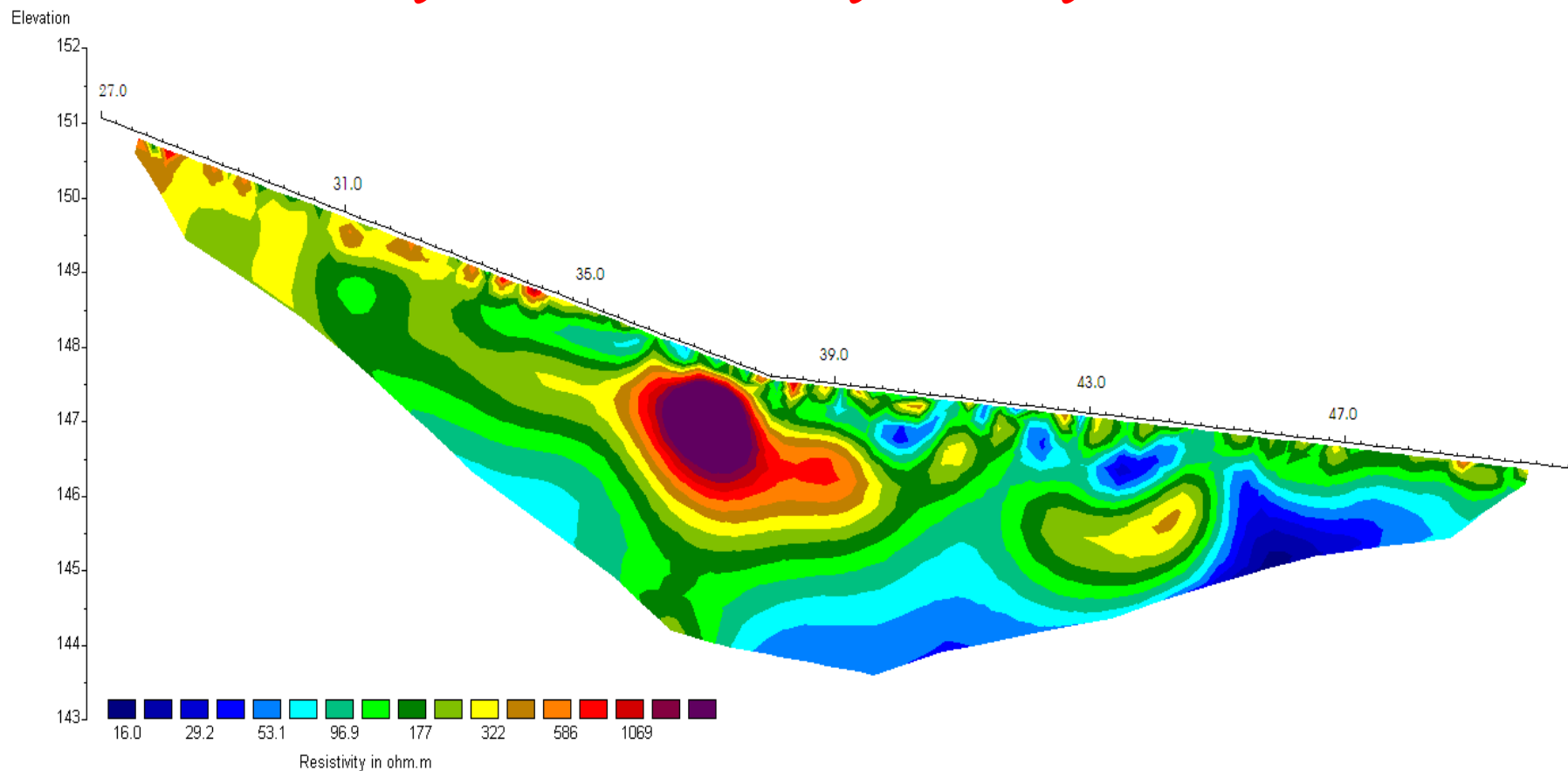


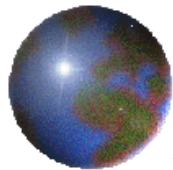






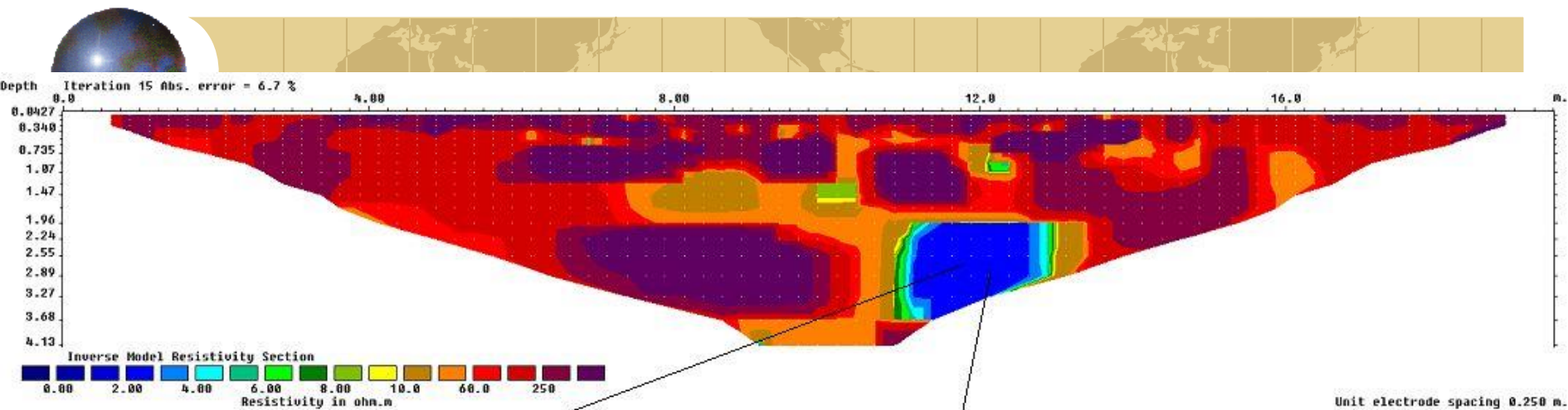
Ukážky nameraných výsledkov





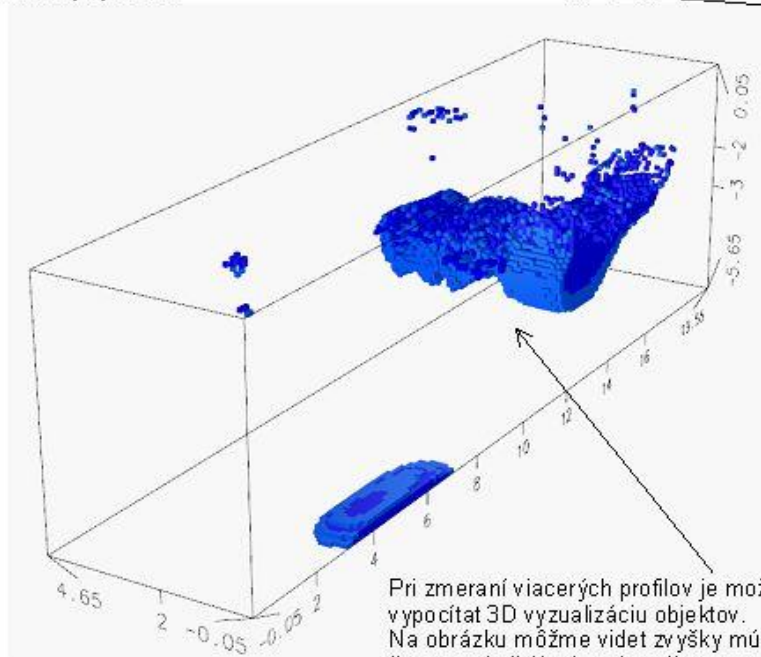
Ukážky nameraných výsledkov





Modrá farba je nameraná anomália, ktorá predstavuje pokračovanie múru.

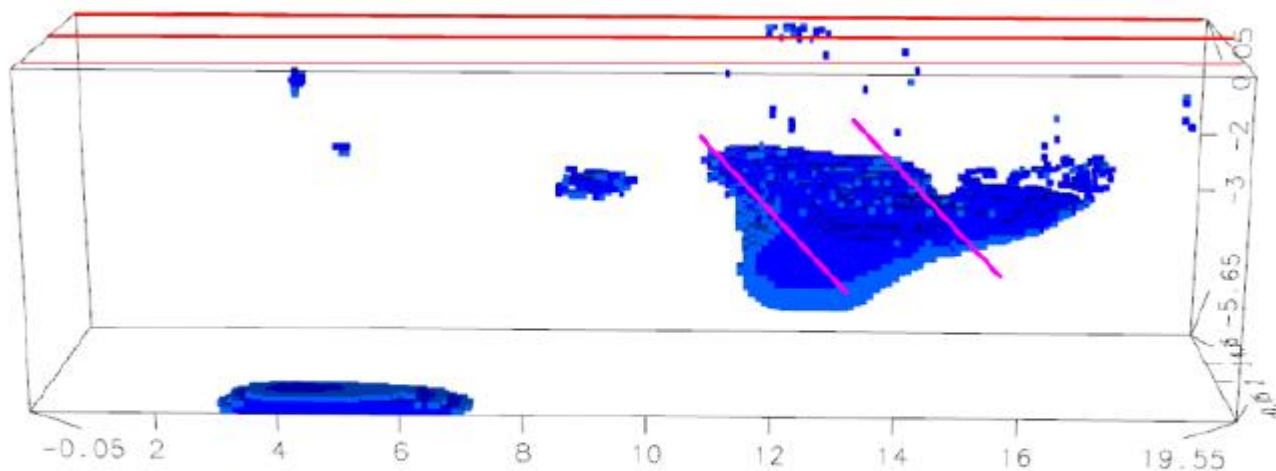
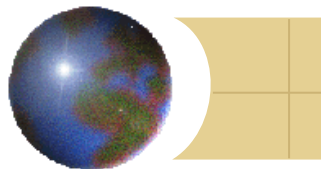
Oranžový kábel je meraný profil, pod ktorým sa nachádza zobrazený výsledok



modrá ciarkovaná je vymapované pokračovanie múru



Odkopaný múr (už zakrytý textíliou) v archeologickej sonde na Bratislavskom hrade



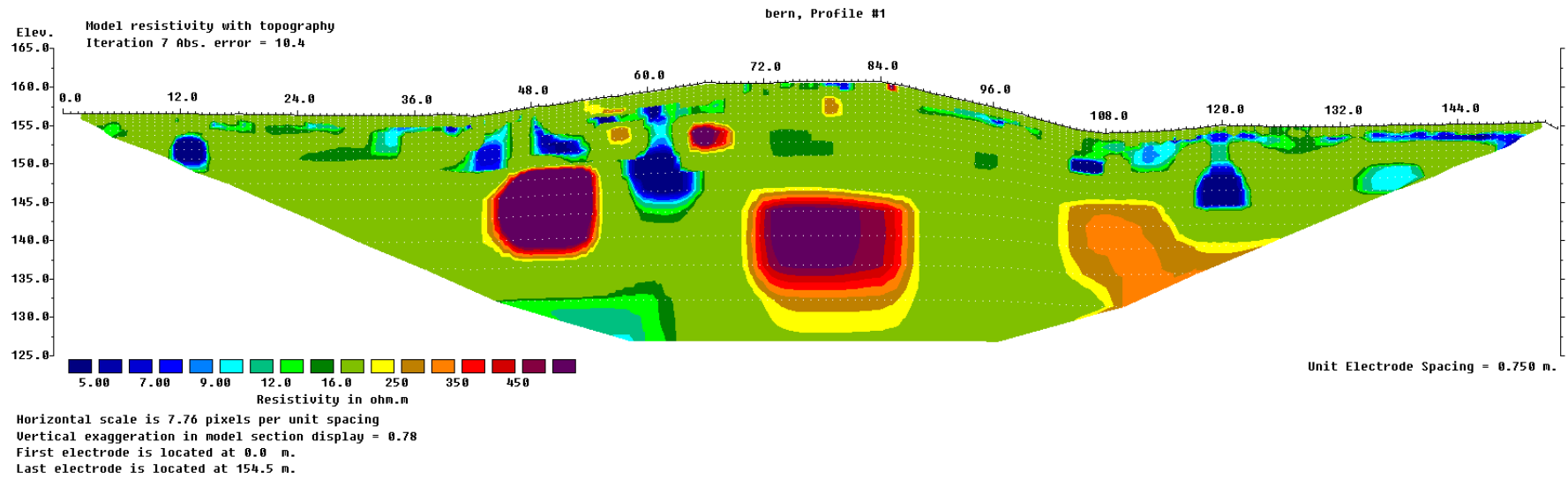
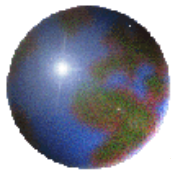
3m
zaciatok
profilov

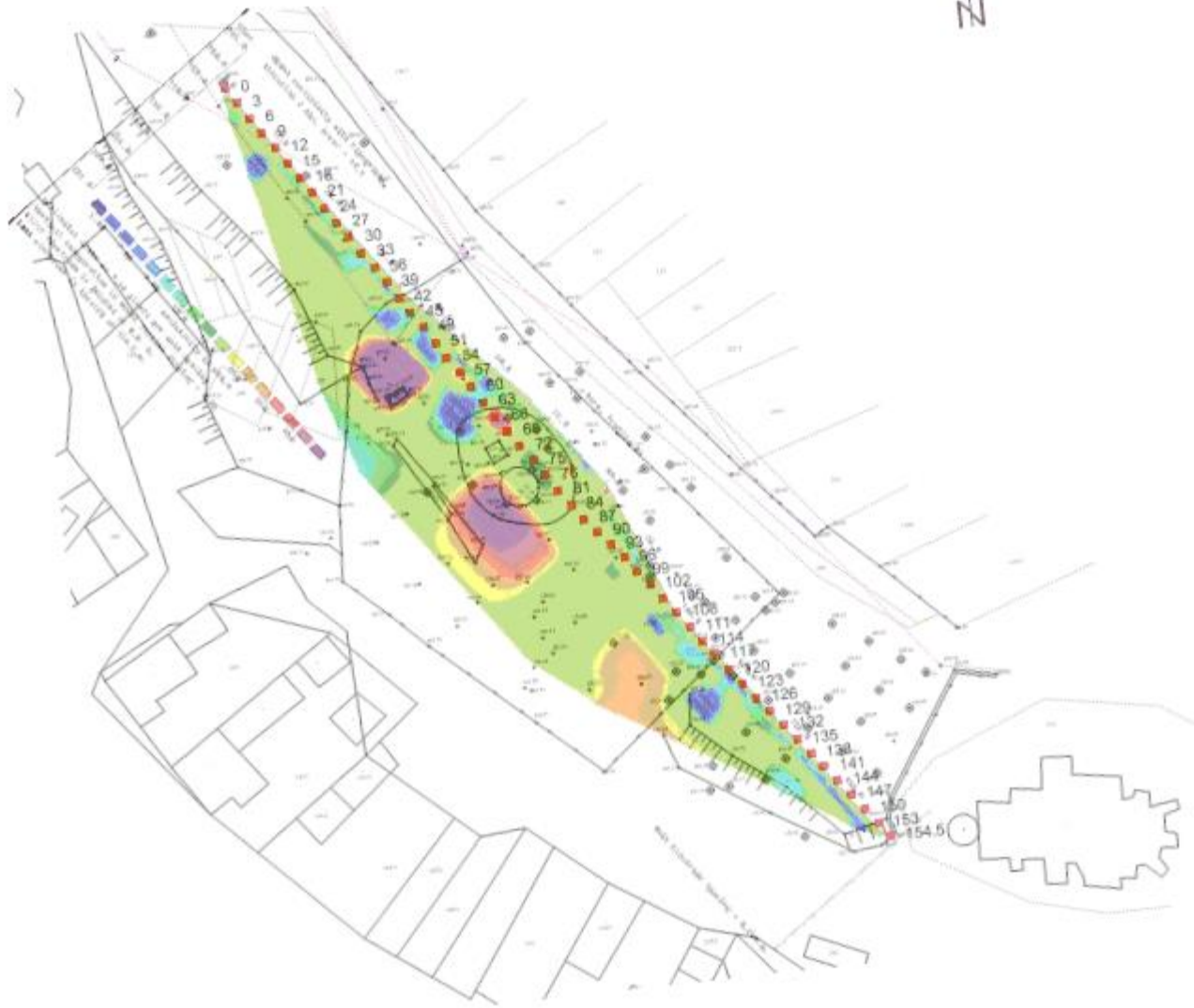
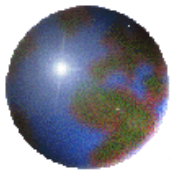


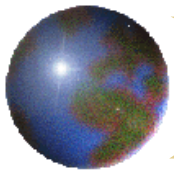
profil3

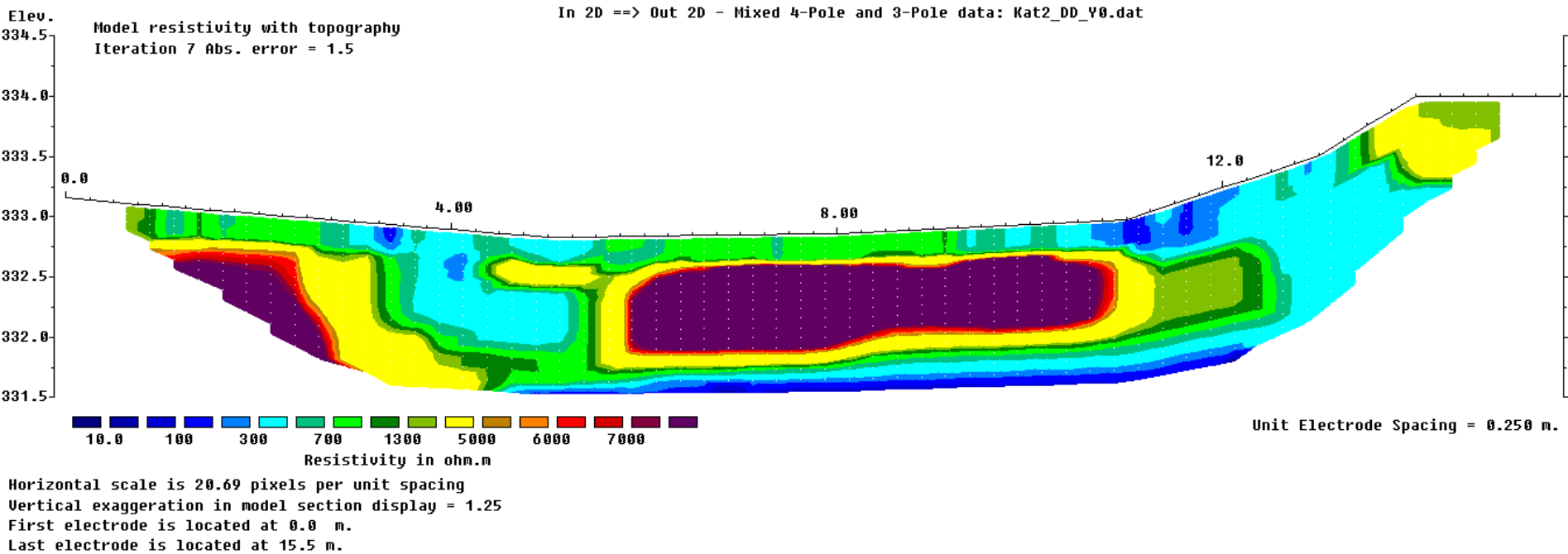
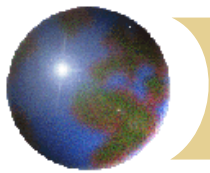
profil2

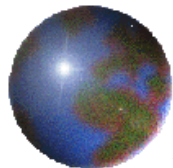
profil1

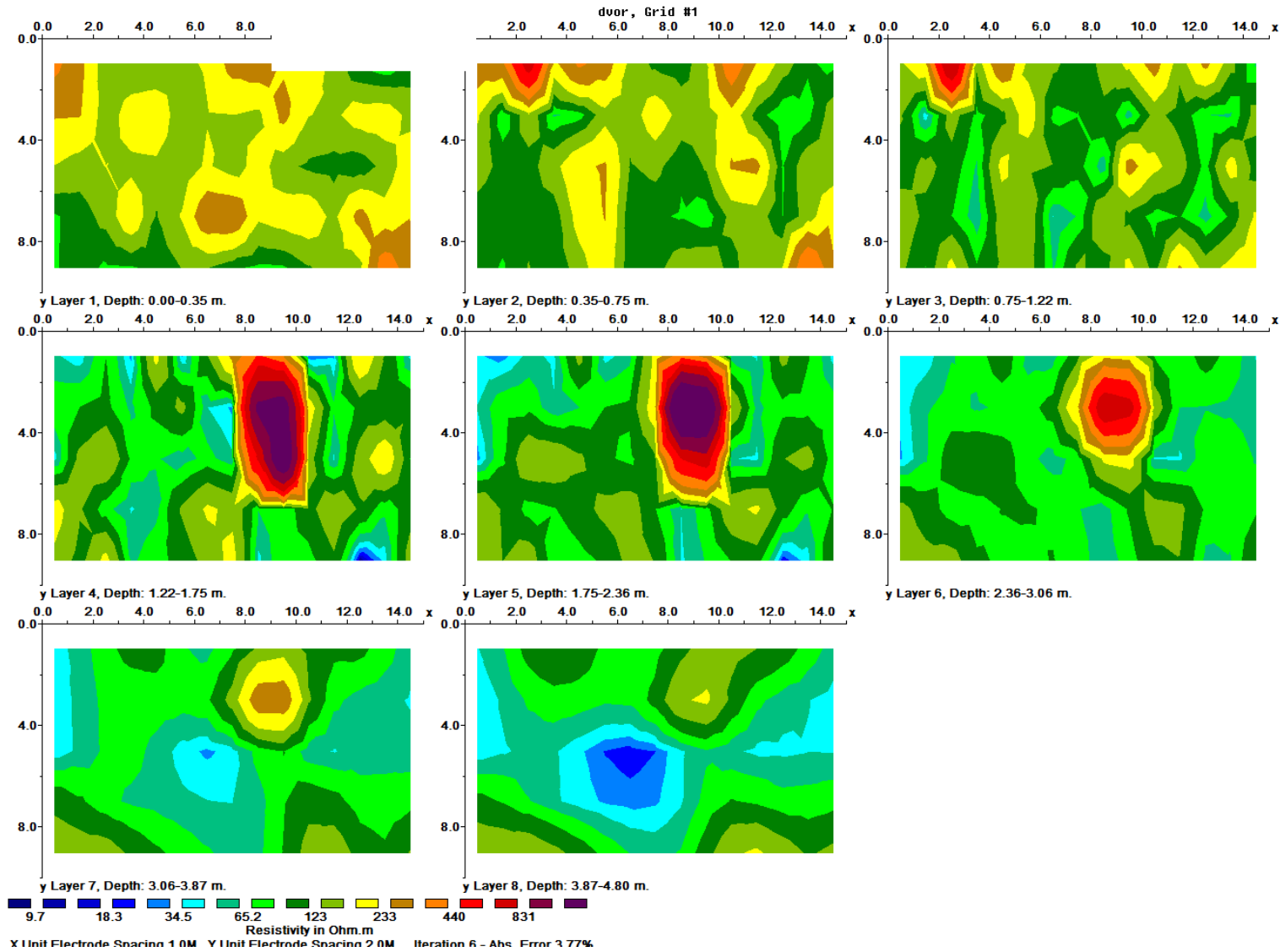
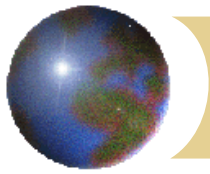


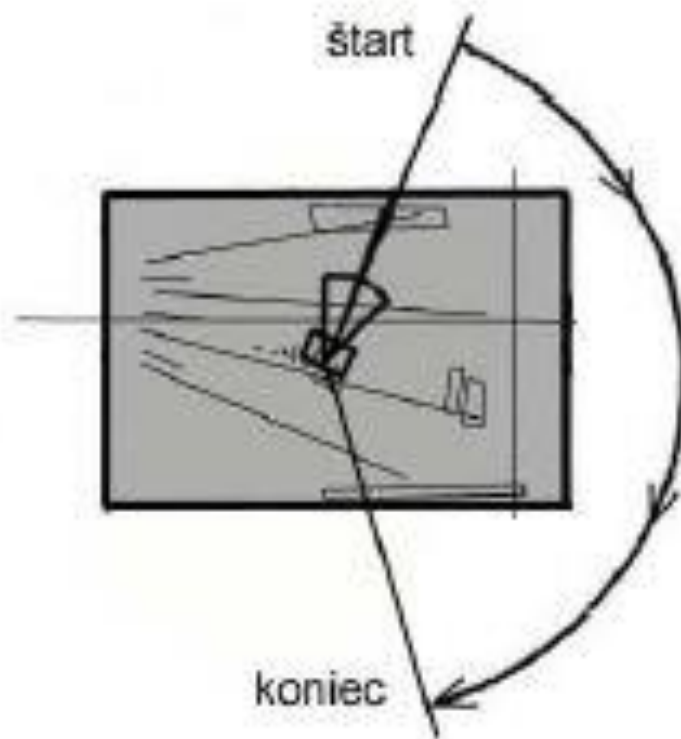
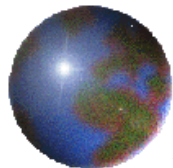


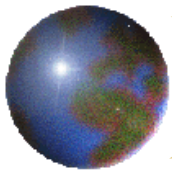


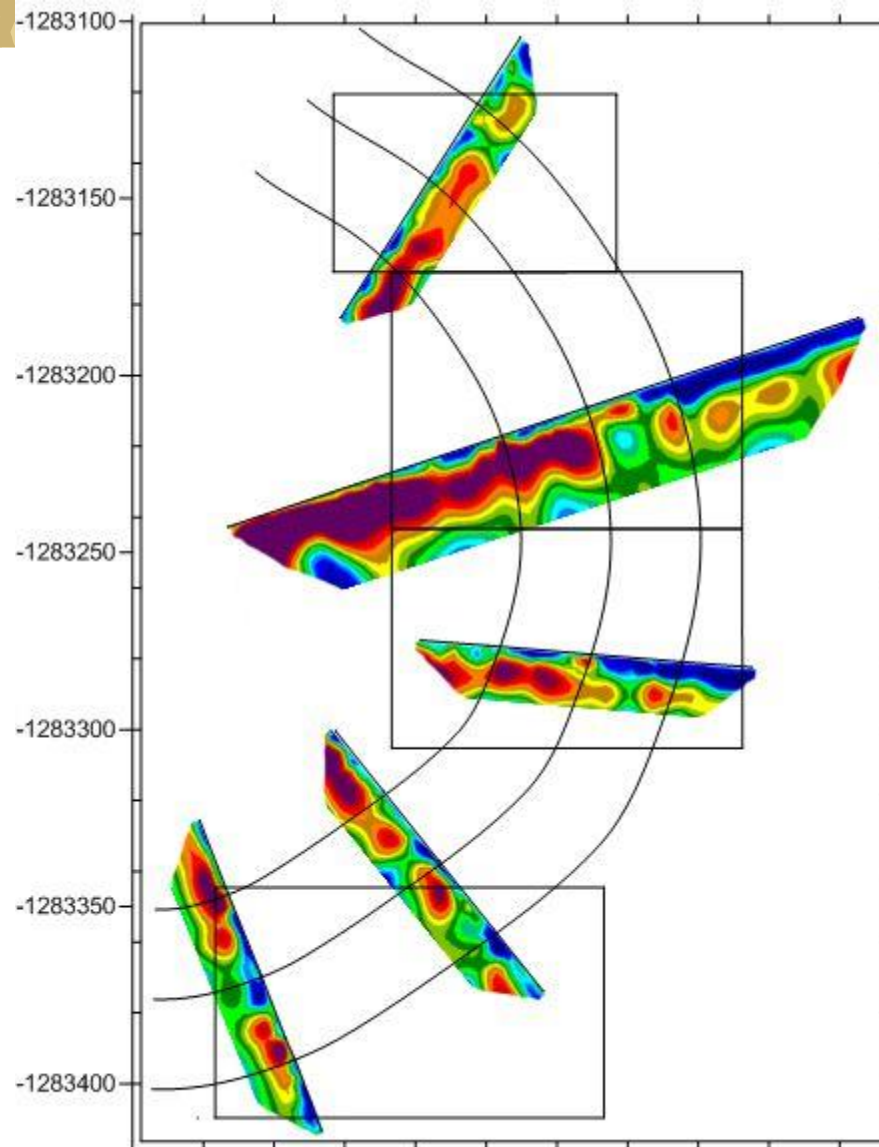
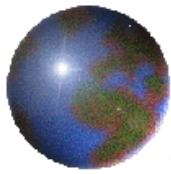


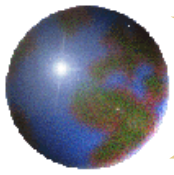






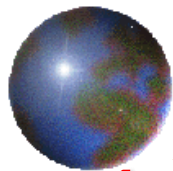






EM38





1



2

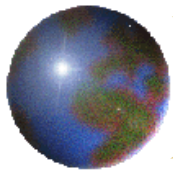


3



4



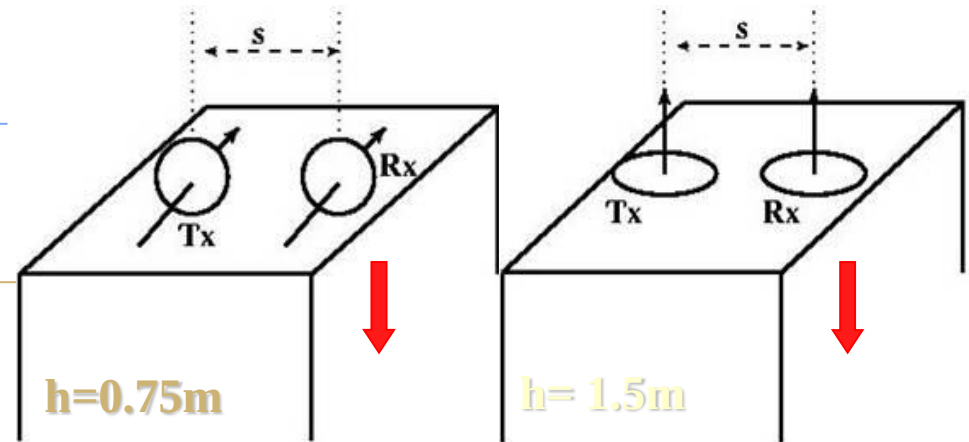


EM38 specifications

 Frequency= 14.6 kHz

 T-R distance=1 m

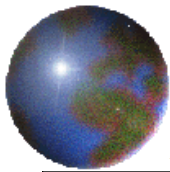
 Horizontal and vertical dipoles



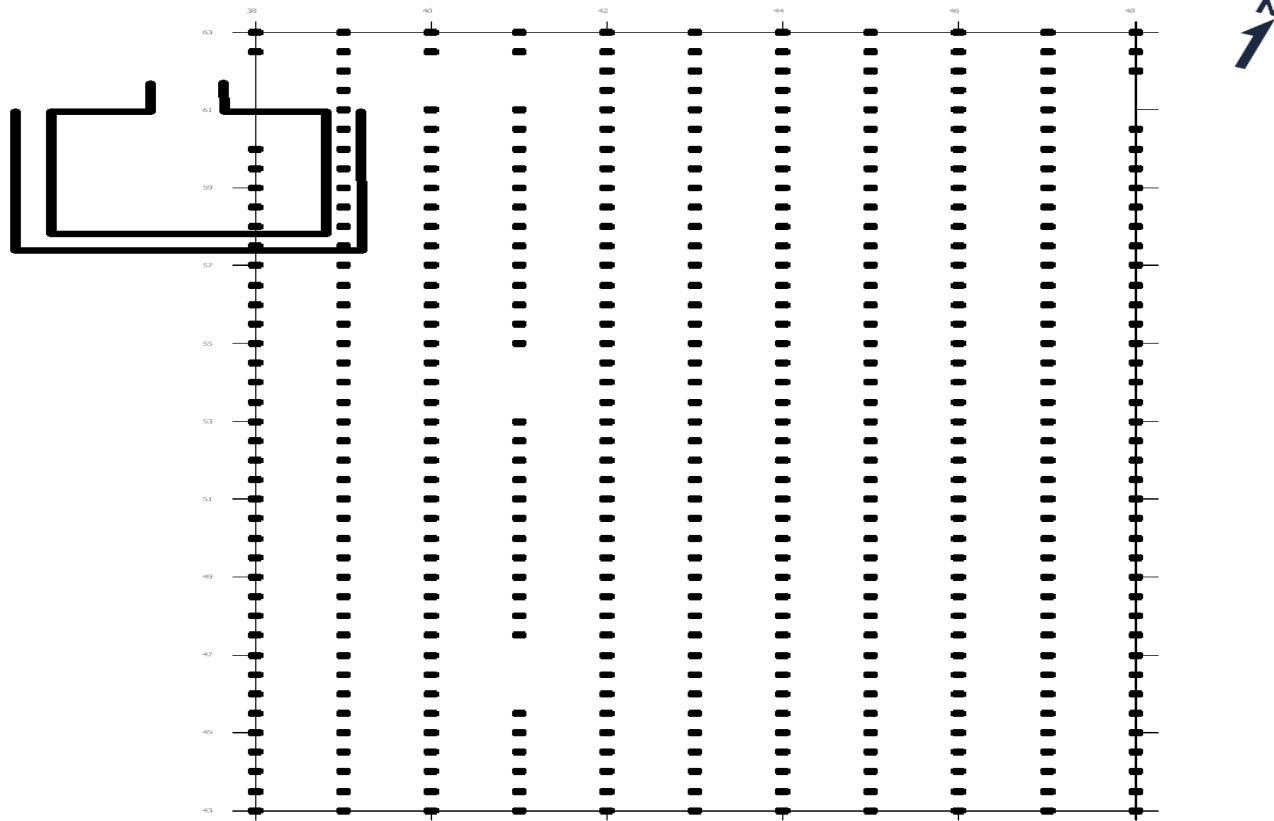
Effective depth ranges

Measured quantities:

- 1) Apparent conductivities (mS/m)
- 2) In phase the ratio of the secondary to primary magnetic field in parts per thousand (ppt)



Measurement scheme



profile distance : 1m

sample distance : 0,5m

