




Self-potential method



The self-potential method makes use of **natural currents** flowing in the ground that are generated by **electrochemical processes** to locate shallow bodies of anomalous conductivity and water circulation



Applications

- Exploration of metalliferous mineral deposits
- Detection of water circulation into the ground
- Monitoring dams or tank integrity



1. Basic SP theory

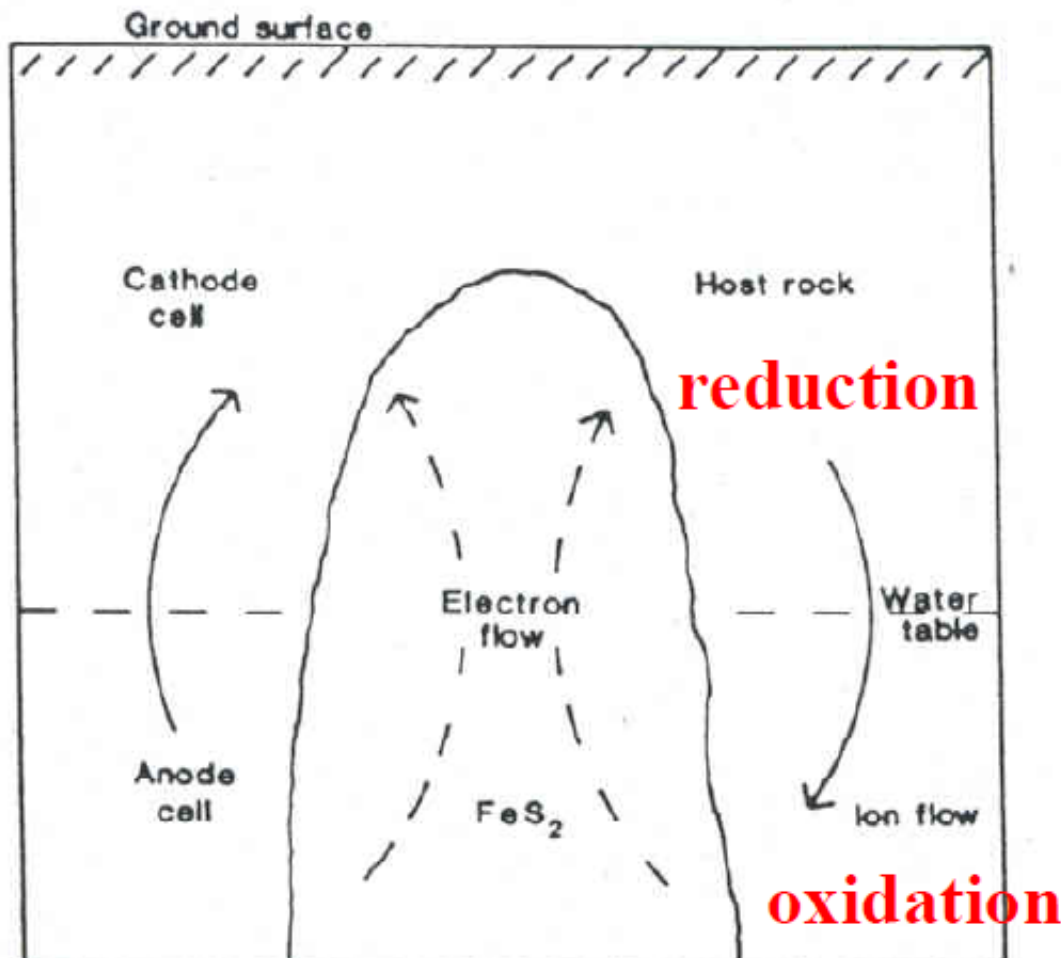


This is a method employing natural electric sources. Two natural potentials are mainly used in exploration geophysics:

- Electrokinetic (streaming) potential
- Mineralization potential

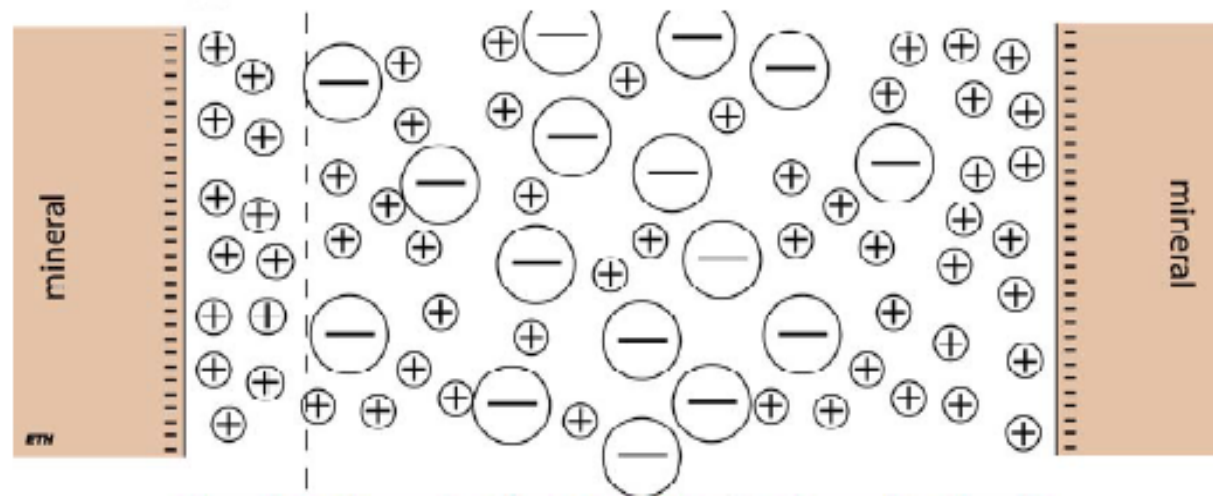
These potentials are expressed in V or mV

Mineralization potential



- Mining geophysics
- Negative anomalies often higher than 100 mV


Electrokinetic (streaming) potential



- Mainly used in hydrogeophysics
- Positive or negative anomalies often lower than 50 mV



2. Survey strategies and interpretation

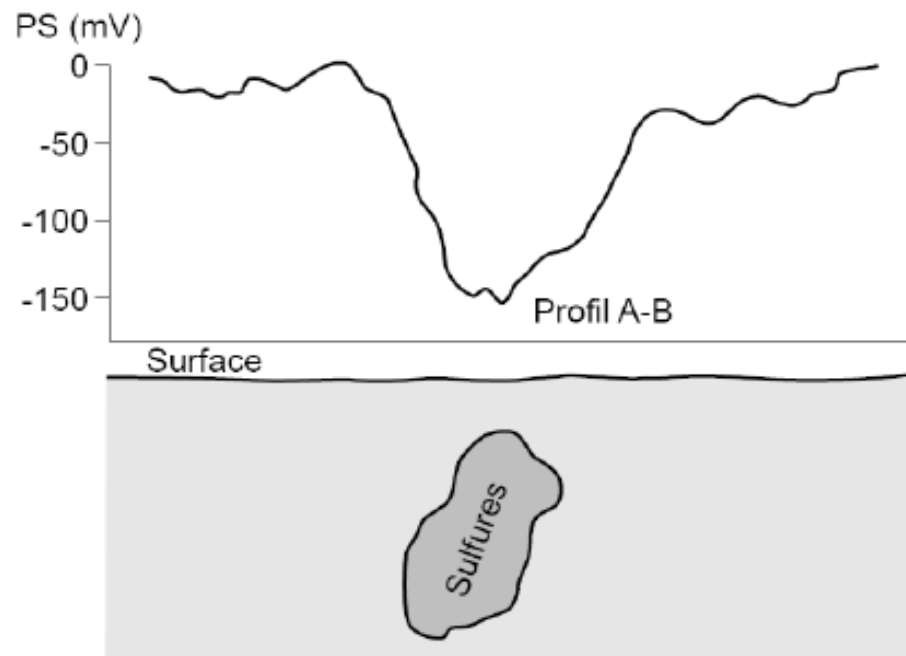


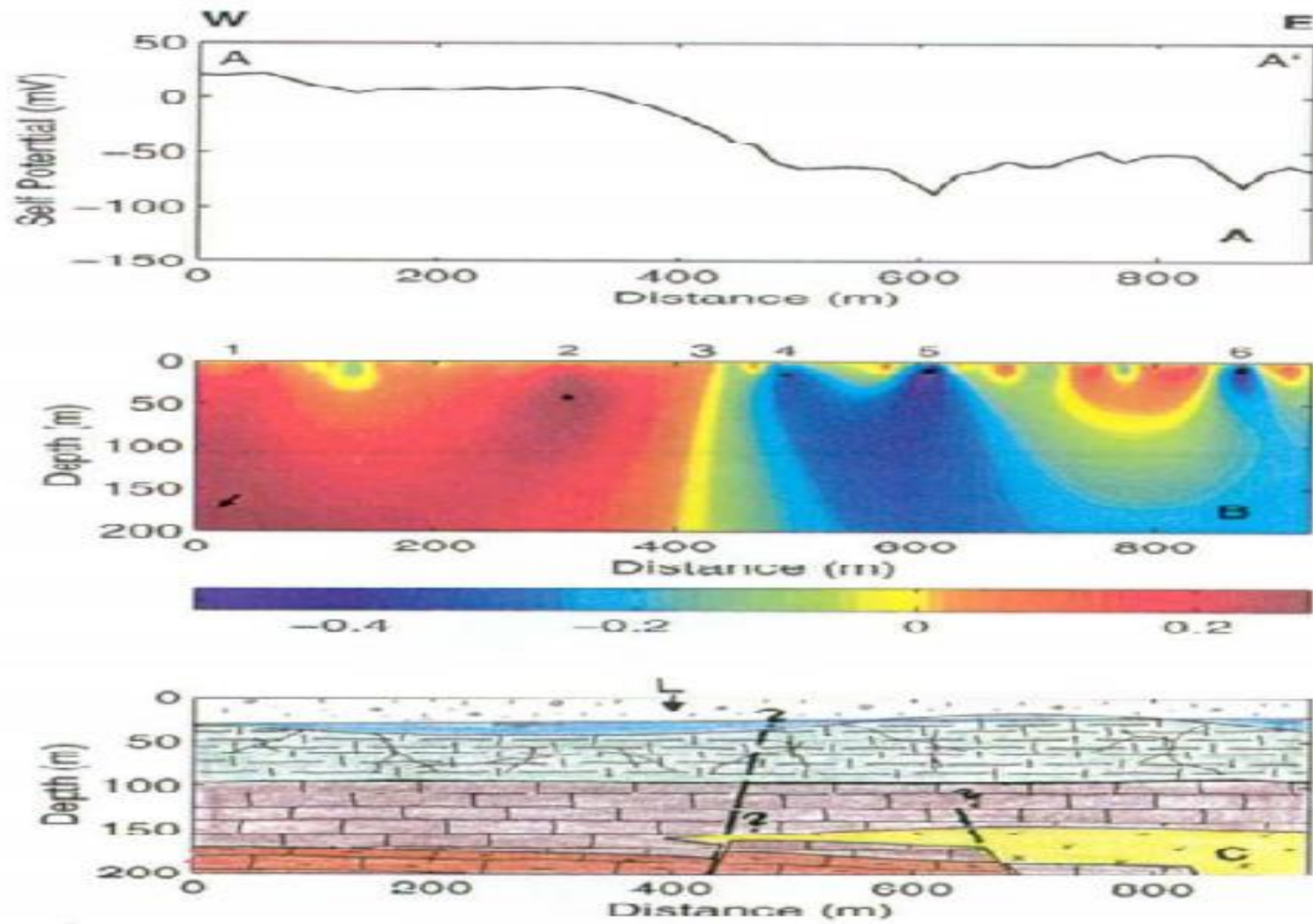
Interpretation

- Depth of investigation depends on the size of the mineralized body and the depth of the water table for a mineralization potential (generally shallow, < 30 m)
- Interpretation mainly qualitative (profile, map)
- Quantitative using dipole approximations for the polarized body (similar to magnetic interpretation)




Example of mineralization potential







3. Conclusions



Advantages

- Survey simple
- Non expensive
- Allows for a rapid qualitative mapping of the underground
- Suitable for monitoring



Drawbacks

- *Very sensitive to noise*
- *Physical aspects still not well understood*
- *Quantitative aspects still need to be developed*