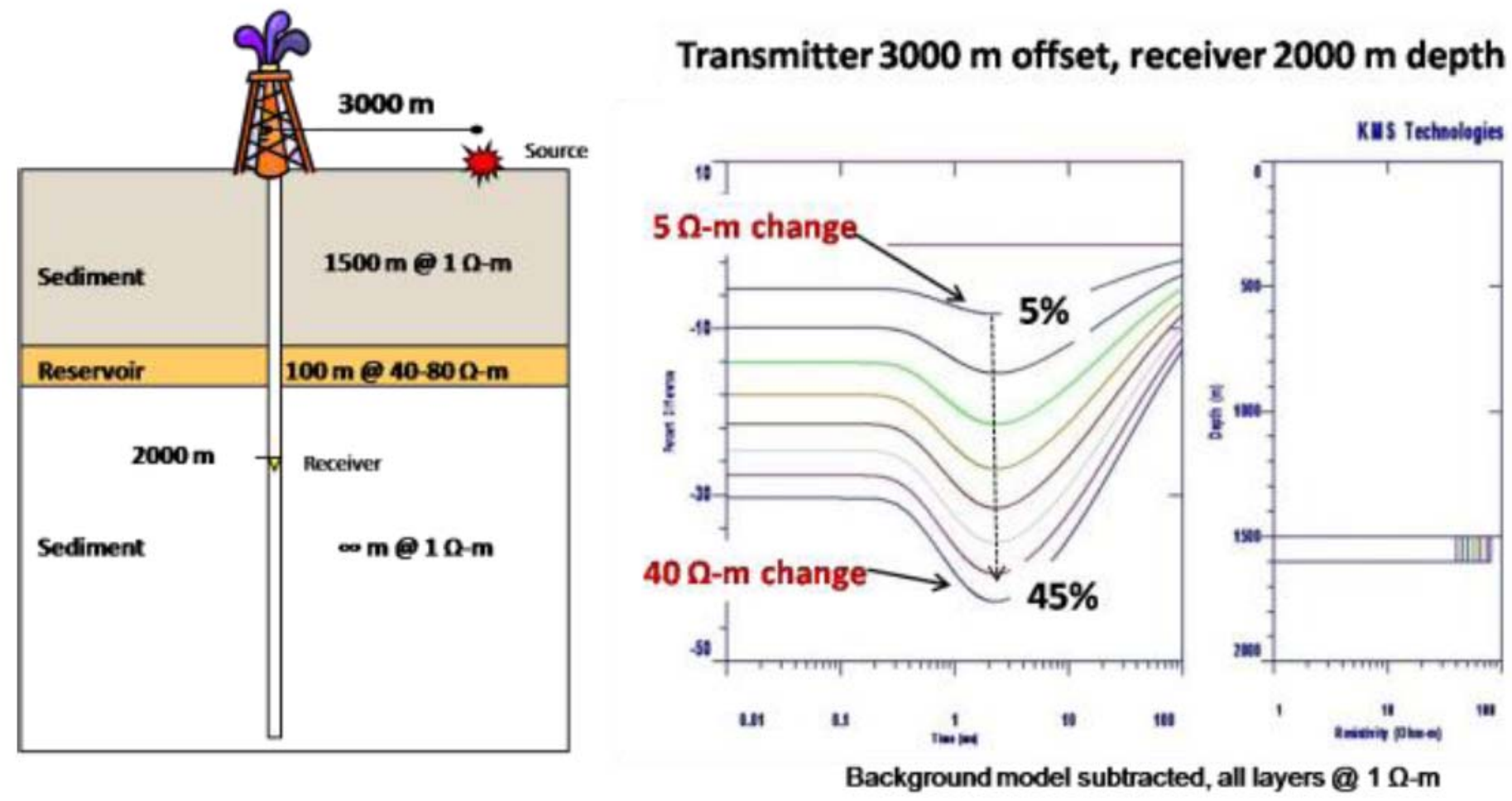


## MONITORING CONCEPT

The monitoring concept is based on several facts:

- Most fluid fronts are associated with a resistivity contrast (Zhou et al., 2002).
- Many reservoirs are more than 1 km depth below the surface and too deep for surface based monitoring.
- Boreholes are available for most reservoirs that need monitoring (as they are being produced).
- While detecting the small response from the fluid front is difficult, it is easier to detect fluid front changes with time.



Surface to borehole time-domain CSEM 1D modeling to evaluate sensitivity to changes in reservoir resistivity.



## SENSOR TECHNOLOGY

- With partnership with LEMI, we provide high quality EM sensors for geophysical industry.
- We provide full permanent or semi-permanent EM monitoring of water/steam flood from the surface or borehole or borehole-to-surface.
- We have invented a system for mapping changes in fluid content of Earth formations which can be used where there is little acoustic impedance contrast between moved fluids, where the moved fluids are relatively electrically resistive, and which does not require permanently emplaced sensors in substantially every wellbore drilled through a reservoir.



LEMI-118 induction coil magnetometer



LEMI-120 land induction coil magnetometer

