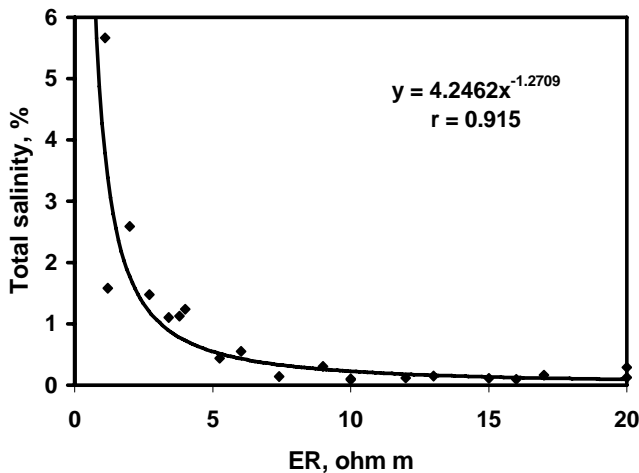


Vertical Electrical Sounding to detect soil salinity in arid areas

Water and salt content distributions within the soil profile are the main properties causing considerable variations in electrical resistivity. Since the evaporation in the arid areas (Astrakhan', Russia) is about five times higher than the precipitation, the water content and salt distributions are determined mainly by the saline groundwater.



The differentiation of salinity in the unsaturated zone of the soil profiles was revealed by small fluctuations of electrical resistivity in upper part of the VES profiles. We thoroughly interpreted the VES results to estimate the layers with different resistivities for 12 soil profiles. The total salt content was measured in soil samples collected from the layers of soil profiles as shown in Table (columns 1 and 2) for one example profile.

The VES method outlined three layers with different resistivities for the same soil profile (Table, columns 3 and 4). In the column 5 a weighted averages for the outlined soil layers were recalculated from the total salt contents in column 2. Data of recalculated total soil salinity and VES electrical resistivity were combined from the layers of all 12 soil profiles to obtain a relationship between electrical resistivity and total salt content.

Depth — m —	Total salinity —%—	Results of interpretation		Recalculated salinity for layers —%—
		Layer depth — m —	ER — ohm m —	
0-0.02	0.092	0-0.17	98	0.074
0.02-0.05	0.087			
0.05-0.20	0.068	0.17-0.74	15	0.095
0.20-0.40	0.07			
0.40-0.70	0.112			
0.70-1	0.117	0.74-2.55	12	0.117

For quick delineation and estimation of salinity in a soil profile we can consider that a resistivity of 10-20 ohm m corresponds to a total salt content between 0.3 and 0.5% and a resistivity less than 3 ohm m indicate that the total salt content in soil is >1%. Note, that for different soils/areas those values can be different, but general relationship should remain the same: low resistivity corresponds to high soil salinity.