

ABOUT THE INTERPRETATION OF SELF-POTENTIAL ANOMALIES

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In a number of geological systems, the main component of self-potential anomalies corresponds to hydroelectric coupling, which is electrokinetic in nature. This phenomenon, also called streaming potential, is modeled here from the scale of the connected pores to the macroscopic scale. A relationship between the depth of the water table and self-potential anomalies is presented and the coupling electrokinetic coefficient entering into this relationship is related to the mineralisation of the pore water and the electrochemical processes occurring at the pore water/mineral interface. An inverse scheme is proposed to determine the depth of the water table directly from self-potential surveys. Nonuniqueness of the problem is reduced by using additional information about the nature of the sediments/rock present in the subsurface or by scaling the relationship if the depth of the water table is available at some points.