The of Magnetic Minerals on Induced Polarization Measurements in Sedimentary Rocks

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Induced polarization (IP) measurements in porous sedimentary rocks are modeled in terms of pore geometrical descriptors (PGD). Using an extensive data set composed of 241 sandstone, carbonate, and arenite samples, we identified a stronger relationship between IP parameters and volumetric magnetic susceptibility versus IP parameters and PGD. This finding suggests that even small concentrations of iron minerals in rocks typically thought to lack electron-conducting minerals can significantly influence IP measurements. The combination of magnetic susceptibility with a pore geometrical descriptor term improves the empirical prediction of IP measurements relative to the use of pore geometrical descriptor terms alone. This suggests that small concentrations of iron minerals exert a strong control on the specific capacitance, a property that remains poorly understood. The lack of any relationship between magnetic susceptibility and the PGD confirms that the magnetic susceptibility provides additional information unrelated to PGD.