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Magnetic authigenesis in drill cuttings from Venezuelan Oil Fields

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In the last few years we have studied magnetic surface contrasts, over some Venezuelan and Colombian oil fields, in order to find an alternative means of assessing hydrocarbon reservoirs. In this work I thoroughly analyze the magnetic phases of 17 drill cuttings, from producer and non-producer wells, from three of these fields. Samples come from depth levels were peaks of Magnetic Susceptibility (MS) have been previously identified and related to anomalies of organic matter free radical concentration (OMFRC) obtained from Electronic Paramagnetic Resonance. Rock magnetic experiments include low and high temperature susceptibility analyses and grain-size distribution of magnetic minerals via room temperature hysteresis curves. Most samples show sharp or weak Verwey transitions around 120K indicating the presence of either pure or partially oxidized magnetite. These results agree with the hypothesis of a reducing swath at the MS and OMFRC anomalous levels that is directly linked to the underlying reservoir. Ti-magnetite, probably detrital, seems to be also present in some of these samples. A Day-plot reveals a dominant PSD grain size for most of the cuttings analyzed.