



Study of magnetic contrasts applied to hydrocarbon exploration in the Maturín sub-basin (Eastern Venezuela)

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We have studied near-surface magnetic contrasts in 9 oil wells located in a prospective area of eastern Venezuela (compressive deformation front of the northeastern Maturín sub-Basin). Samples are drill cuttings taken at intervals of ca 15 meters for the first 1200 meters of each oil well. Rock magnetic experiments, electronic paramagnetic resonance (EPR), extractable organic matter (EOM), X-ray diffraction and scanning electron microscopy (SEM) are used to discriminate between A and B-like magnetic susceptibility (MS) anomalies. The A-like are linked to a reducing environment caused by the underlying reservoir, whereas the B-like reflect primary lithological contrasts. A NE transect of MS, OMFRC and EOM amplitude, for the A-like depth levels, shows a major swathe of anomalous values that comprises the middle part of the profile. This swathe is probably associated to the southerly migration of hydrocarbons from the northern petroleum kitchen toward the deformation front. We argue that such a result could be used, for future exploration and production ventures in the region, as a preliminary characterization of the reservoir. We also demonstrate in a Day plot that J_{rs}/J_s and B_{cr}/B_c ratios stand as additional criteria to discriminate between these two types of magnetic contrasts. In fact, for the area of study, hysteresis parameters show three distinct trends corresponding to samples from A-like, B-like and non-anomalous depth levels.