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The Role of Coal "Cleat System" in Coalbed Methane Prospecting/Exploring: A New Approach

The Coalbed Methane (CBM) generated by coal is located in coal pores and the drainage of the coalbed gas to the production well is made through the so-called "cleat system", i.e., the natural fracture network of coal. This justifies the classic method of CBM production by providing fracture-stimulation with fluids under pressure to open coal natural fractures.

However, natural fracturing system of any coal is very complex, depending on coalification process and local and regional tectonics. Additionally, the cleat network cannot be inferred using conventional regional micro-tectonics studies.

Therefore, what really matters is to know, in each case, the spatial orientation of the different classes of fracturing, ordered by connectivity frequencies, to make possible an orientated injection of fluids to open the cleat permitting higher amounts of gas release/drainage. In fact, the cleat family of highest connectivity frequency is the one that define the gas circulation network to the producing well, and consequently the most favorable one to be opened by fluids injected in the correct direction.

The current investigation refers to a new and innovative proposal to develop a method for determining cleat family orientation in the space, ordered by cleat connectivity frequency. This new semi-automatic method is based in the study of "cleat characteristics" by image analysis in orientated core samples of boreholes for CBM prospection/exploration. The information from image analysis is studied by statistical CCT ("coal-core tectonics") methodology and subsequently combined with Geographic Information System, thus referring to location of the real case under study.