

### **Determination of Migration Events of Present Hydrocarbons in the Eastern Llanos Basin, Through the Characterization of Fluid Inclusions**

**Gabriel David Moreno Aguilar**<sup>1,2</sup>, Juan Carlos Molano mendoza<sup>1,2</sup>, Ariel Oswaldo Cadena<sup>1</sup>, Santiago Jimenez<sup>1,2</sup>, Angie Cardona<sup>1,2</sup>, Nathalie Burbano<sup>2</sup>

<sup>1</sup>Universidad Nacional de Colombia, Bogota, Colombia, <sup>2</sup>Microfluid Spectral Laboratory, Bogota, Colombia

Within the Mesetas sector in the Lejanías area of the Llanos Orientales Basin, defined as part of the ANH's Caracterización de Arenas Bituminosas (CAB) project, six hydrocarbon-impregnated sandstone samples were studied. These samples were collected from two stratigraphic columns (Río Cafre and San Antonio columns) within the Guadalupe Group in the project. Various techniques were used, including petrography, cathodoluminescence, SEM images, and UV epifluorescence, which helped differentiate the diagenetic events of the rock and temporally locate the formation of fluid inclusions (FI) in these processes, followed by FI petrography. Among the fluid inclusion assemblages (FIA's), three main types of FI were studied: Type 1 inclusions consisting of light to dark brown liquid hydrocarbon, gaseous hydrocarbon, and occasionally black irregular solid (insoluble organic material); Type 2 inclusions composed of liquid and gaseous hydrocarbon along with water and sometimes solids (insoluble organic material); and Type 3 inclusions consisting of water and gas. Data on homogenization temperature (Th), final ice melting temperature (Tm), salinity, pressure, Raman spectroscopy, and UV epifluorescence were obtained from these inclusions. The various data allowed for the differentiation of at least two hydrocarbon migration events in the area. One event shows a temperature of around 62 – 86 °C, predominantly greenish-blue fluorescence and salinities around 0.18% wt. NaCl equiv. The other event shows a temperature of around 88 – 100 °C, predominantly strong blue-green fluorescence and salinities around 2.41% wt. NaCl equiv. Both hydrocarbons must have API gravities between 20 and 50 degrees, with the predominantly blue fluorescence indicating lighter hydrocarbons. Finally, a qualitative comparison was made between the fluorescence of hydrocarbons present in fluid inclusions and those in the rock pores, showing significant degradation of the latter, evidenced both by the loss of fluorescence and the characteristics observed in hand samples.