

**AAPG Annual Convention  
Salt Lake City, Utah  
May 11-14, 2003**

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### **Petroleum Inclusions: Markers of Tectonic and Diagenetic Evolution of a Foreland Petroleum Basin (Columbia)**

The petroleum inclusions of two oil fields from Columbia have been investigated. Fourier transform infrared and Raman microspectroscopies have been used to characterize the gas composition of petroleum and aqueous inclusions respectively. Confocal scanning laser microscopy allows us to determine the volume of the gas phase at a given temperature and describes the shape of the inclusions. Homogenization temperatures and volume measurements are the input data for the PIT software that has been applied to reconstruct the P,T conditions of fluid trapping and to model the petroleum composition. For both locations four groups of petroleum inclusions can be separated. Ante-tectonic petroleum migration is marked by imploded inclusions containing a black oil. Syn-tectonic migration seems to be related to deformed inclusions in fracture planes filled with a light oil. Two main post-tectonic inclusion types in fractures contain a gas condensate and a heavy oil.

After analyzing and modeling the aqueous and petroleum inclusions the following scenario for the two oil fields is proposed: a first petroleum generation has invaded the basin and was removed during an intense tectonic phase. While compressive tectonics, inclusions imploded and fracturing created migration pathways. The pre-existing oil was then replaced by a light oil that could separate in a gas fraction and in a heavy oil fraction during the final uplift. This last event has led to the present day petroleum reservoirs. This study shows how the inclusion petrography and analysis can help us to decipher the complex history of a foreland basin.