

*Paper 22*

**Evaluation of formation fluids from surface gas measurements**

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The analysis of downhole well data (LWD / Wire Line) for the purpose of identifying and locating hydrocarbon fluids is now widely practiced, and current interpretation methods are perfectly adapted to this. These methods do

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have their limits, however, the most common being the way the measurement itself is performed.

Some oil companies and a few mud logging companies have been looking at an alternative type of measurement, one that has been available for years but never before used for reservoir interpretation - surface gas readings.

Despite some setbacks on the first attempts, persistent effort has finally paid off. Working on the project since 1996, and using a combination of a new type of gas trap linked to a more accurate, more reliable and faster hydrocarbon gas analyser, Geoservices has been able to develop an interpretation method based on this direct and independent measurement.

In 2001, Geoservices introduced equipment for continuous measurement in the C1 to C8 range, including BTX (benzene, toluene, xylenes) as well as non hydrocarbon gases such as CO<sub>2</sub>, H<sub>2</sub>S, methanol, acetic acid, etc. This innovative concept, called FLAIR (FLuids Analysis In Real time), was developed with assistance from the French Petroleum Institute, and consists of a mass spectrometry analyser associated with a volumetric heated gas trap and specific gas transport line.

FLAIR has been successfully tested in wells in different geological environments and has dramatically improved the quality of gas data, notably in deep offshore wells drilled with OBM. The new data have proven their usefulness at the wellsite level, in allowing early evaluation of the fluids encountered and the consequent optimisation of the final well program. Investigations are in progress concerning the input of such new data on the post well synthesis (integration of non HC gases, heavier components, etc.).

The benefits of this new generation of service have already been significant, even though much of the method's potential remains largely unexplored due to its relatively recent introduction. This paper seeks to present the applications currently used for reservoir characterisation, hydrocarbon fluid differentiation, inter-fluid contact determination, identification of leak or diffusion phenomena, seal efficiency, compartmentalisation, lateral extensions etc.