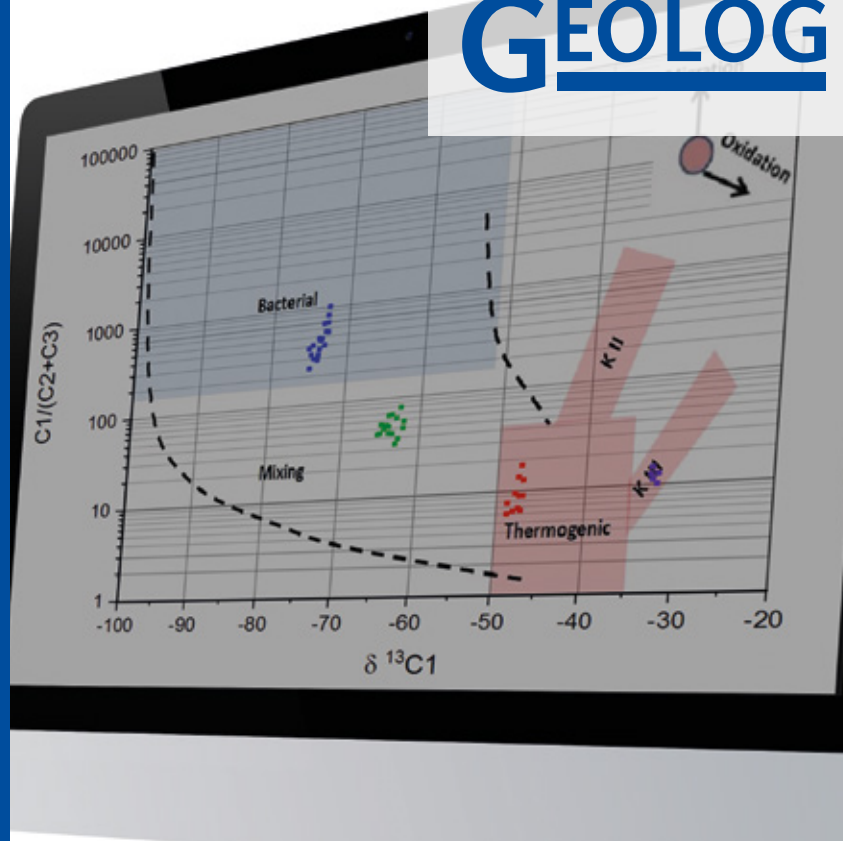


Real-Time Isotopic analyses $\delta^{13}\text{C}$ of C1, C2 and C3

GEOLOG can offer a comprehensive range of carbon isotopic analyses at well site, thanks to an innovative patented analytical solution. GEOLOG was the first company able to perform isotopic analyses from methane to propane and at the well site. This provides a continuous real-time log throughout the well, using our efficient mud gas extraction techniques for increased gas characterization and reduces risks incurred through conventional spot sample collection.



Benefits

- To identify the biogenic, mixed or thermogenic origin of gas
- To establish the provenance of gas in cap rocks and to assess seal efficiency
- To determine maturity of gas evaluation
- To identify possible sources of gas
- To assess compatibility between gas and associated oil (similar source or maturity?)
- To detect and quantify possible mixing of gases with different origins
- To corroborate fluid contact identification
- To corroborate reservoir connectivity

Challenges and Solutions

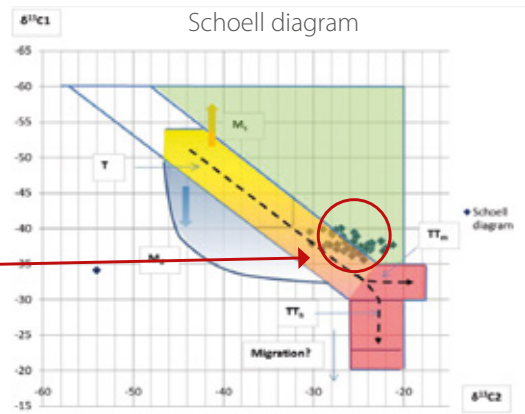
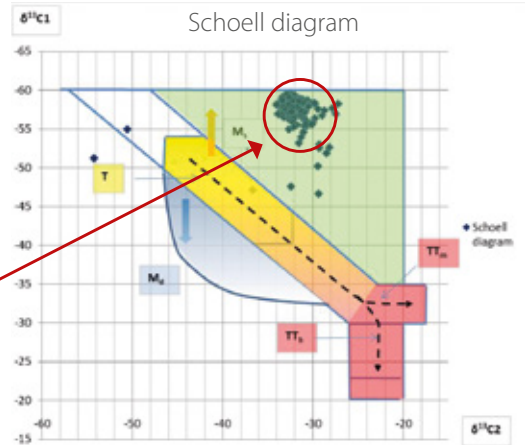
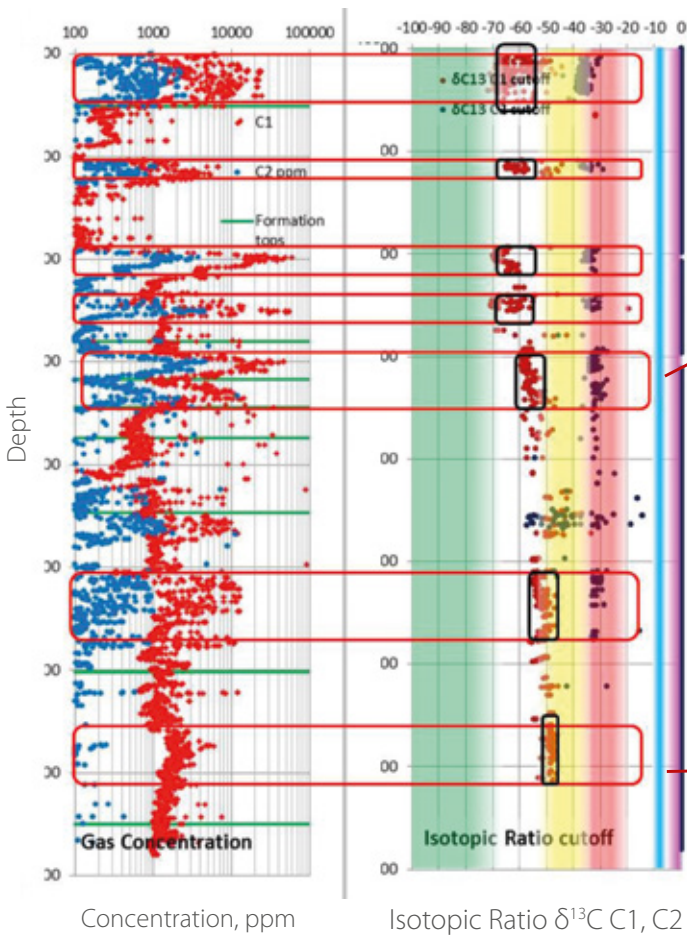
Chemical analyses of gas compositions are fundamental, but sometimes these data are insufficient to fully understand gas origin, maturity and distribution.

For example, a well-sealed thermogenic gas reservoir underlying less mature or biogenic gas sourcing shales would be isotopically heavier than the gases in the overlying cap rocks. In the event the seal was leaking, the overlying gases would develop a heavier isotopic signature due to the presence of the thermogenic gases entering the seal. By recognizing these trends operators can gain a better understanding of the gas origin, being indigenous or migrated from a reservoir, through slight but continuous leakages.

To understand the origin of gas, GEOLOG utilises various published models validated by case histories and based on integration of compositional and isotopic values.

Applications

In exploration, the GeolIsotopes service can be utilized to understand the origins of oil, to identify source rocks and help confirm migration pathways.



The log charts on the left identify different isotopic marking of gases detected at different well targets. The shallower ones indicate mixing with bacterial gas. Only the lowest interval (the main reservoir target) shows a clear thermogenic origin. On the right, the crossplots between C1 and C2 isotopic ratio show the extent of migration and alteration of the hydrocarbons. This is only possible on site with GEOLOG's Geolotope service providing continuous well data and interpretation.

Geolotopes is a GEOLOG patented service (*US PAT 10145835*).

Specifications

δ ¹³ C Analysis	Methane (C1), Ethane (C2) and Propane (C3)
Limits of Detection	Minimum 500ppm to 30% of volume
Analysis Time	3 min (C1-C2), 8 min for full range

GEOLOG around the World

