GEOTech
RESEARCH & LABORATORY

GEOTech in a Nutshell

THE TEAM

(An ideal mix of fresh ideas and experience)

A multidisciplinary group of very young and motivated professionals (under 35) with PhDs in various disciplines supervised by technical managers with long experience within Oil Companies

THE LOCATION

Innovation Hub "Fondazione Filarete" of University of Milan (Universita' Statale di Milano) An incubator where many high technology start-ups are growing.

THE APPROACH

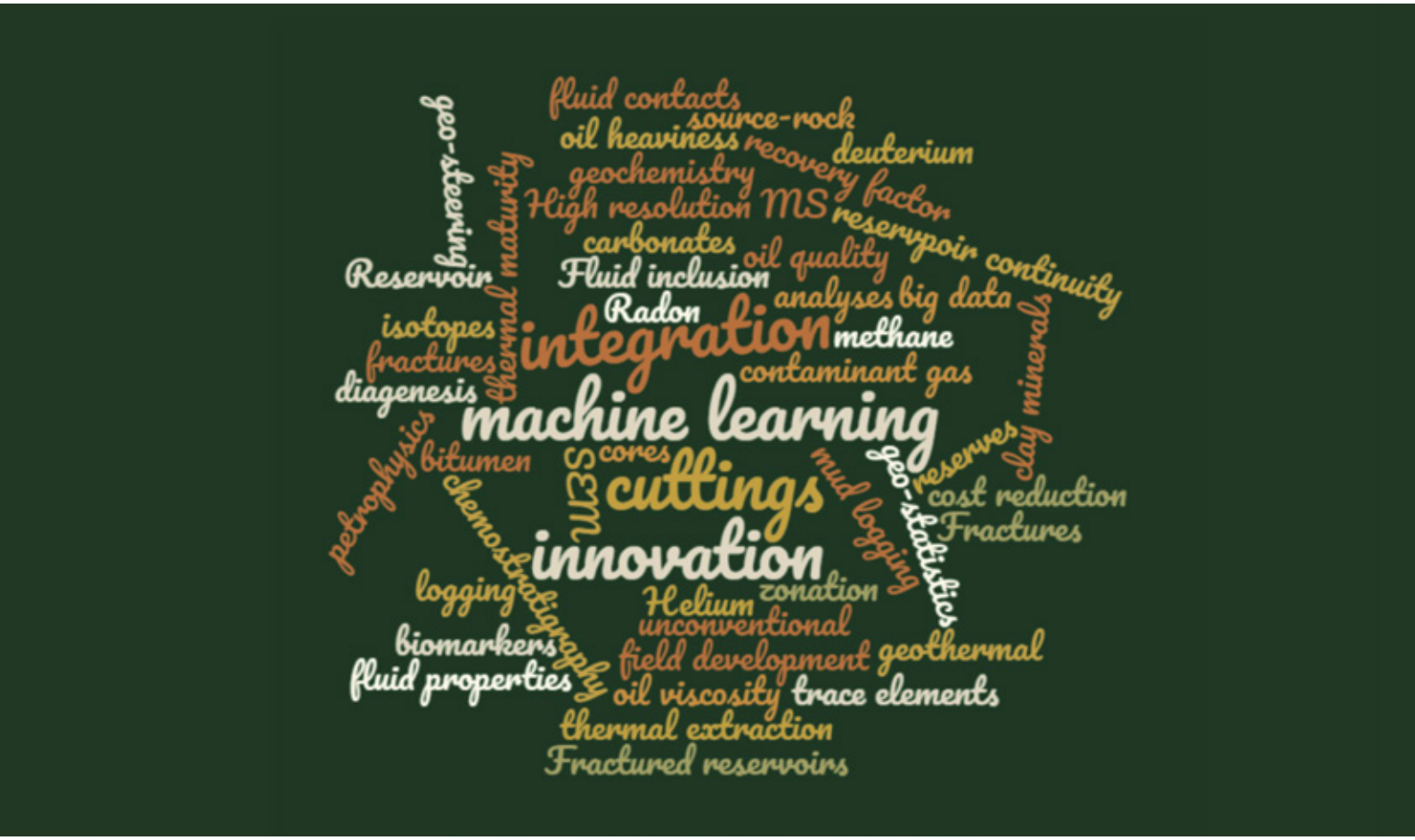
- Alliances with best in class technological providers to develop leading edge products. Research today demands very different skills and we continuously seek technological partners able to complete and integrate our competences. Academia, technological start-ups and Oil Companies are our preferred partners.

- Cross fertilization: to leverage technologies developed in other industrial sectors, adapting them to our needs

- Integration & multidisciplinary: magic technology doesn't exist; data integration is the only solution to reducing uncertainties and generate additional value from each technology.

Laboratories & Research

What we cannot see in the subsurface, can be analyzed, characterized and interpreted when rock samples come to the surface, bringing with them a huge amount of information.



GEOTech Laboratories' intention is to:

- Plan and optimize future well site activity through preliminary tests
- Materially improve activity performed at the well site, by deploying tools not currently available for field applications
- Test new, experimental tools before moving them to the well site

Research to:

- Make available new analytical tools for field applications (towards the future of fully equipped upstream labs at the well site)
- Extract maximum value from acquired data so as to address and solve key industry issues

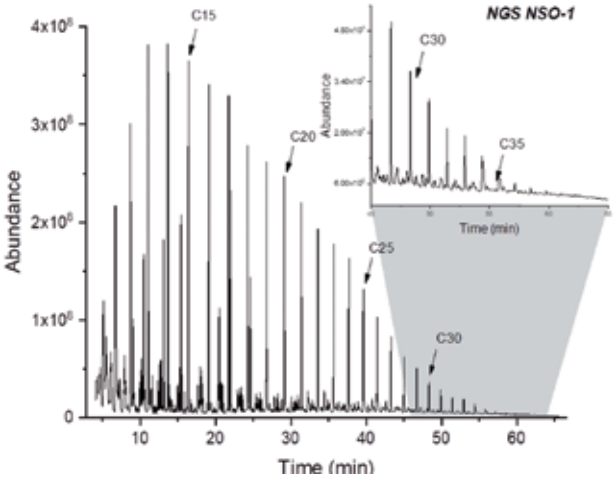
Lab Studies

Oil - Oil and Oil - Source rock correlations

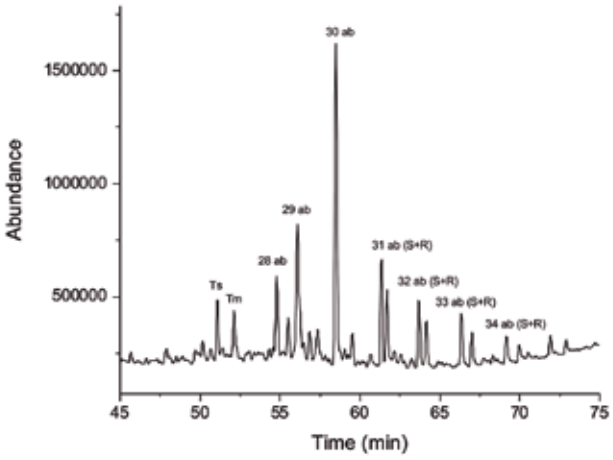
- Biomarker studies on oil and extracts
- Isotopic analyses (GC-IRMS)
- Samples may be whole oil or cuttings for solvent extraction or thermal desorption

Source rock characterization and maturity assessment

- TOC
- Pyrolysis
- Organic facies identification and characterization
- Vitrinite reflectance
- AFTA
- Fluid inclusions



Example of whole oil GC-FID

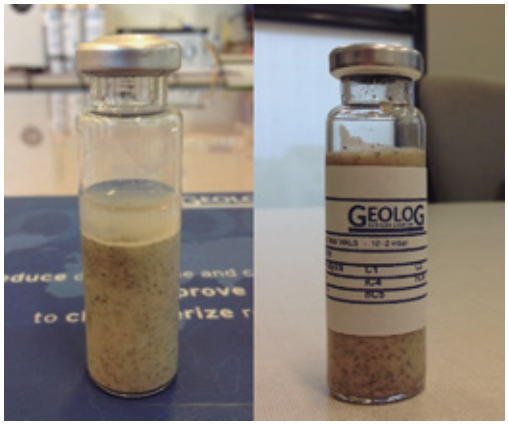


GC-MS of oils Terpanes (m/z 91)

Pyrolysis equipment (rack size) developed in house.

Gas characterization

• Complete chemical analyses, including contaminant gases
• Carbon and deuterium isotopic analyses
• Gas – oil correlations
• Head Space analyses
• Residual gas (as still present in cuttings)

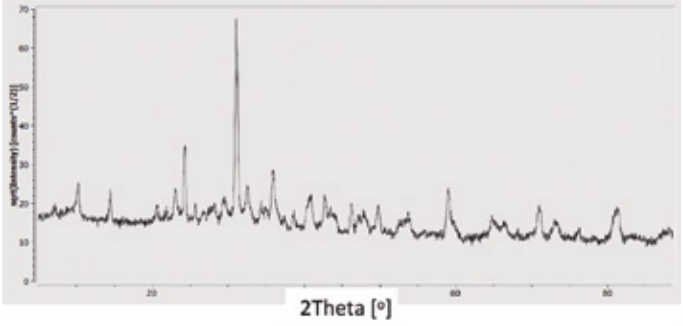


Head space: small samples, great information

Gas collected at well site in small pre-evacuated vials (GeoTubes) can be quickly analyzed

Rock Analyses and characterization

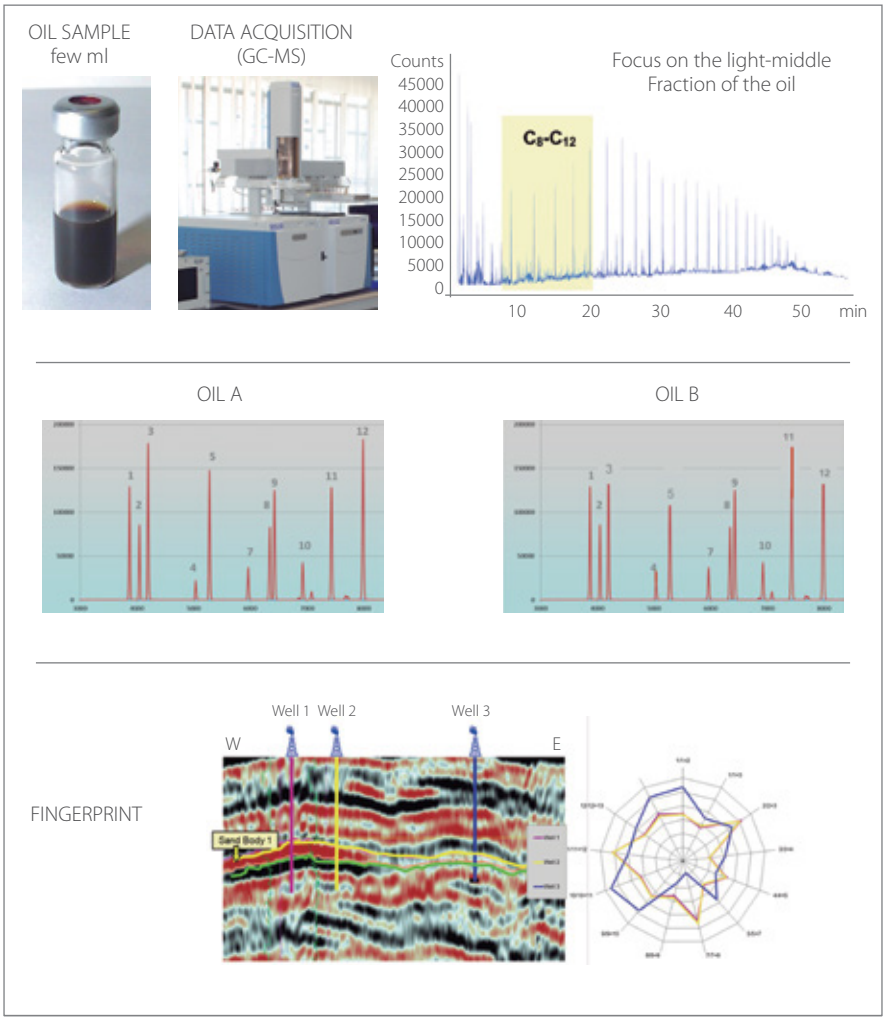
• XRD diffraction for mineralogical analyses
• XRF chemical analyses for major, minor and trace elements



PROPRIETARY SOFTWARE

Diffractogram of a cutting sample, Rietveld method is applied in order to determine the quantities of the resulting crystalline phases

Highlights of some technologies



Reservoir continuity

Reservoir continuity is a growing issue for Oil Companies, significantly impacting field development strategies.

Reservoir continuity using produced oils is a well-established methodology, but limited by the availability of MDT or DST samples.

GEOTech is able to offer a highly innovative and proprietary approach to establish reservoir continuity utilising cuttings.

Fractured reservoirs

Production from fractured reservoirs makes an important contribution to global oil production, but is not an easy task.

Fracture detection and the evaluation of fracture permeability is a fundamental step for production optimization.

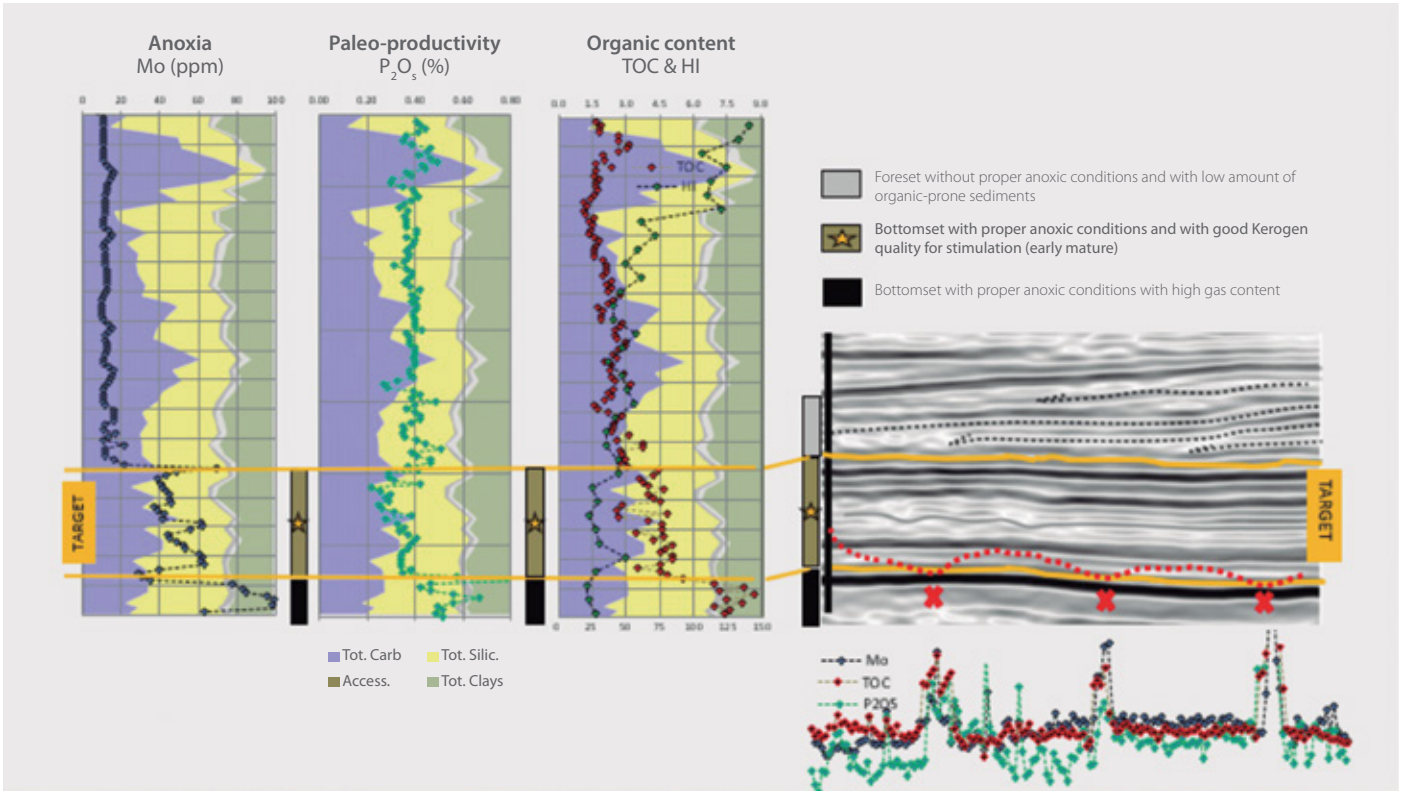
GEOTech, in addition to the package offered by GEOLOG at the rig site for fracture detection, is able to utilise proprietary and innovative software to evaluate fracture aperture using mud delta flow data collected at well site.

XRD and XRF integration

Mineral and chemical composition are two sides of the same coin, however XRF accuracy is higher than XRD, as consequence of the analytical approach. GEOTech, in collaboration with University of Trento is working to create innovative software combining these two data sets to obtain more and more accurate data to allow better quantification of the different mineralogical phases.

Chemostratigraphical interpretation

GEOTech is intensively engaged in devising new tools and methodologies to be applied to Chemostratigraphical interpretation. Carbonates are investigated to create new methodologies for evaluating varying diagenetic effects Clastics are studied to distinguish sediment provenance and overlapping effects due to diagenesis.



XRF, XRD and TOC data can give key information for reconstruction of source rock/unconventional reservoir deposition.

Unconventional reservoirs

Unconventional reservoirs require special studies to map fluid and rock properties in a unique framework. GEOTech's approach organic matter distribution, quality and maturity are fully integrated with mineral composition, sedimentological environment and rock properties.
All measurements are performed upon a single physical sample and data then displayed in a 3D using samples from different wells/depths.

Locations & Partners

LOCATIONS

Based at the Universita Di Milano's research incubator facility, GEOTech is ideally situated to leverage exposure to multiple fields of advanced technology research to enable the development of novel solutions to the challenges of the oil, gas and geothermal industries.

In addition to the Milan Research Laboratory, GEOTech also has satellite operational laboratories in Houston, USA, Neuquén, Argentina and Doha, Qatar.

GEOTech *also leverages GEOLOG's global network of operational bases in over 40 countries for localised R&D projects and Laboratory studies.*

PARTNERS

GEOTech actively seeks to collaborate with the industry and leading academic institutions on new projects to drive forward the state of the art in geochemical and physical techniques. Recent projects include the following partners:

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