MULTI-SENSOR XRF CORE LOGGERS

CHEMICAL & PHYSICAL PROPERTY CORE SCANNING FOR RESEARCH & INDUSTRY

IF CORE'S WORTH TAKING, IT'S WORTH LOGGING

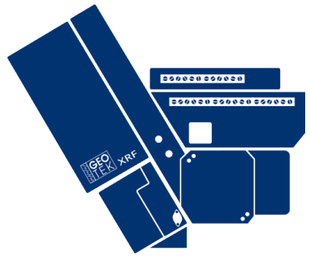
XRF CORE SCANNING WITH A CHOICE OF SENSOR

A Multi-Sensor Core Logger (MSCL) is the perfect platform to acquire XRF data, as it offers a stable and repeatable geometry with each measurement depth co-registered with other chemical and physical properties. Geotek offer **two XRF spectrometers** that can be **installed onto any of Geotek's MSCL platforms.**

The choice of sensor and system is yours!

Choose your sensor

GEOTEK XRF

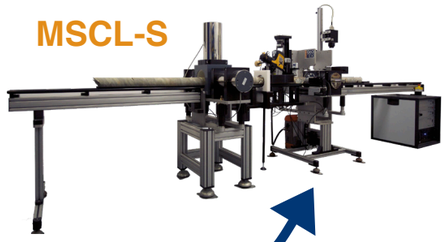


OLYMPUS VANTA

The value of integrating XRF measurements simultaneously with other physical and chemical sensor technology allows Geotek XRF core scanners to be applicable over a wide range of geoscience applications.

Choose your system

MSCL-S



Provision of continuous high resolution physical and geochemical stratigraphy

MSCL-XYZ

An integrated imaging and spectroscopy core analysis workstation for mineralogical and chemostratigraphical studies

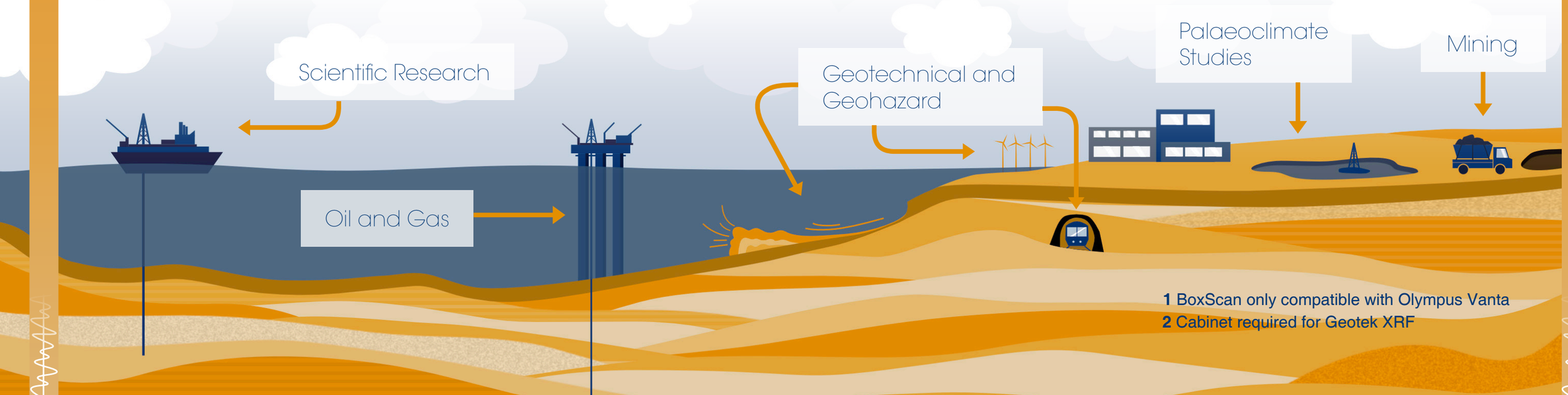
BOXSCAN [1]

A simple core box scanning platform for handheld XRF

MSCL-XZ [2]

Benchtop core imaging and spectroscopic scanning instrument

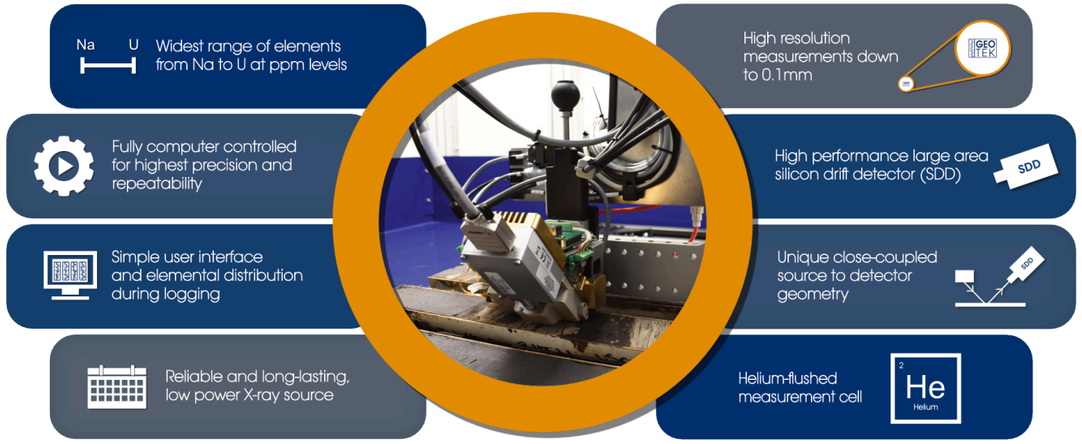
GEOTEK XRF TECHNOLOGY IS READY FOR ANY GEOSCIENCE APPLICATION



1 BoxScan only compatible with Olympus Vanta
2 Cabinet required for Geotek XRF

HIGH RESOLUTION GEOTEK XRF

The ultra-sensitive Geotek XRF spectrometer is designed for class leading light energy element (e.g Na, Mg, Al, Si) sensitivity to provide elemental distribution and abundances from the surface of geological samples. Innovative close-coupled geometry with a market-leading X-ray detector and signal processing technology delivers impressive count rates at high spectral resolutions without the sacrifice of measurement speed. Geotek XRF software features easy to use set-up windows giving the user flexibility of measurement conditions and areas of illuminations; so whether you are focused on palaeoclimate research, or oil and gas chemostratigraphy the Geotek XRF will fit into your workflow.



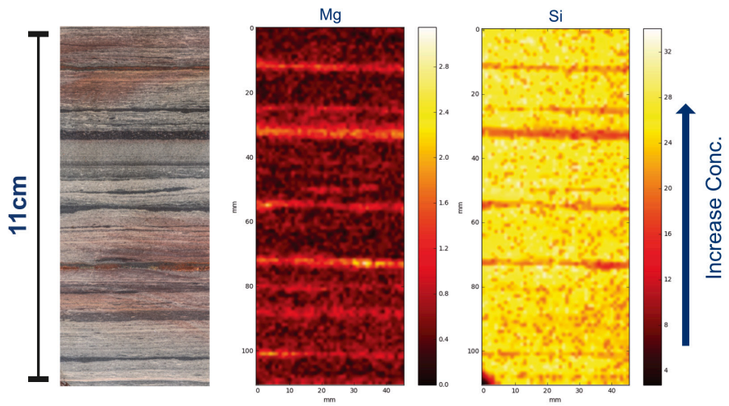
MARKET-LEADING SENSITIVITY AND PERFORMANCE

11	12	13	14	15	19	20	26
Na	Mg	Al	Si	P	K	Ca	Fe

The Geotek XRF sensor delivers superb light energy element performance at resolutions down to 0.1 mm making the sensor perfect for detailed studies on highly laminated sediments. The latest advances in X-ray detector technology and digital signal processing coupled with an improved helium flushed cell and new filter wheel mechanism produce higher spectral resolution without the sacrifice of measurement time.

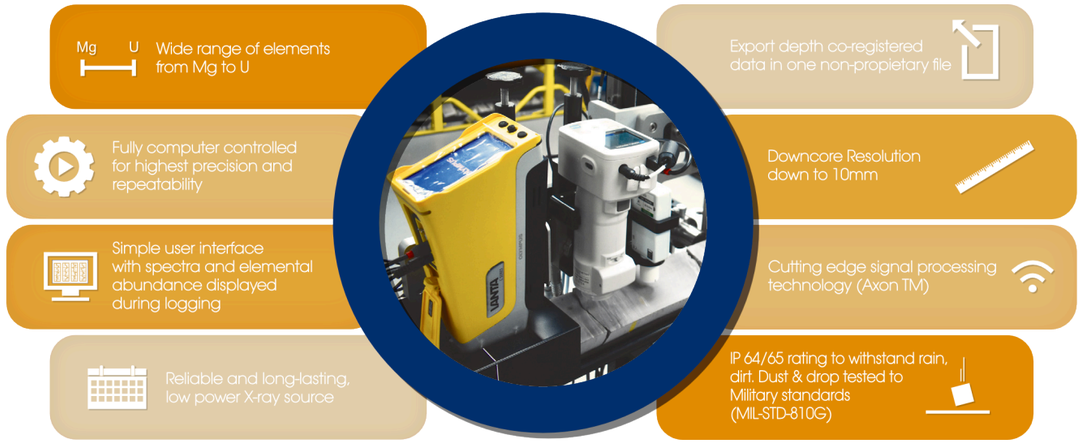
Understand heterogeneity
Left:

XRF maps of Mg and K at 0.1 mm x 1 mm pixel size created using the MSCL-XYZ Core Workstation and a Geotek XRF sensor.



OLYMPUS VANTA XRF

Geotek have integrated one of the most powerful handheld XRF spectrometers onto our MSCL platforms: The Olympus Vanta. The Olympus Vanta can be mounted onto any of Geotek's MSCL product range to enable the simultaneous acquisition of both petrophysical and geochemical properties from geological samples. The MSCL systems seamlessly communicate with the Olympus Vanta and its cutting edge signal processing technology (Axon TM) to deliver accurate and repeatable elemental abundances that are depth co-registered to other MSCL sensor technology. The Vanta XRF analyzers are pre-calibrated using a wide range of industry standard certified reference materials (CRMs) providing users with excellent out of the box accuracy.



THE OLYMPUS VANTA XRF SPECTROMETER IS AVAILABLE IN TWO MODELS:

VMR Model

- Highest performance analyser with the lowest limits of detection
- Larger area SDD with 50kV X-ray tube (Rh target)

VCR Model

- A combination of value, superior speed and excellent limits of detection
- SDD with 40kV X-ray tube (Rh target)

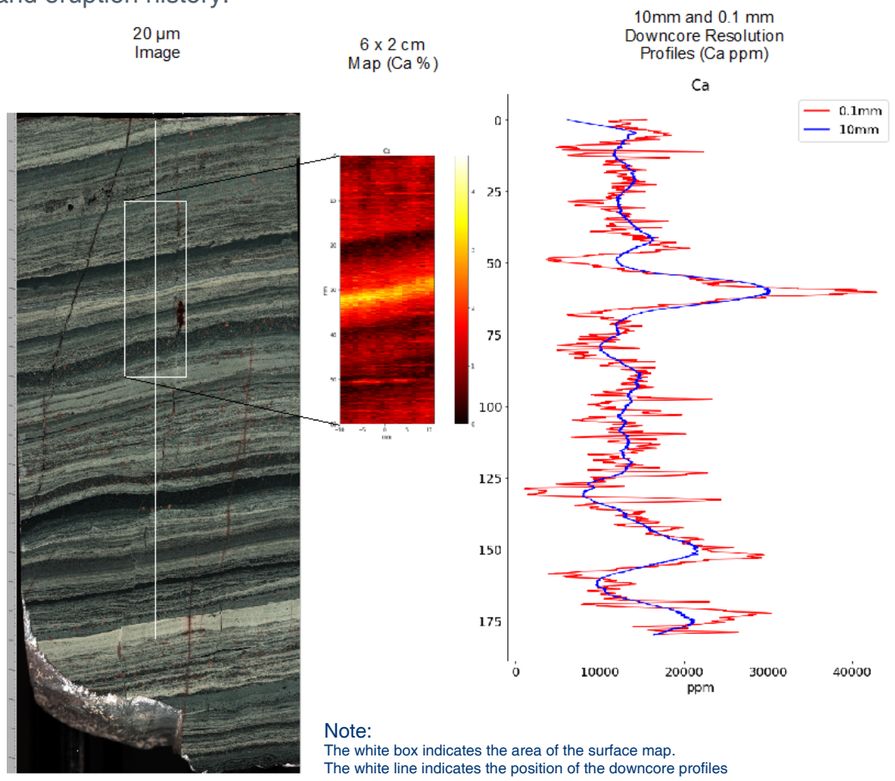
VANTA VMR MODEL

ELEMENT / DETECTION LIMIT, PPM							
Mg	1800	S	15	Mn	5	Ag	1
Al	125	K	15	Fe	15	Pb	2
Si	190	Ca	20	Cu	2	Sr	1
P	20	Ti	20	Mo	1	U	1

LODs were developed by testing a variety of certified reference materials or standards, and are dependent on testing time, sample heterogeneity, the presence/absence of interfering elements, and the beam conditions used.

CASE STUDY: XRF ANALYSIS USING GEOTEK XRF FROM A LAMINATED TUFF SAMPLE

A Pre-Cambrian Tuff hand specimen was supplied to Geotek courtesy of the National Geological Repository, Keyworth, which is part of the British Geological Survey (BGS). The aim of the investigation was to explore the chemistry of each of the lamina to better understand eruption history.



Note:
The white box indicates the area of the surface map.
The white line indicates the position of the downcore profiles

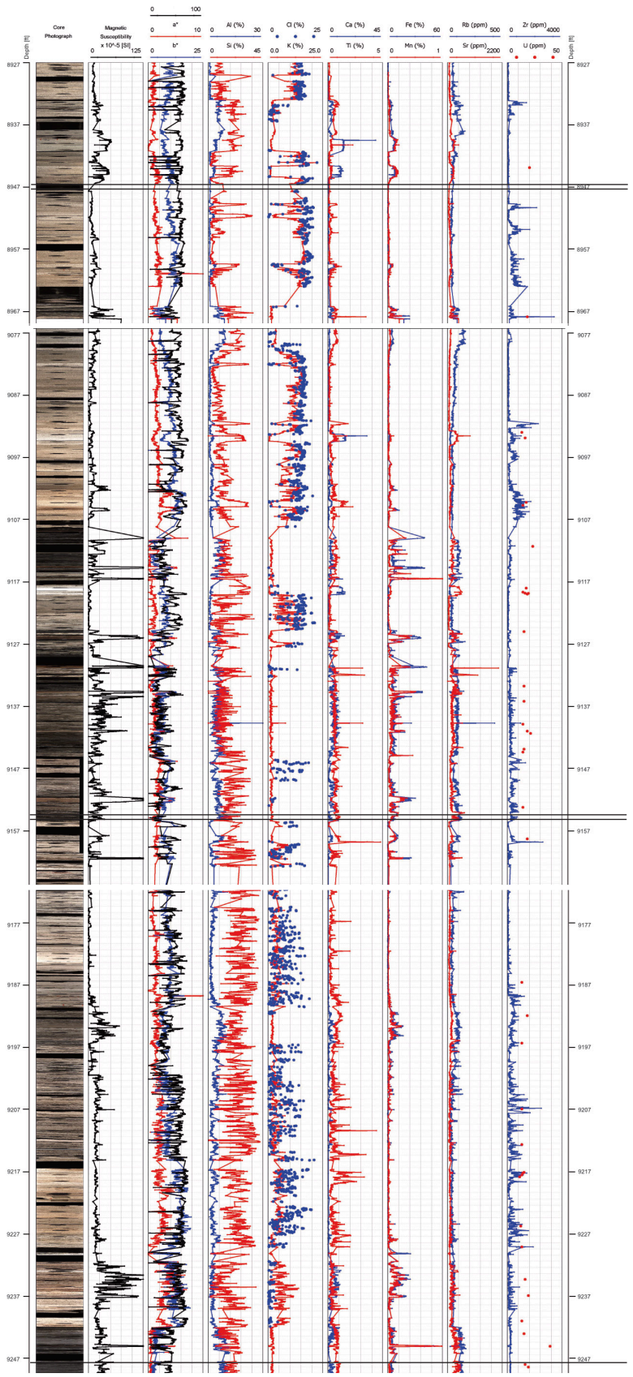
A white light image of the sample was acquired using a Geoscan V camera with cross-polarisation. The resultant image has a 25 µm per pixel resolution and the sample surface is wet to enhance the visible geological structure. A Geotek XRF spectrometer was used to acquire the geochemical data at downcore area of illuminations of 10 mm x 15 mm (Ca concentration shown in blue curve in the above figure) and 0.1 mm x 15 mm (Ca concentration shown red curve in the above figure) within a helium atmosphere. In order understand the spatial distribution of elemental concentrations a 2D XRF map was acquired over a small area of the sample at a bin size of 0.1 mm x 1 mm (downcore x crosscore); position indicated by the white rectangle on the core image.

RESULTS

- **Ultra High Resolution:** The Ca concentration for the 0.1 mm x 15 mm profile demonstrates the capabilities of the Geotek XRF by highlighting the variation in Ca concentration within each lamina and hence a change in eruption chemistry between each event
- **Flexibility:** Comparison between the two areas of illumination show an excellent correlation with respect to measured ppm values to provide bulk and high resolution information. Therefore high and low resolution scanning is possible.
- **Spatial Distribution:** The high resolution map of Ca concentration demonstrates how mapping can be used to understand distribution of elements through heterogenous samples.

CASE STUDY: XRF ANALYSIS USING AN OLYMPUS HANDHELD XRF FROM A CONVENTIONAL SANDSTONE RESERVOIR

MSCL technology was employed on an archived 4” slabbed core from Well 211-23-8S1 located at the Dunlin Field, East Shetland Basin, UK. A multi-parameter stratigraphy including high resolution core photography using a Geoscan V camera, X-ray fluorescence (XRF) using an Olympus Delta XRF, magnetic susceptibility, and quantitative colour spectrophotometry at a 1 cm downcore resolution was generated (Figure 3). The measurements were taken from the surface of the slabbed cores with no preparation to the surface.



RESULTS

- **Definition of Stratigraphy:** Identify formation boundaries between the sandstones and mudstones, which are typical of the Brent and Dunlin group. The cm-scale resolution of the geochemical data highlights areas of brine that are associated with hydrocarbon staining in the sand facies; and clay enrichment in sands with clay-facies noted from from increases in magnetic susceptibility along with Al and decrease in L*, which is measuring the grayscale of the core.
- **Understand Sediment Provenance:** Typical elements used for this analysis are Zr and Rb, which in this case fluctuate within the sandstone reservoir rocks as a result of terrestrial influx of the deltaic and shore-line facies of the Brent and Dunlin Group.
- **Rescue Data Lost in the Archive:** the only records available for these cores are the core photographs taken in the 1990s with limited to no information about the sedimentology. Therefore, the acquisition of MSCL data on this archived material has increased the value of this core, potentially reducing the need to acquire a new core from the field development.

SUPPORT

Geotek offer Gold and Silver service and support packages for our product line. The Geotek team incorporates a range of engineers, software developers and geoscientists who can provide both instrument and application support to our customers.

	SILVER	GOLD
Telephone and online support for application and instrument queries	✓	✓
Online diagnostic support	✓	✓
Latest software upgrades	✓	✓
30% Discount on labour and consumable parts	✓	
Labour and consumable parts included		✓
Annual service or repair visit		✓

PURCHASE

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SERVICE

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