

QL40-OBI-2G-UV

Optical borehole imager

30.06.2023

The QL40-OBI-2G-UV is a derived product from the ALT slim-hole Optical Borehole Imager.

The new system shares the same technology as the standard QL40-OBI-2G. It implements a high resolution CMOS digital image sensor combined with a fisheye lens. This new optical televiewer combines white light as well as ultraviolet (UV) light source in the same logging tool. In separate passes, images of the borehole wall can be acquired using white (visible) or ultraviolet light. When certain minerals or hydrocarbons are exposed to ultraviolet light, characteristic fluorescence can be observed in the resulting images. Besides lithological and structural analyses, new applications are possible such as mineral identification based on fluorescence and ground hydrocarbon contamination surveys.

The tool produces an extraordinarily clear, sharp, 360° continuous - unwrapped digital picture of the borehole wall, either in air or clear water. Resolutions up to 1800 pixels over the borehole circumference can be achieved which makes it ideal for lithological, mineralogical, microfossil and structural analyses.

A built in high precision orientation package incorporating a 3 axis fluxgate magnetometer and 3 accelerometers allows orientation of the images to a global reference and determination of the borehole's azimuth¹ and inclination.

The QL40-OBI-2G-UV is fully digital and can operate on standard wirelines. It is a bottom sub and can be either combined with other logging tools of the QL (Quick Link) product line to build tool strings or operated as a standalone tool.

Application

OPEN HOLE

- Detailed and oriented structural information
- Reference for core orientation
- Fluorescent mineral detection and identification (NEW)
- Ground hydrocarbon contamination (NEW)
- Fracture detection and characterization
- Breakout analysis
- Lithology characterization (Detection of thin beds, foliation, grain size, mineralogy, luminance), determination of bedding dip

CASED HOLE

- Casing inspection

¹ Only applicable in non magnetic environment



Tool

- Diameter** : 40mm (1.6")
- Length** : 1.49m (58.7")
- Weight** : 5.3kg (11.7 lbs)
- Temp** : 0 - 70°C (32 - 158°F)
- Max. Pressure** : 200bar (2900psi)

Optical system

- **Sensor** : 1/3" high sensitivity CMOS digital image sensor
- **Color resolution** : 24 bits RGB true colors
- **Azimuthal resolutions** : 120, 180, 360, 600, 900, 1800 points
- **Vertical resolution** : User defined. Function of depth encoder vertical resolution
- **Light source** : High efficiency white and UV LEDs (UV light wavelength : 365 nm-UVA)

Orientation sensor

- 3 axis fluxgate magnetometer - 3 accelerometers
- Inclination accuracy : +/- 0.5 degree
- Azimuth accuracy : +/- 1.2 degree

Operating conditions

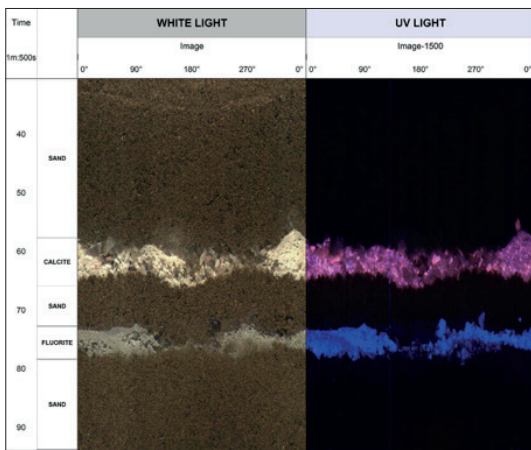
- Cable type** : Mono, multi-conductor, coax
- Compatibility** : Scout Pro / Opal (Scout / Bbox / Matrix)
- Digital data transmission Telemetry** : Variable baudrate telemetry according to cable length/type & surface system
- Logging speed** : Variable - function of image resolution, borehole diameter, wireline and surface system model.
- Centralisation** : Required
- Borehole fluid** : Dry or clear water
- Measurement range** : **White light source** :
in air and in water : 2.3" to 21" (58mm to 530mm)
- UV light source** : in air : 2.3" to 10" (58 to 254mm)
in water : 3.5" to 8.5" (89 to 216mm)

Principle of measurement

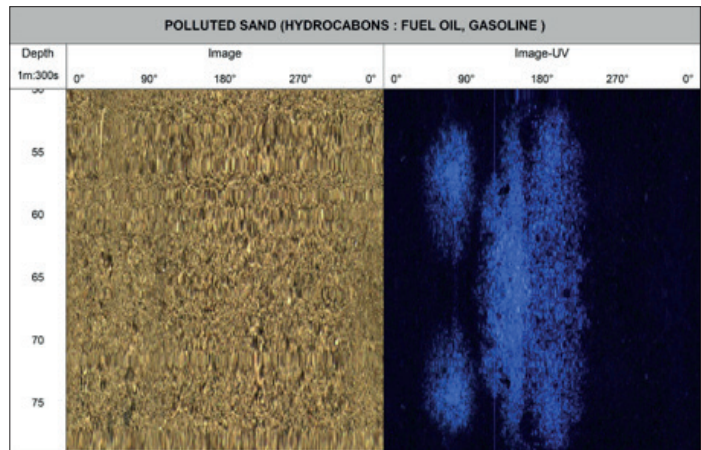
The tool incorporates a 1/3-inch CMOS digital image sensor and matching fisheye optics. The digital image sensor captures the reflection of the borehole wall through the fisheye lens. The light source is provided by 10 high efficiency white and ultraviolet LEDs. The displayed log image is derived from a single annulus extracted from the active pixel array. Azimuthal resolutions available are 120, 180, 360, 600, 900 and 1800 points per recorded circle. By using processed digital images in combination with deviation sensor data, the tool can generate an unwrapped 360° oriented image.

Measurement features

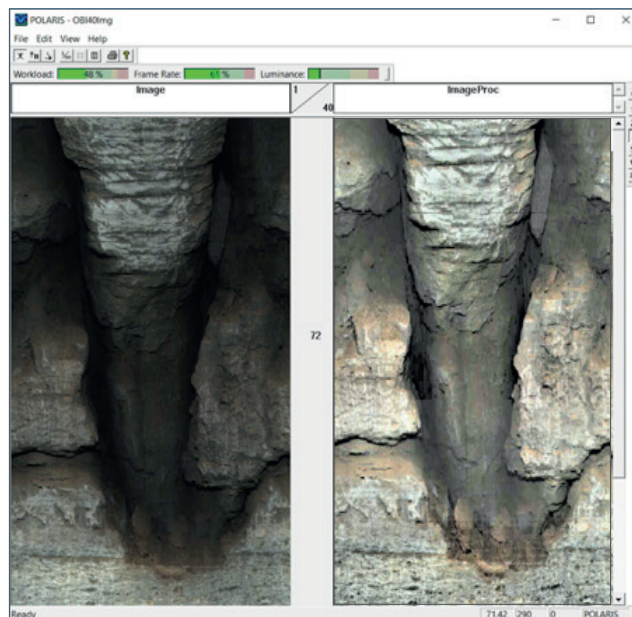
- 360° RGB true color oriented image
- 360° UV oriented image (NEW)
- 360° real time image filtering to enhance image contrast in dark environment (NEW)
- Deviation parameters: azimuth, tilt, tool relative bearing, magnetic field, gravity
- 3 accelerometer calibrated components, 3 magnetometer calibrated components
- Temperature of CMOS image sensor
- Real time exposure level adjustment (NEW)



White light vs UV light mineral fluorescence in a sandstone (calcite in pink and fluorite in blue)



White light vs UV light fluorescence in hydrocarbon contaminated sands



OBI image browser : cavity broken zone in dolomitic sandstone (left, real time OBI image - right, real time filtered OBI image)