DFOS Application

Addressing the Challenges in Early Sand Production Detection To Avoid Serious Well Integrity Issue

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Expro

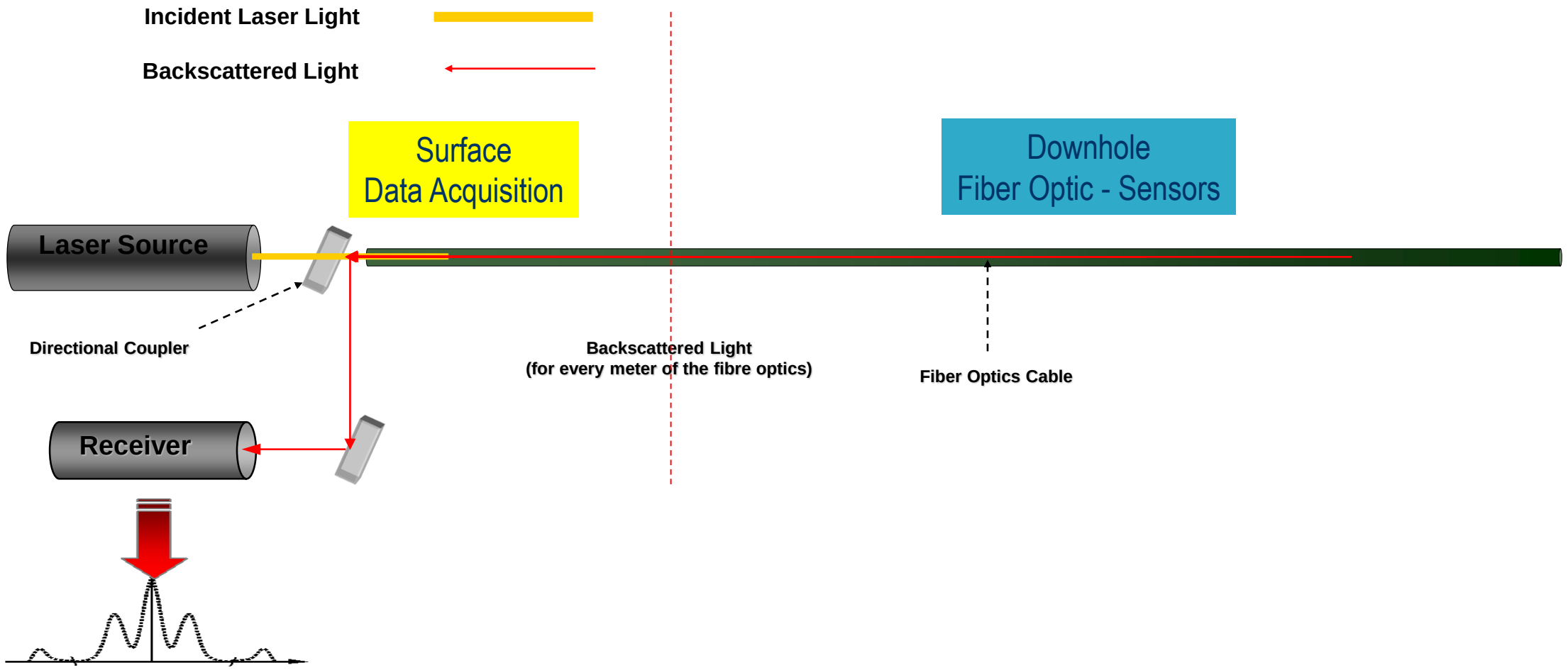
Addressing the Challenges in Early Sand Production Detection to Avoid Serious Well Integrity Issue

Outline

- Lates Development in Distributed Fiber Optics Sensing for Oil & Gas Application
- Sanding Problem and The Impacts
- The Existing Technology to Detect Sand
- Challenges in Early Sand Production Detection
- DFOS for Sand Detection : Unique features and benefits
- The Way Forward

What Is Distributed Fiber Optic Sensing?

Turn the Whole Length of Fiber into Multi Point Sensors



WHY NOW?

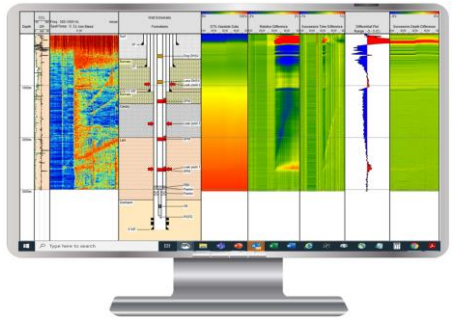
Sanding problem …….

Distributed Fiber Optics Sensing

Latest Development in Distributed Fiber Optics Sensing

The Enabler to Wide Oil & Gas Applications

1. Flexibility & Availability



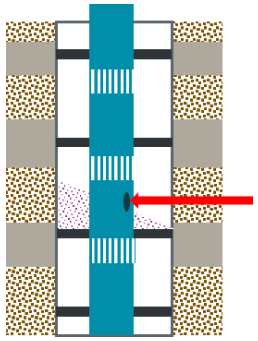
2. Data Handling & Processing

3. O&G Experiences & Expertise

Sanding problem …….

Sanding Problem & The Impact

Productivity – Cost – Safety Hazard



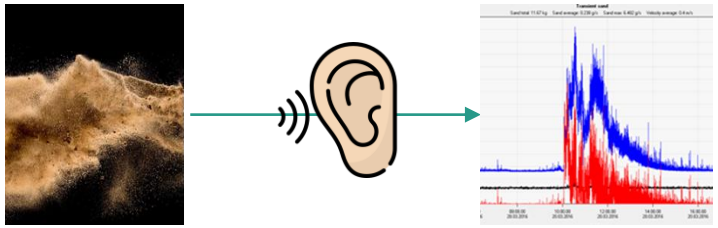
Obstruction

Equipment/Facility Damage

Faulty instrument/ safety device

The Existing Technology to Detect Sand

The Basic Principle – Acoustic Detection



Listen

Indirect

Monitoring sand production

Surface – clamp on
One position, continues in time

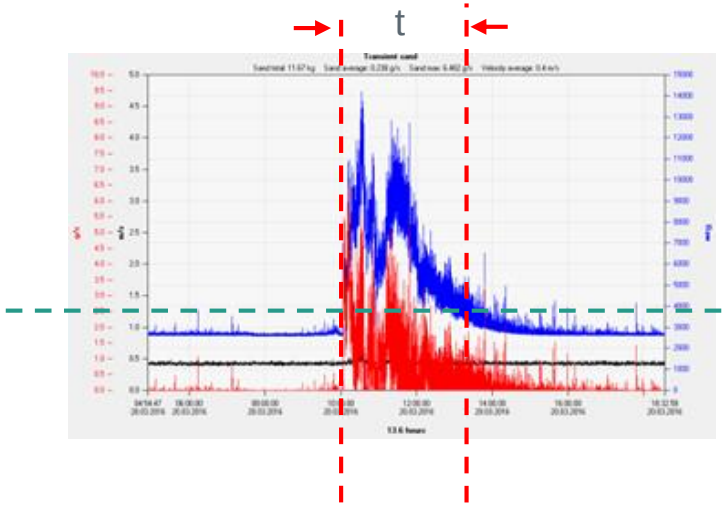
Direct

Identify sand producing zone

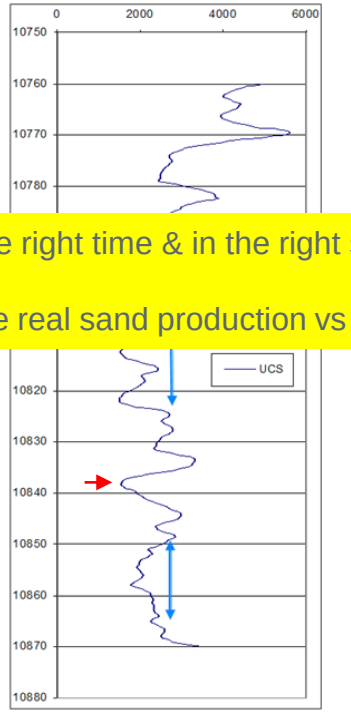
Downhole – moving sensor
Multi-points, logging pass

Challenges for Early Sand Production Detection

Why It is Difficult to Get Convincing & Consistent Result



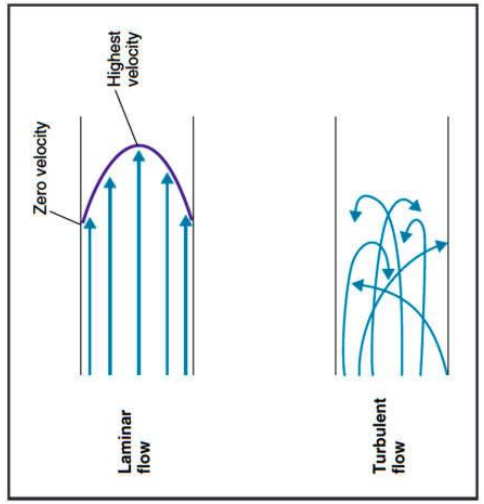
Intermittent



In the right time & in the right spot

Differentiate real sand production vs turbulence

Weakest zone first



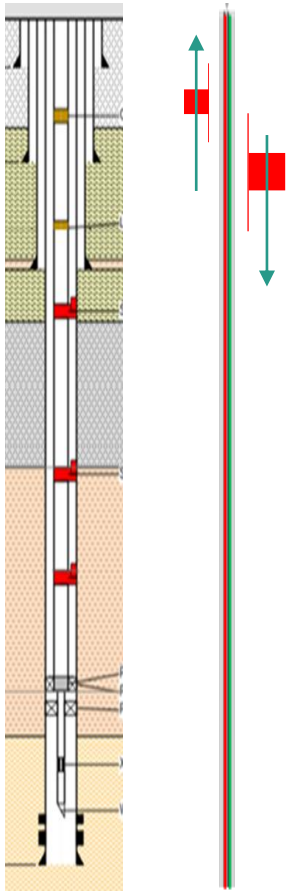
Recirculation /turbulence

DFOS Application for Sand Detection

Unique Features & Benefits

Surface Eqpt

DAS DTS



Downhole

In the right time & in the right spot

Differentiate real sand production vs turbulence

- Continues monitoring from surface to TD (monitor at any time and at any points)
- Simultaneous recording distributed acoustic & temperature data
- “Action-Reaction” method
- Multi frequency analysis
- Historical tracking

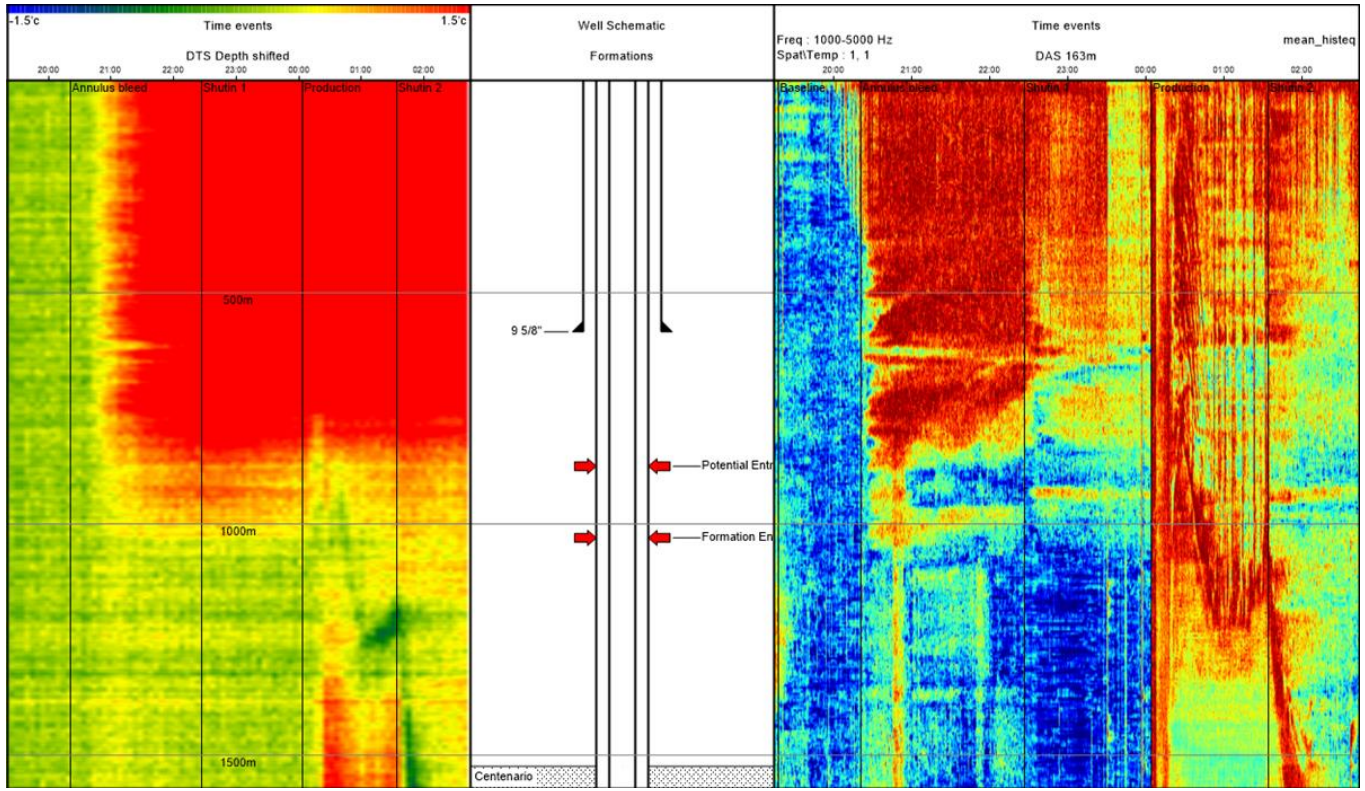
DFOS – “Action-Reaction” Method

Unique Tool for Diagnosis & Analysis

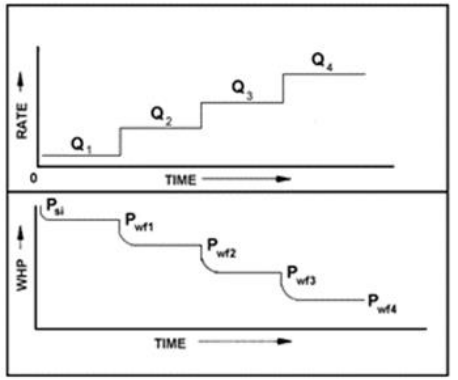
Action

Reaction

Shut in all – Annulus venting – annulus shut in – open well – shut in well

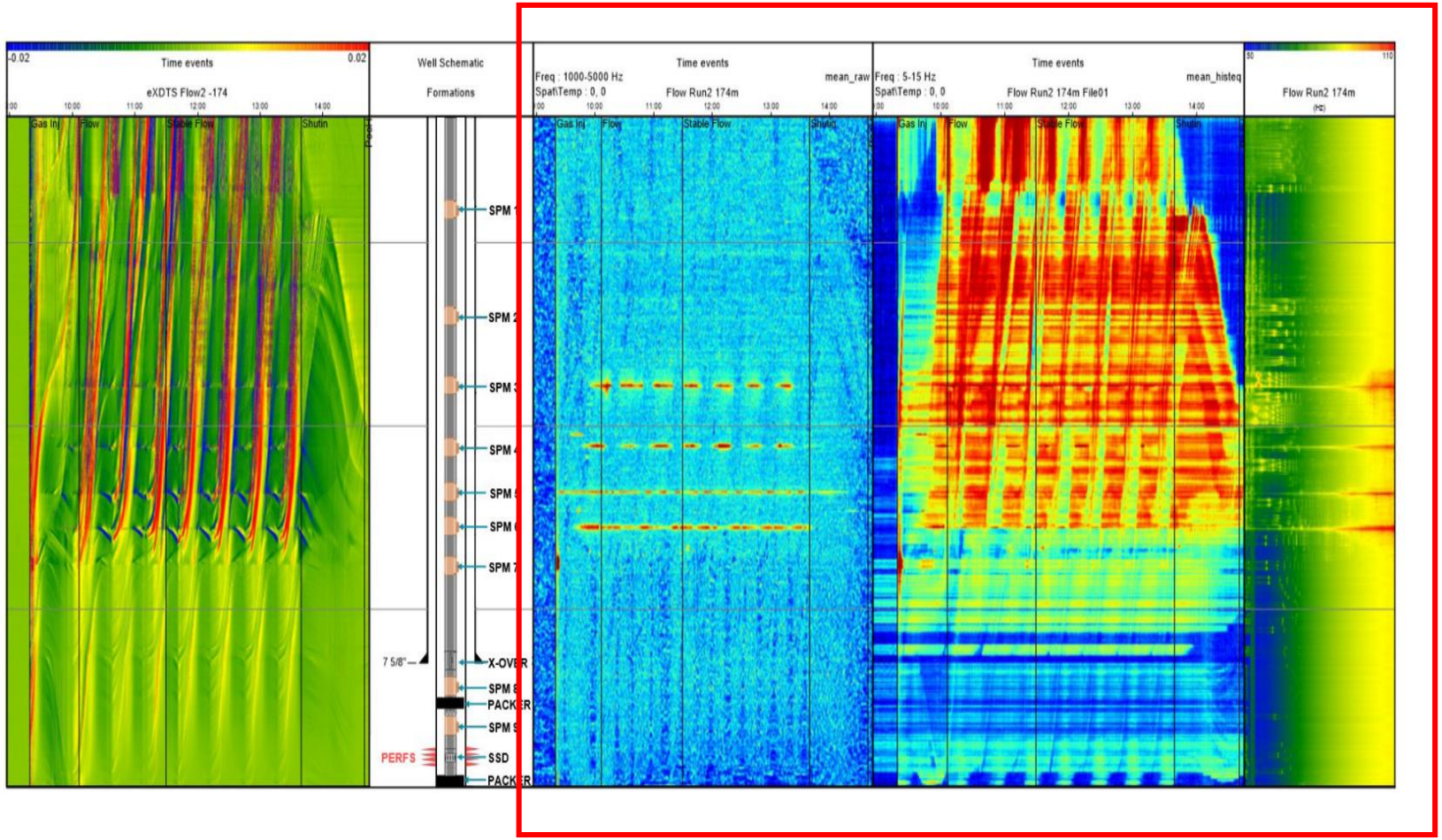


Sanding Investigation



DFOS – Multi Frequency Analysis

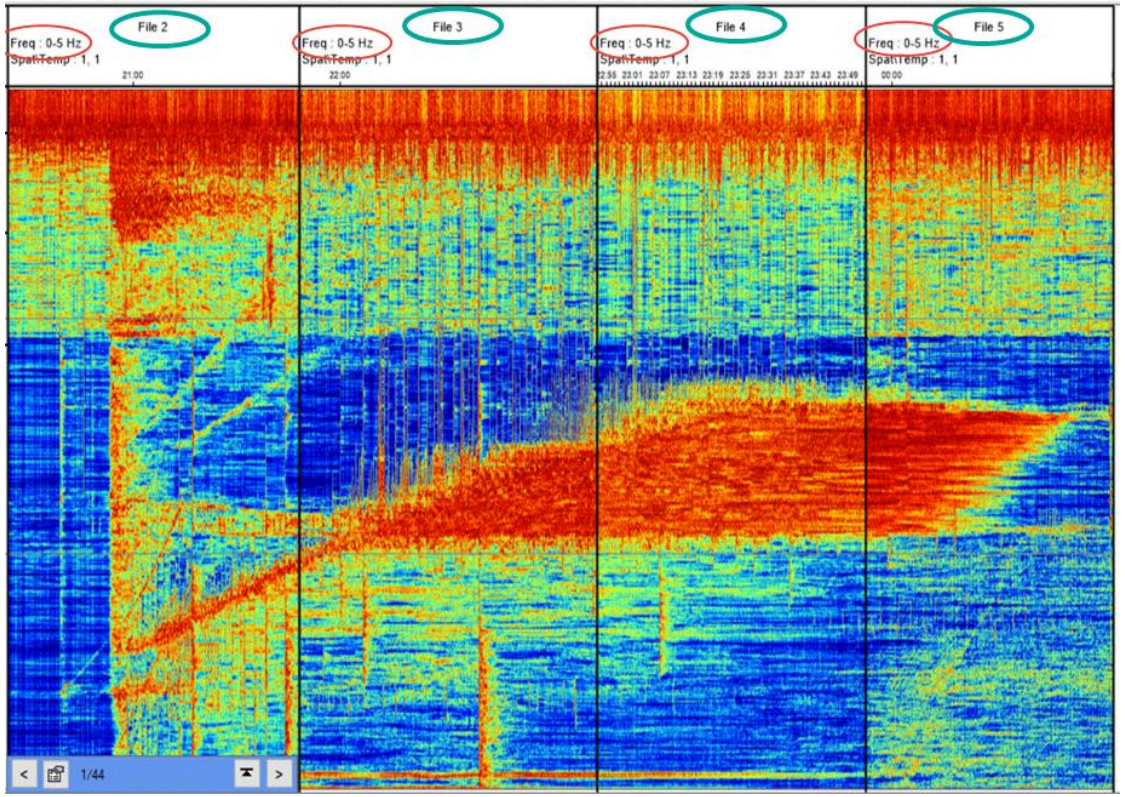
Extracting the different events



- Desired frequency ranges can be plotted
- We can cycle through the frequency bands and temporal and spatial settings to help enhance specific features
- Feature velocities can be plotted to aid interpretation
- Frequency energy spectral for certain time period

DFOS – Historical Tracking

Picture Tells Thousands Words

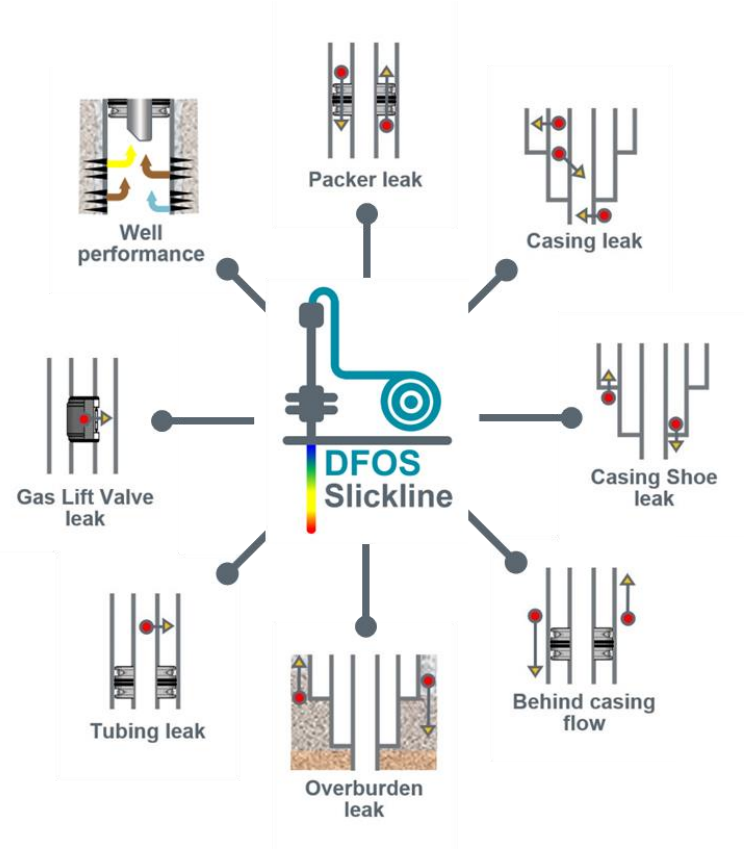


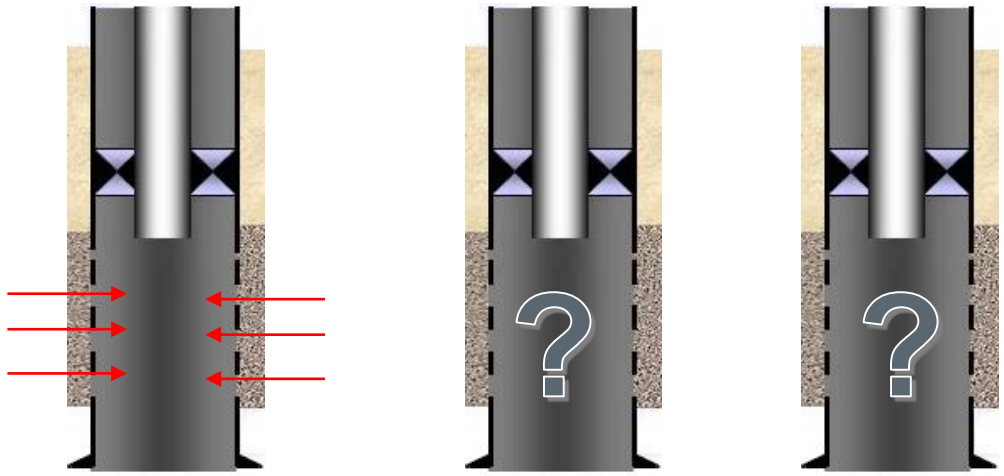
Observation on :

- Static & dynamic noises
- Strong & weak noises
- Temporary & continuous noises
- Short or long events

The Way Forward

More to Explore ……





Sand Detection

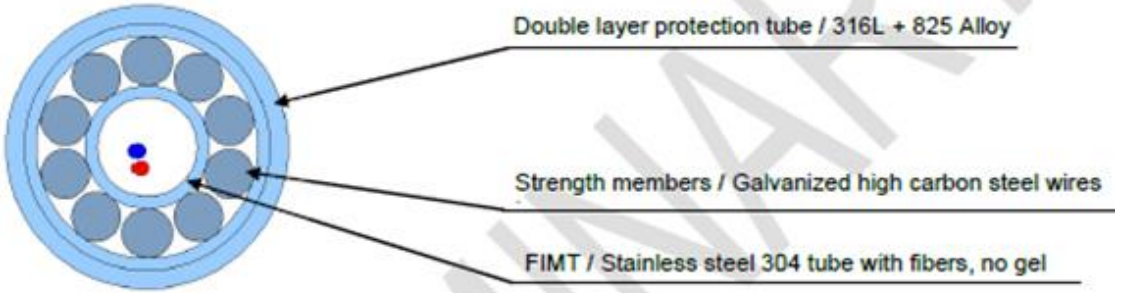
Presentation end

Thank you

DFOS – Distributed Fibre Optical Sensing

DFOS Slickline specification – 0.181” OD 180 °C variant

Design:



Design details:

FIMT diameter (OD / ID)	0.079" / 0.063"	2,0 / 1,6 mm
Protection tube outer diameter	0.181"	4.6 mm
Protection tube total wall thickness	0.020"	0.5 mm
Strength members (number x diameter)	10 x 0.031	10 x 0,8 mm
Cable weight	0.069 lb/ft	103 kg/km
FIMT optical fibers (number x type)	Up to request. Please see below in Order Information	

Operating parameters:

Operating temperature	-76°F...+300°F (+350°F)	-60°C...+150°C (+180°C)
Rated tensile strength	3550 LB	15,8 kN
Maximum operating tension	2130 LB	9,5 kN
Rated collapse pressure of protection tube	17 300 psi	1195 bar
Minimum bending radius without tensile load	3.9"	100 mm
Minimum sheave diameter for maximum operating tension	11.8"	300 mm