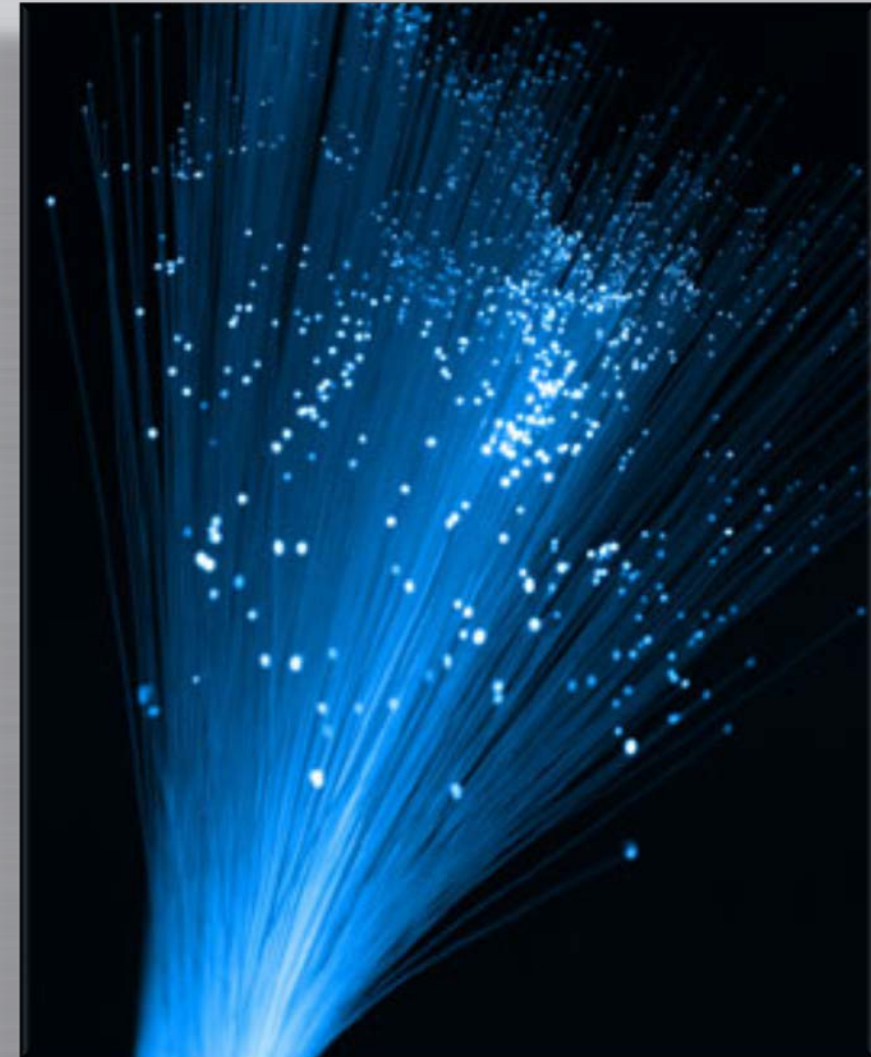


# Temporary DTS Monitoring with Coiled Tubing



# Agenda

- Appropriate DTS Selection
- Temporary DTS Monitoring Applications
- Distributed Temperature Sensing in CT
- Example of an Actual Data-Set
- Specific CT String With Optical Fiber
- Fit-For-Purpose Coil Unit & Operation
- Summary



# Appropriate DTS Selection

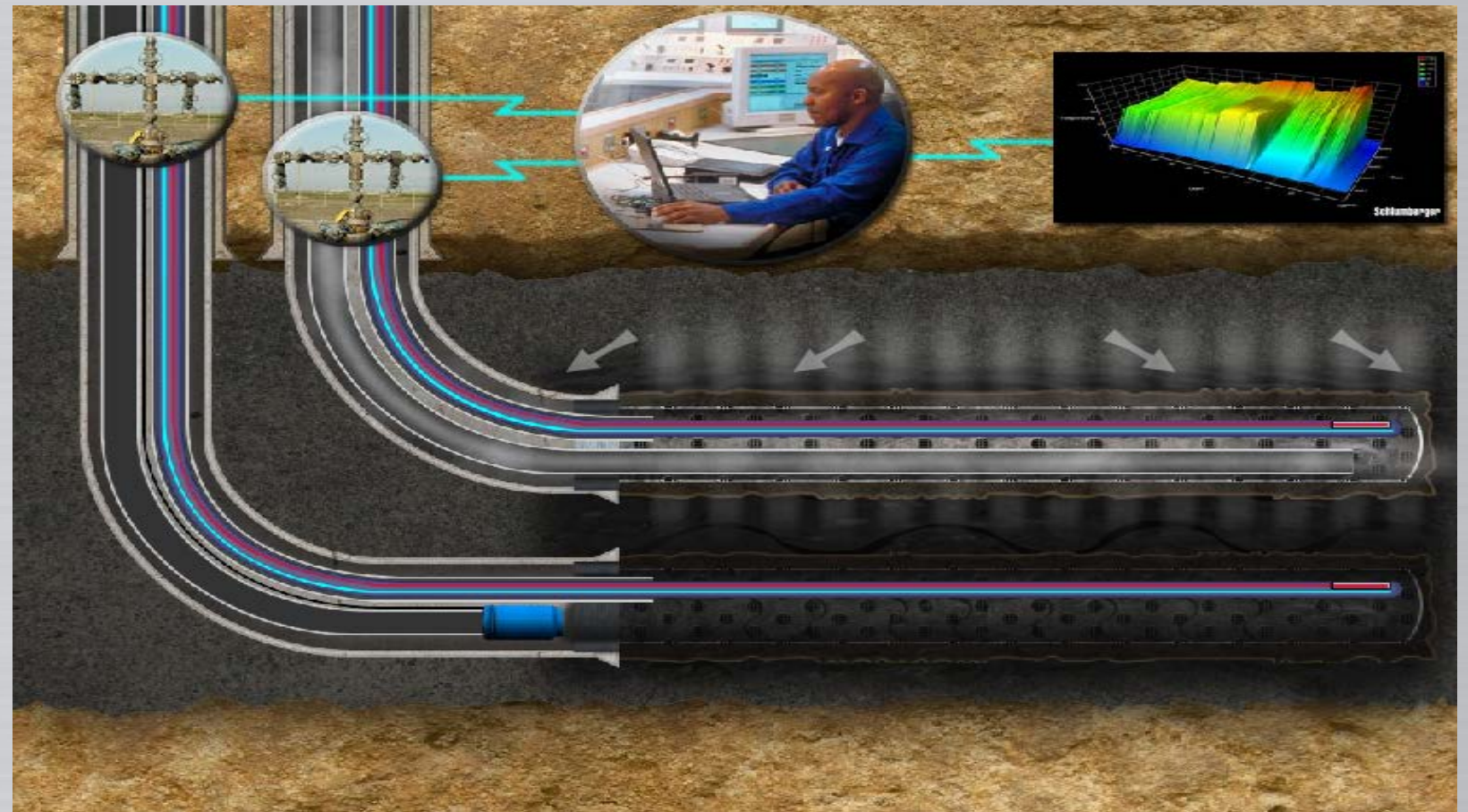
	Slick Line	Coiled Tubing	Permanent
Horizontal Completion	✗	✓	✓
Vertical Completion	✓	✓	✓
Cost	\$	\$ \$	\$ \$ \$
Rig-Up / Rig Down	🕒	🕒 🕒	🕒 🕒 🕒
Data Quality	📁	📁	📁 📁 (1)
Wellbore Inspection	✓	✓	✗



# Temporary DTS Monitoring Applications

- Steam chamber development
- Evaluate SAGD process
  - Detect & avoid steam breakthrough
  - Optimize the steam/oil ratio
- Thermal model matching
- Completion issues
  - Casing leak
  - Plugged liner

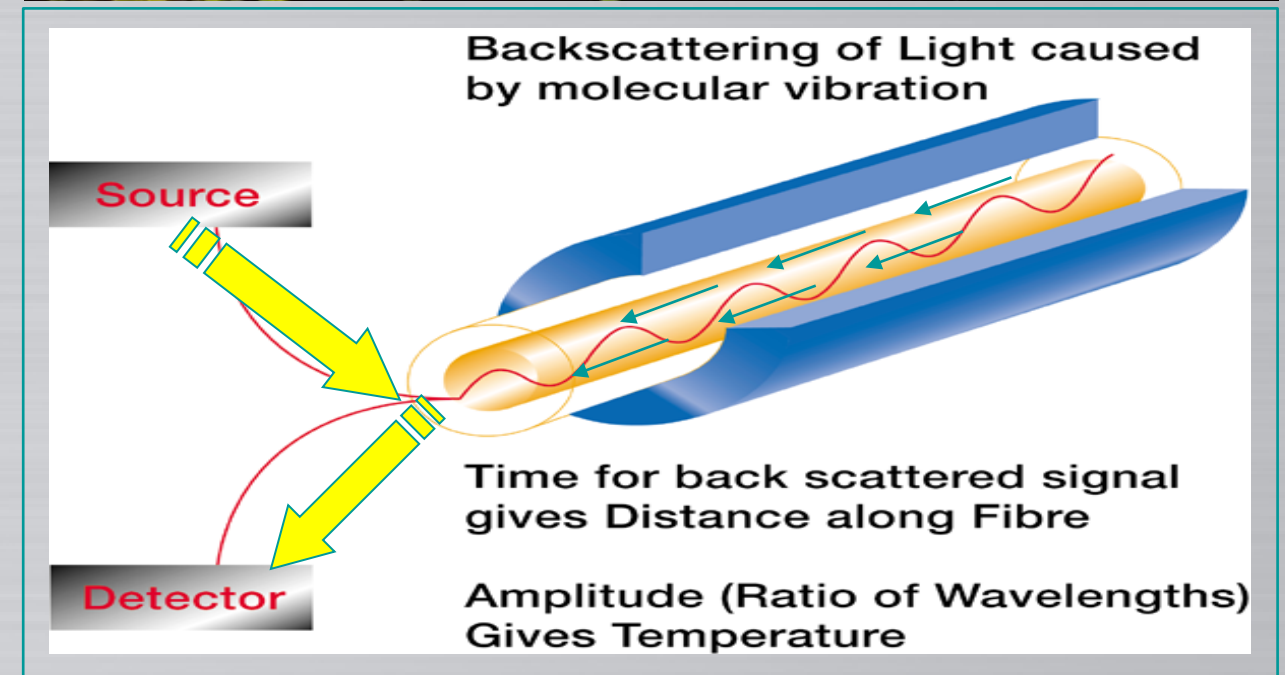
When data is accurately collected for the life of the well, interpretations can be powerful.



**Increase heavy oil recovery and/or reduce OPEX and CAPEX**

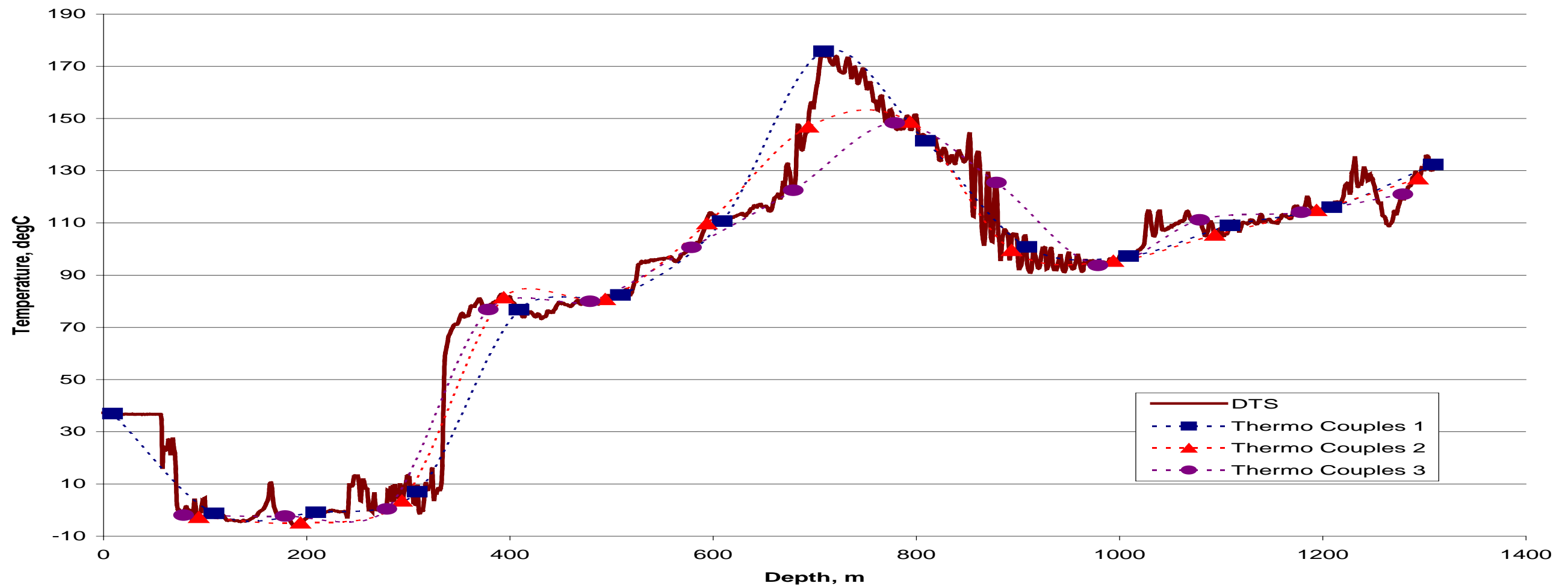
# Distributed Temperature Sensing Through CT

- A measurement on an optical fibre
- Spatial Resolution of 1 meter
- Based on backscattering of light
- Proven over the past 20 years in industrial fire detection and power line monitoring



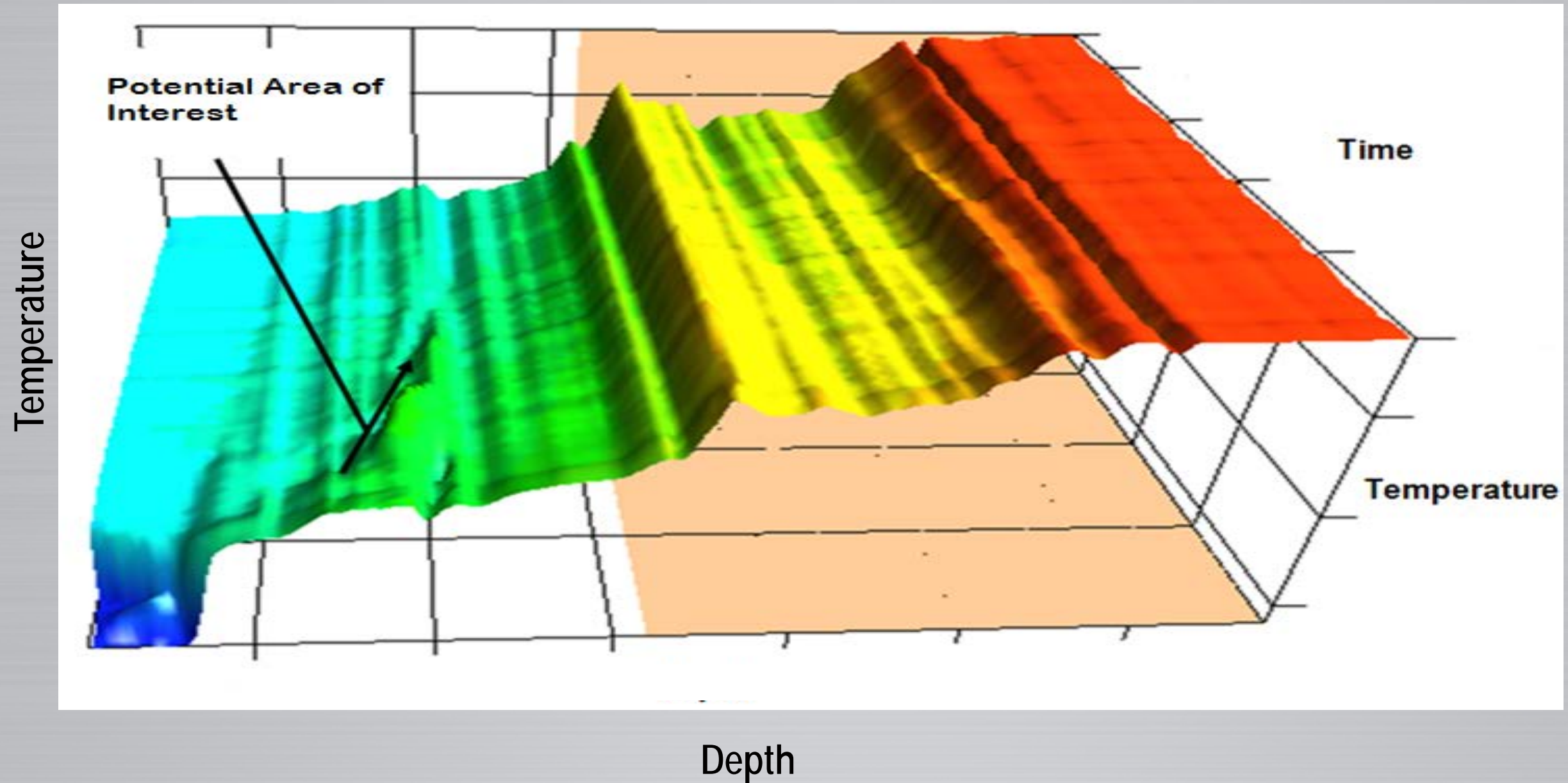
# Spatial Resolution

Which temperature array plot is right ?  
Use DTS and get the whole story.





# Actual Data-Set Example



# Coiled Tubing String – Specifically Designed for DTS

## 1.75" Coiled Tubing String

- Able to reach TD on most HO completions
- High temperature fiber optic (300 degC/572 degF)
- Efficient deployment/retrieval method

Utilizes ASE measurement system

- Accurate temperature measurements

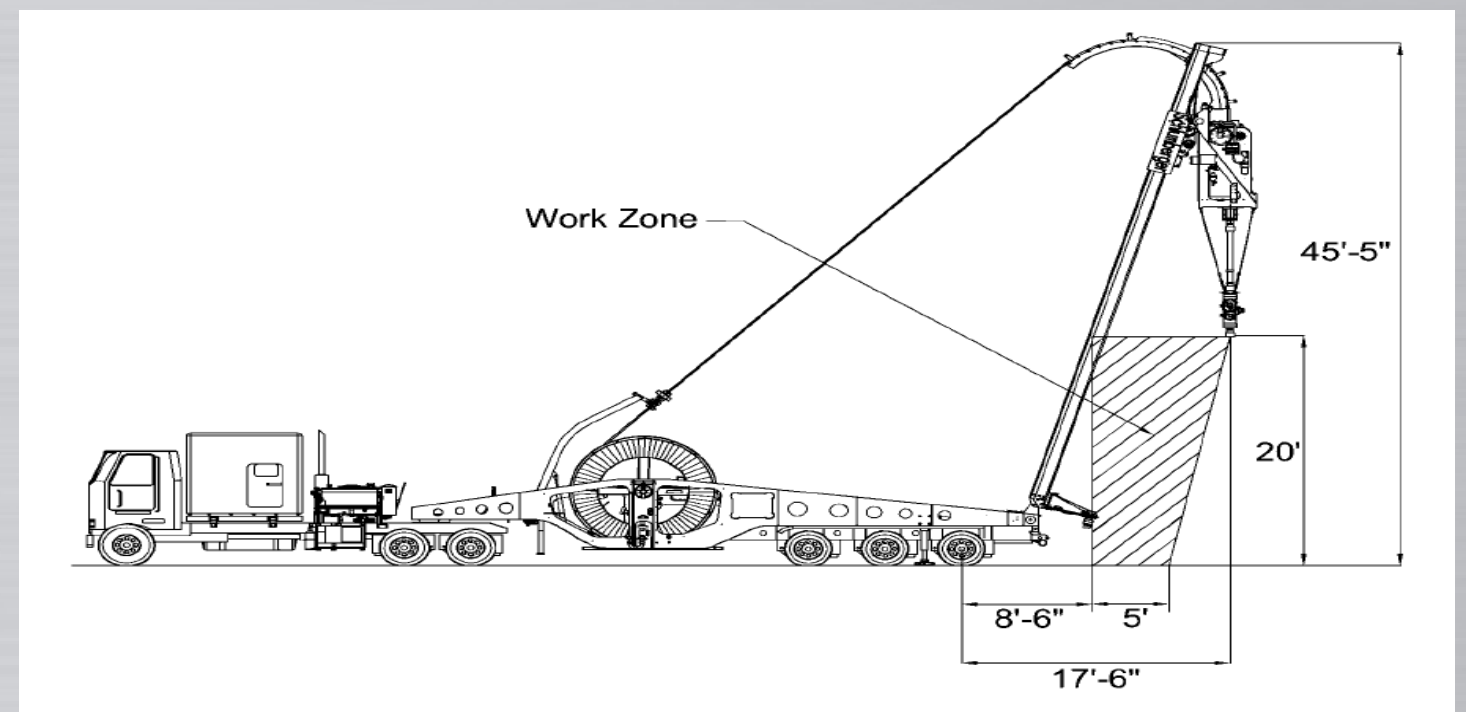
Real-time temperature data





# Fit-For-Purpose Coiled Tubing Unit

- Quick & efficient rig up/down time
- BHA, Lubricator, and BOP's assembled prior to transport
- Single connection to tie onto wellhead
- Elimination of a crane
- Reduced footprint
- Real-time data monitoring



# CT Operations

## Tubing Force Analysis

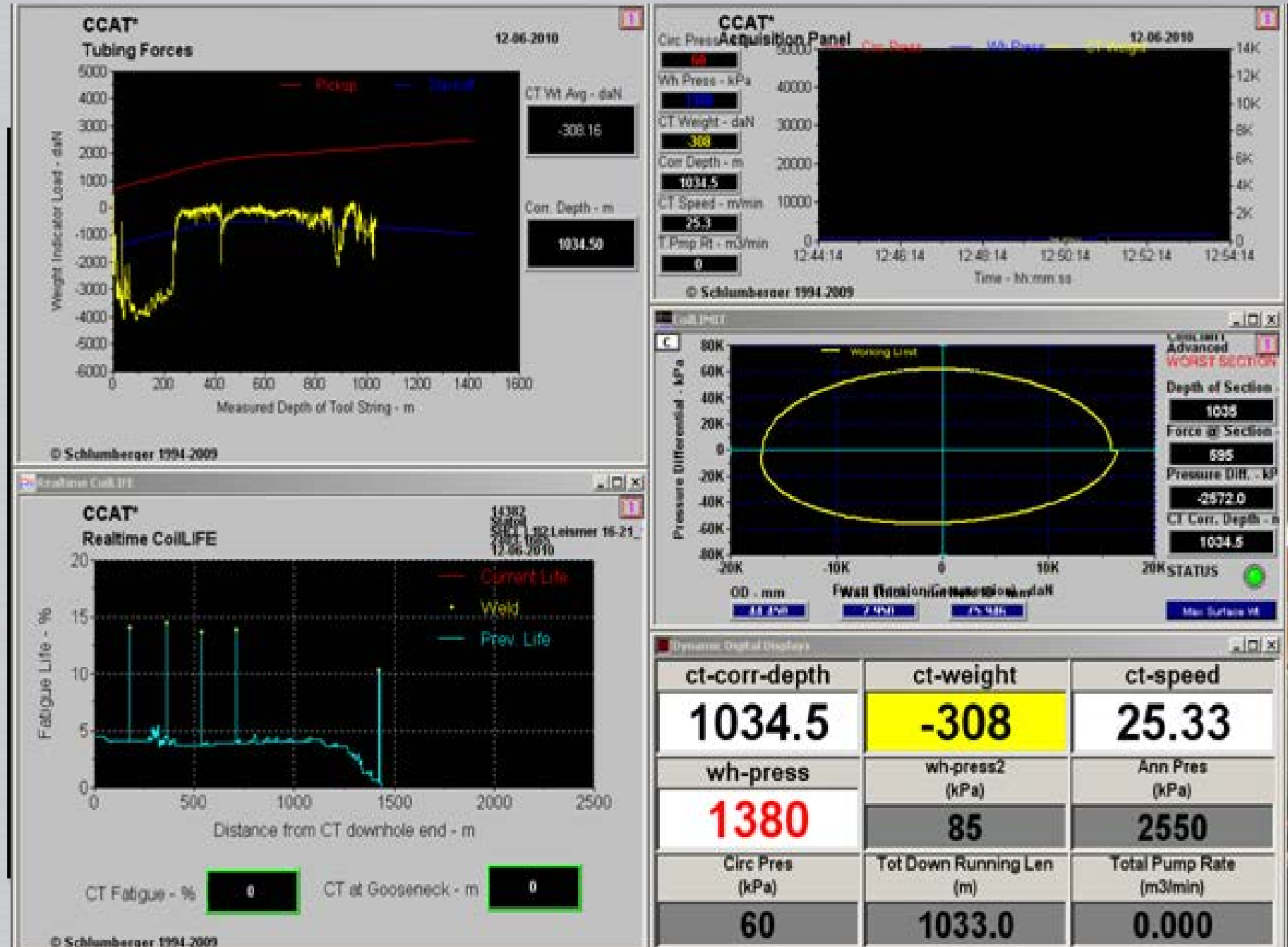
- Ability to reach TD
- Operating limits

## Fit-for-purpose well control stack

- High temperature seals
- Cooling System

## Real-time data monitoring

- Monitor Job Parameters
  - Depth, Weight, Pressures
- Fatigue life & tubing limits



# QHSE Highlights

## Quality

- High quality real-time data
- Efficient rig-up/rig down times

## Health

- Reduced crew size
- Automatic pipe lube (chemical exposure)



## Safety

- No swinging loads
- Reduced exposure (WH/Pinch/Equip)

## Environment

- Small foot print
- Self-contained coil unit



# Summary

	Slick Line	Conventional Coiled Tubing	Permanent	Fit-For-Purpose Coiled Tubing Unit
Horizontal Completion	✗	✓	✓	✓
Vertical Completion	✓	✓	✓	✓
Cost	\$	\$ \$	\$ \$ \$	\$ ¢
Rig-Up / Rig Down	🕒	🕒 🕒	🕒 🕒 🕒	🕒
Data Quality	📁	📁	📁 📁 (1)	📁
Wellbore Inspection	✓	✓	✗	✓

Thanks for your attention!

Questions?

*“Temporary distributed temperature sensing provides real-time data to assist in the evaluation of the thermal process, leading to increased efficiency and reduced production costs”*

