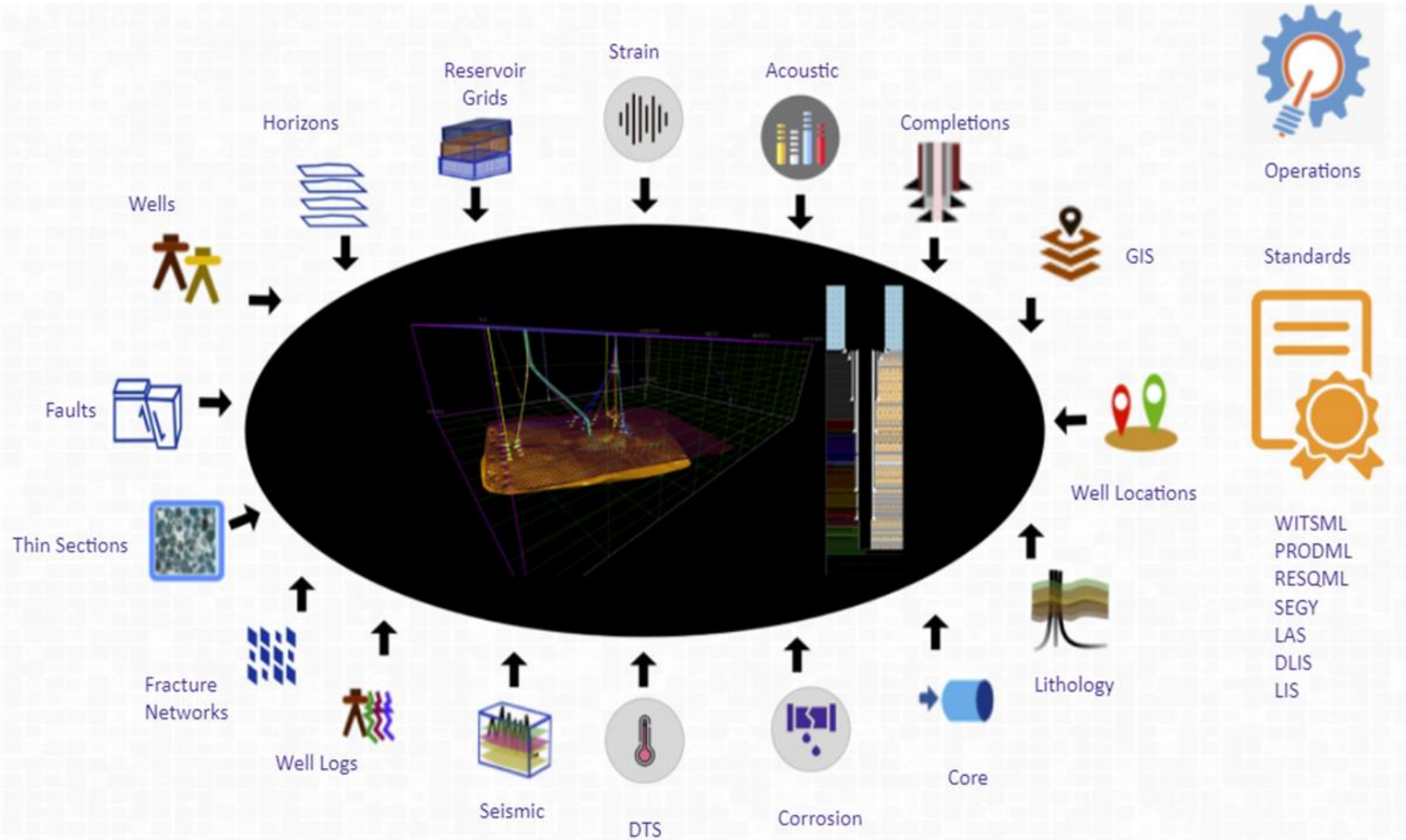


OCTOBER 25, 2023

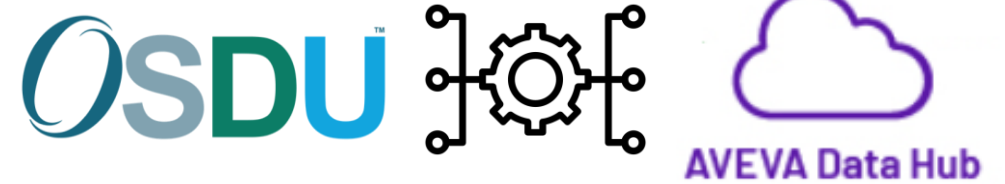
Enriching OSDU Energy Standards with Edge Analytics, FogLAMP, and AVEVA Data Hub

Sashi Gunturu
CEO, Petrabytes

Open Subsurface Data Universe



- ❖ Data Standards for Upstream Energy Datasets
- ❖ Expanding to Other Energy Sources
- ❖ OSDU is Cloud Agnostic



- ⦿ OSDU Platform is currently supporting Exploration Drilling and Production Domain. Operators want to analyse OSDU data with real time Operational data.
- ⦿ ADH provides a centralized repository for all operational data and continuously updated in real time.
- ⦿ Extensive APIs for IO into ADH. Seamless integration into OSDU
- ⦿ OSDU Integration with ADH enables
 - Complete Operational insights
 - Predictive Maintenance of Drilling and Production Assets

Enhanced Business Value - Edge Integration

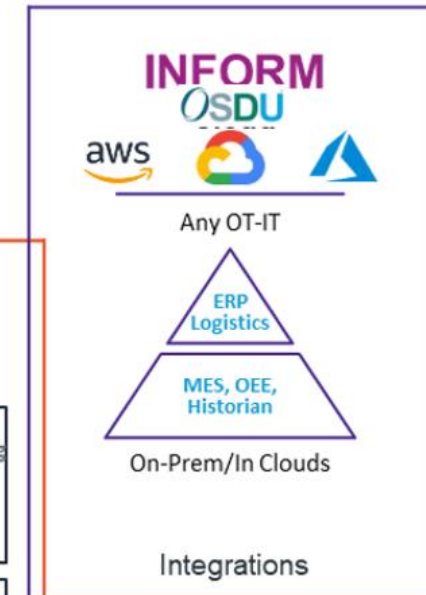
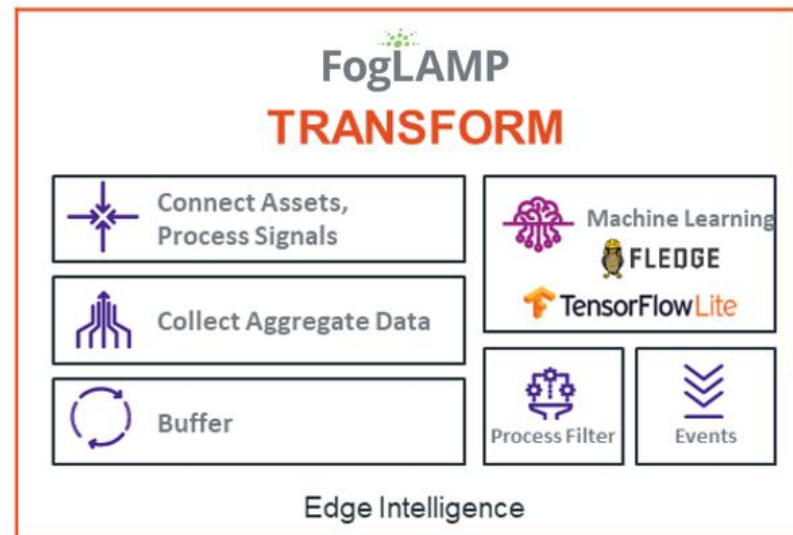
FogLAMP



OSDU

- ◎ Fledge brings in real time data with variety of protocols
- ◎ Enables Edge Intelligence
- ◎ Support Drilling & Production, Process Control Domain

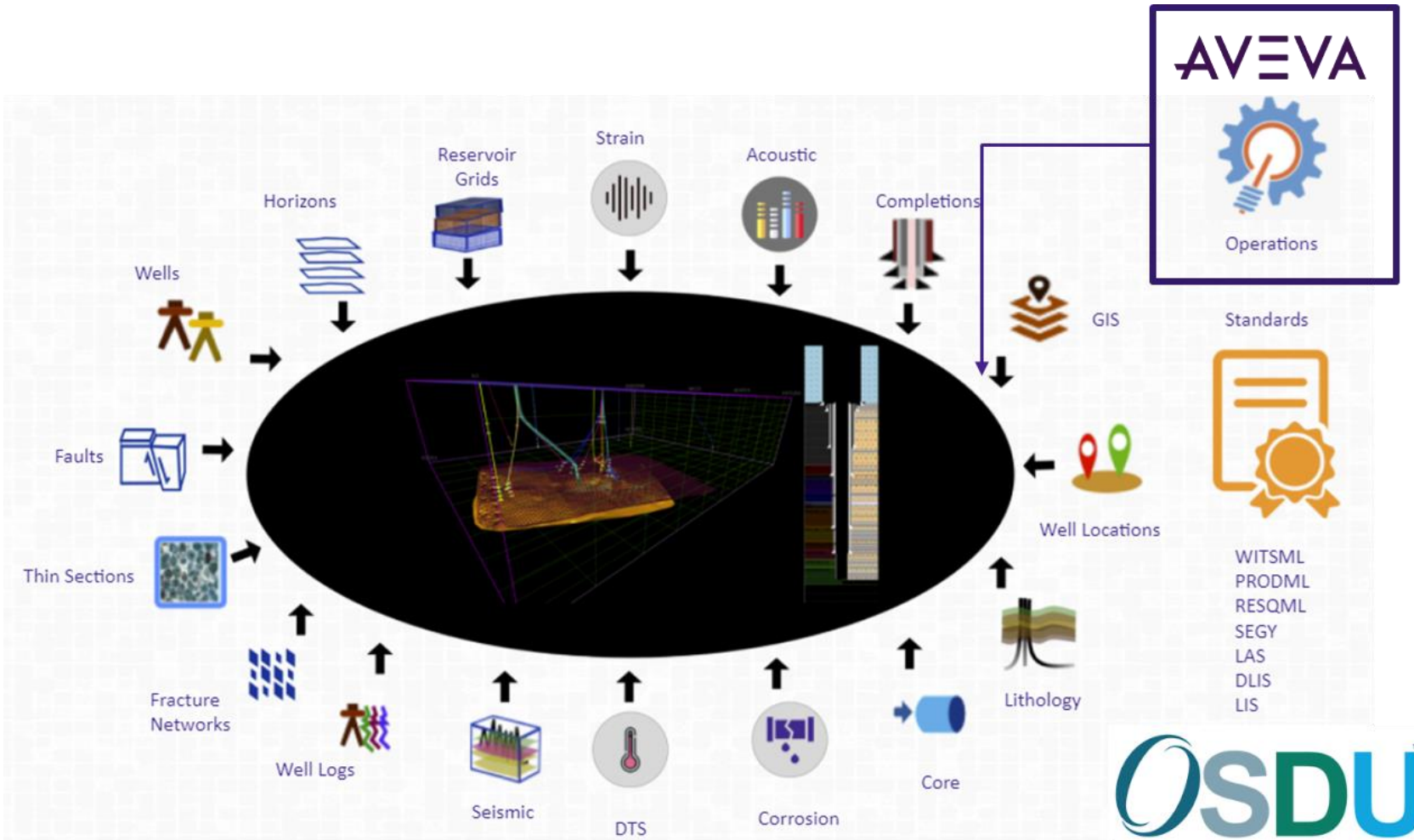
Critical Assets
Remotely located



OSDU



Enhanced Value with ADH Integration



- ❖ ADH brings in Operational Data
- ❖ ADH enables Operations Insights
- ❖ Cloud Architecture and ADH APIs enables easy Integration

Real-Time Data Drilling Data Aggregation in ADH

AVEVA™ Data Hub ▶ Trend ⚙️ Petabytes ▾ 🔔 ? 👤

- 🏠 Home
- 🗄️ Data Management ▶
- 📶 Data Collection ▶
- 📊 Visualization ▶
- ∑ Analytics ▶
- 🛡️ Security ▶
- 🔧 Developer Tools ▶
- 📄 Support ▶

RESET 🔗 🔊

📊
2,500 2.50 140

1,900 2.00 10
Now

⏮️
🕒 Last 5 minutes
⏭️
🔍

<input checked="" type="checkbox"/>	Name	Timestamp	Value	UOM
well1 📍 Petabytes				
<input checked="" type="checkbox"/>	Density Composite density_composite	Oct 13, 2022, 8:18:05 AM	2,125.184	1,94 🗑️
<input checked="" type="checkbox"/>	Pseudo Density pseudo_density	Oct 13, 2022, 8:18:05 AM	2.12	2 🗑️
<input checked="" type="checkbox"/>	UCS ucs	Oct 13, 2022, 8:18:05 AM	37.841	20 🗑️

Add Traces

Assets
Streams

✕ 🔍 ?

- i well1 | Shear Velocity | shear_veloci... +
- i well1 | Sonic Composite | sonic_co... +
- i well1 | Sonic Porosity | sonic_poros... +
- i well1 | Static Bulk Modulus | static_... +
- i well1 | Static Poissons Ratio | stati... +
- i well1 | Static Shear Modulus | stati... +
- i well1 | Static Youngs Modulus | sta... +
- i well1 | Tensile Strength | tensile_str... +
- i well1 | UCS | ucs +

Example of Streaming Drilling Data - Metadata

AVEVA™ Data Hub ▶ Sequential Data Store

Petrabytes_ADH_Dev

Home | Data Management | Data Collection | Visualization | Analytics | Security | Developer Tools | Support

Streams Search for Streams

<input type="checkbox"/>	Name ↑	Id
<input checked="" type="checkbox"/>	drilling_well_logs	drilling_well_logs
<input type="checkbox"/>	DroneLocationContainer	DroneLocationContainer
<input type="checkbox"/>	input_well_logs_stream	input_well_logs_stream
<input type="checkbox"/>	Tank1Measurements	Tank1Measurements
<input type="checkbox"/>	Tank1Measurements1	Tank1Measurements1
<input type="checkbox"/>	well_stream	well_stream_id

drilling_well_logs

Details Metadata and Tags Sharing

[View in Trend](#) [View Data](#)

Id
drilling_well_logs

Name
drilling_well_logs

TypeId
drilling_well_logs_type

Namespace
Petrabytes_ADH_Dev
6a2773a8-a6b1-4c84-a961-d380ad29486e

Stream URL
https://uswe.datahub.connect.aveva.com/api/v1/tenants/92319c79-1...

Stream Properties

```
[  
  {  
    "name": "drilling_well_logs"  
  }  
]
```

Items per page: 50 1 - 6 of 6

Example Drilling Data Stream in ADH

AVEVA™ Data Hub ▶ Sequential Data Store ⚙️ Petrabytes_ADH_Dev 🔔 ? 👤

[Home](#) [Back to Streams](#) **drilling_well_logs** (*drilling_well_logs*)

Data Management > [+ Add Event](#) ⋮

Data Collection > [Range Query](#)

Visualization > **Stream Name**
drilling_well_logs

Analytics > Query Type
Get Range Values

Security > [By Count](#) [By Range](#)

Developer Tools > Start Index
17-10-2023 20:10:28

Support > Count*
11000

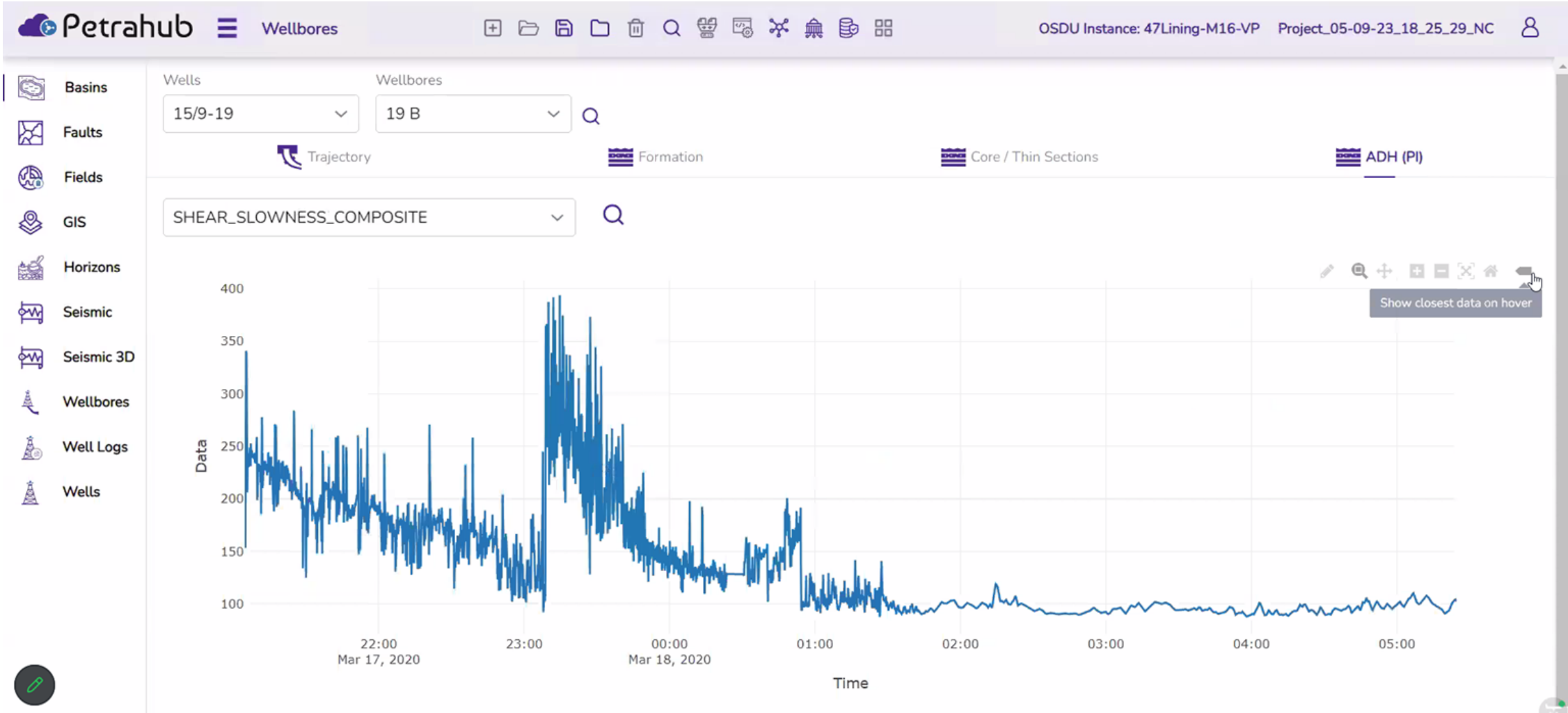
Reversed
True

[Reset](#) [Apply](#)

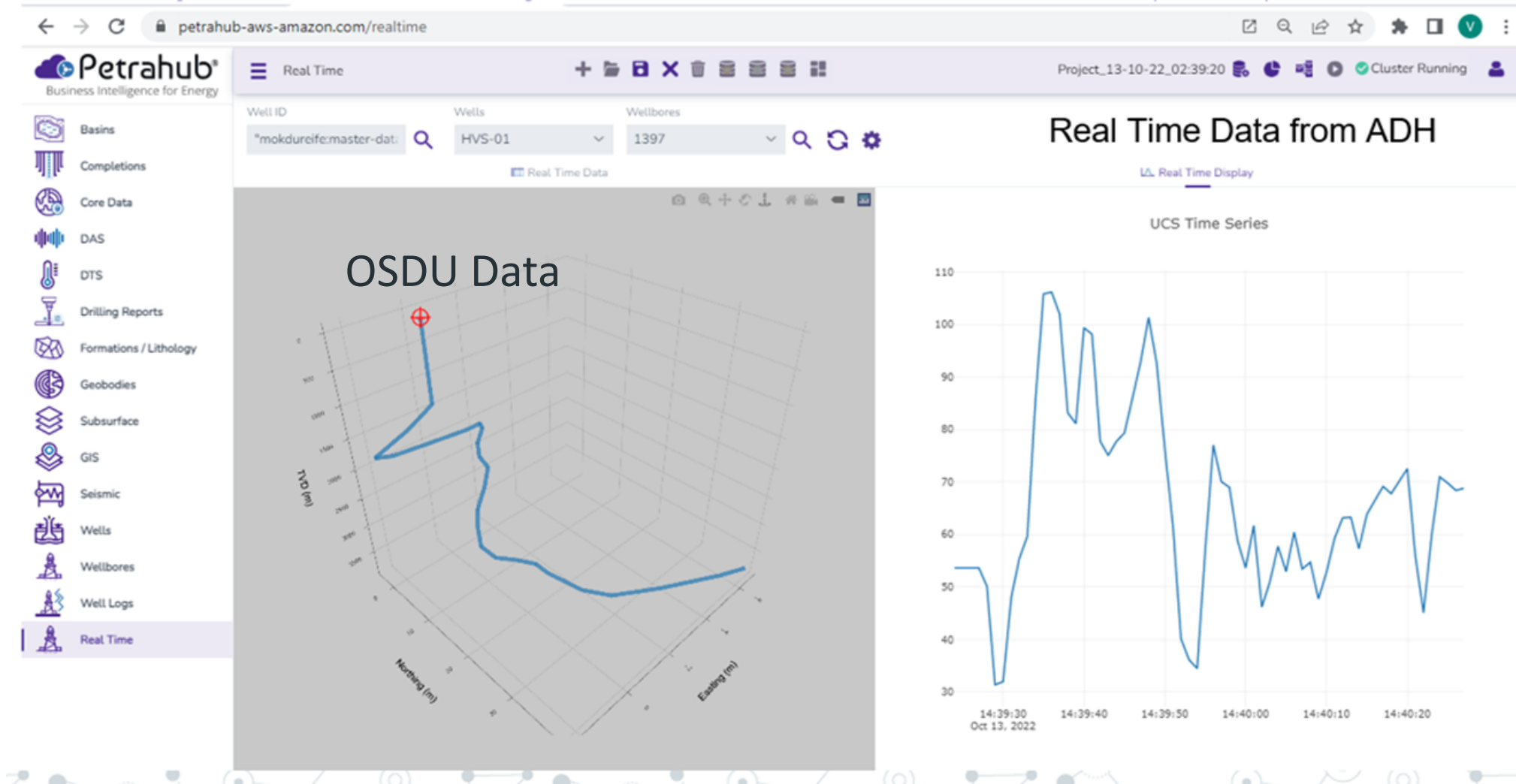
Time	DEPTH	DENSITY_COMPOSITE
Mar 18, 2020, 10:54:42 AM	5731.812	2.543972908
Mar 18, 2020, 10:54:39 AM	5731.312	2.60250511
Mar 18, 2020, 10:54:36 AM	5730.812	2.591967633
Mar 18, 2020, 10:54:33 AM	5730.312	2.648923197
Mar 18, 2020, 10:54:30 AM	5729.812	2.571329438
Mar 18, 2020, 10:54:27 AM	5729.312	2.561476037
Mar 18, 2020, 10:54:24 AM	5728.812	2.62260176
Mar 18, 2020, 10:54:21 AM	5728.312	2.555079366
Mar 18, 2020, 10:54:18 AM	5727.812	2.575438502
Mar 18, 2020, 10:54:15 AM	5727.312	2.61630577

Items per page: 50 1 - 50 of 10000

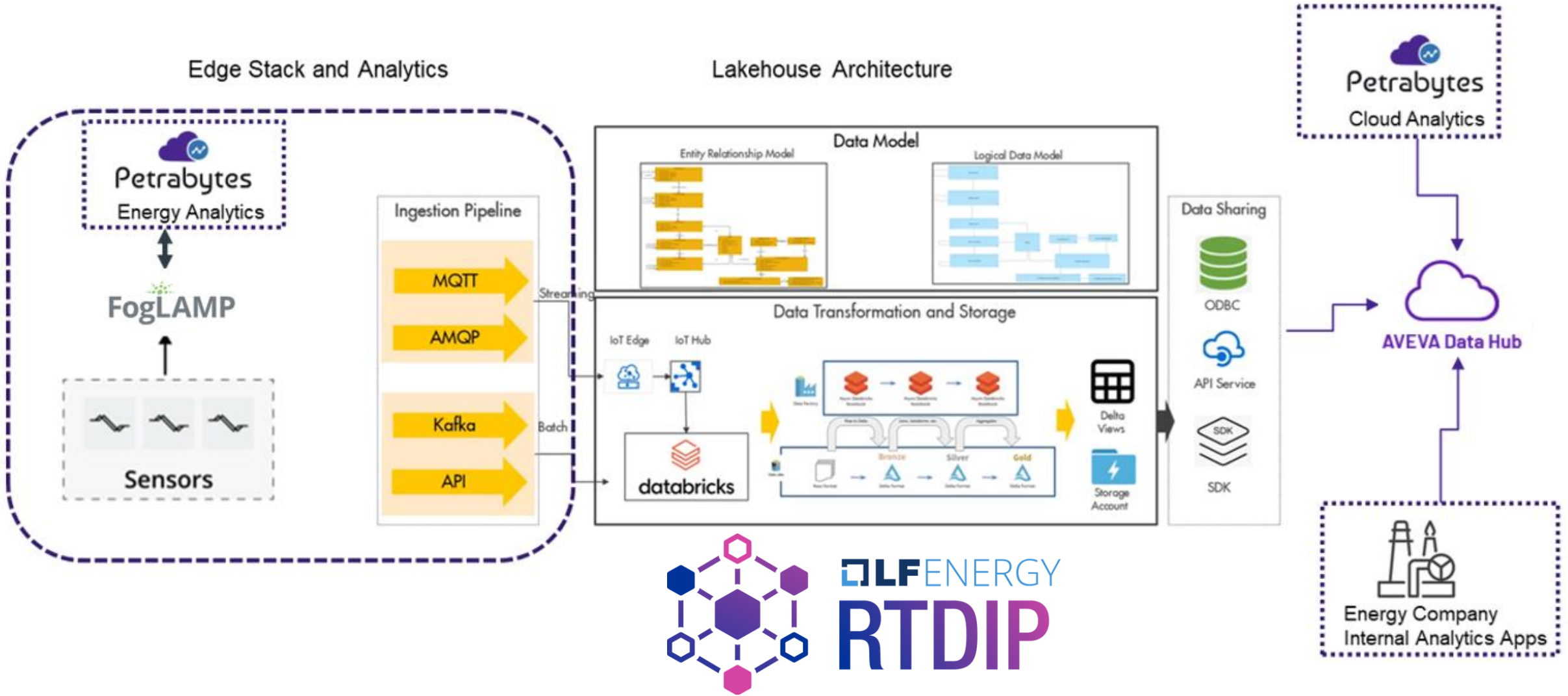
PetraHub Energy EDM Platform - Query data from ADH



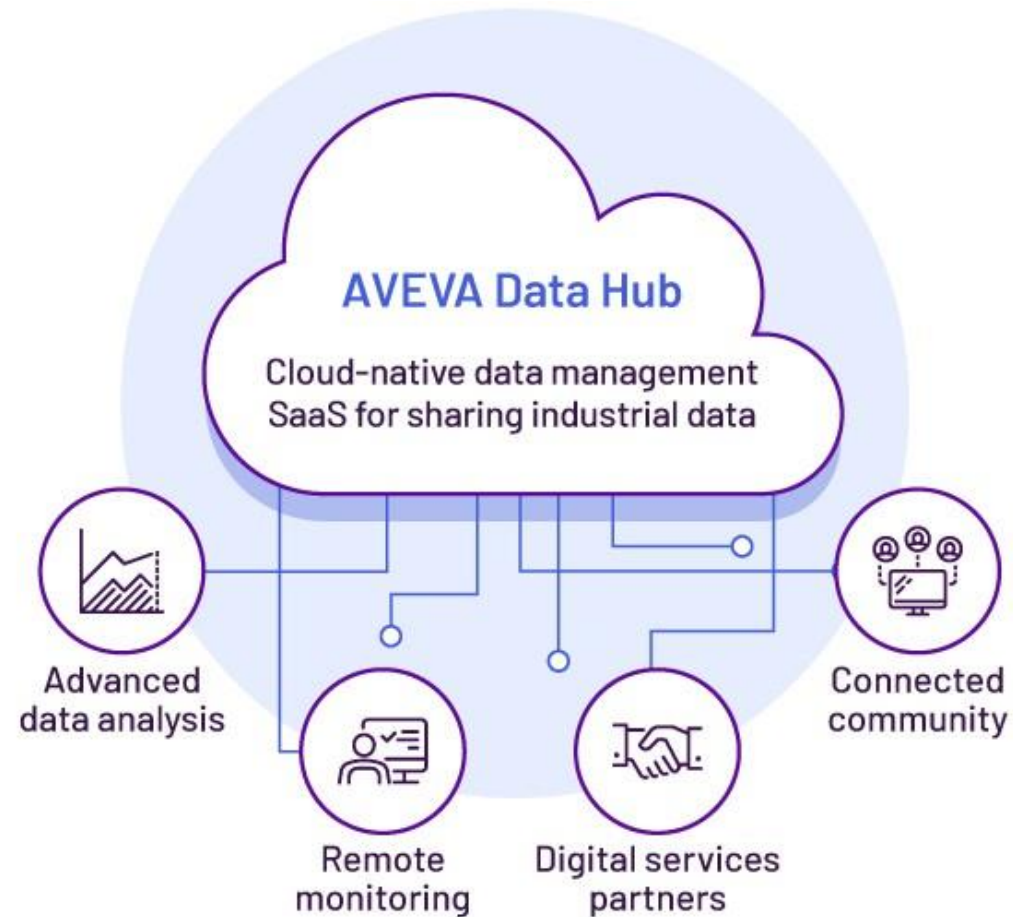
Data Federation - Contextual Analysis OSDU Data with ADH



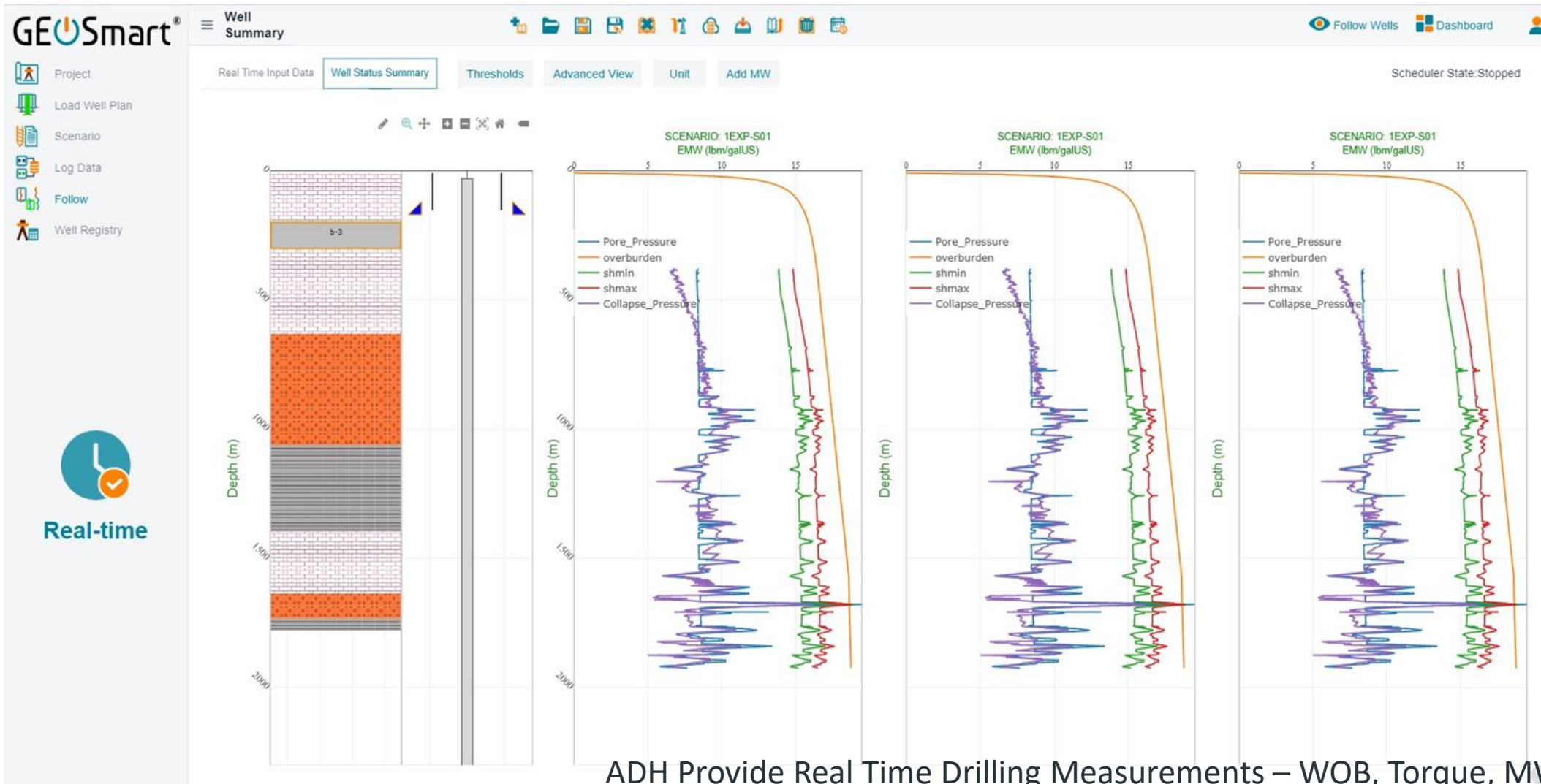
Edge & ADH Integration with Real Time Data Ingestion Platform



Use Cases - Upstream & Midstream



Mitigation Drilling Risks with Failure Predictions

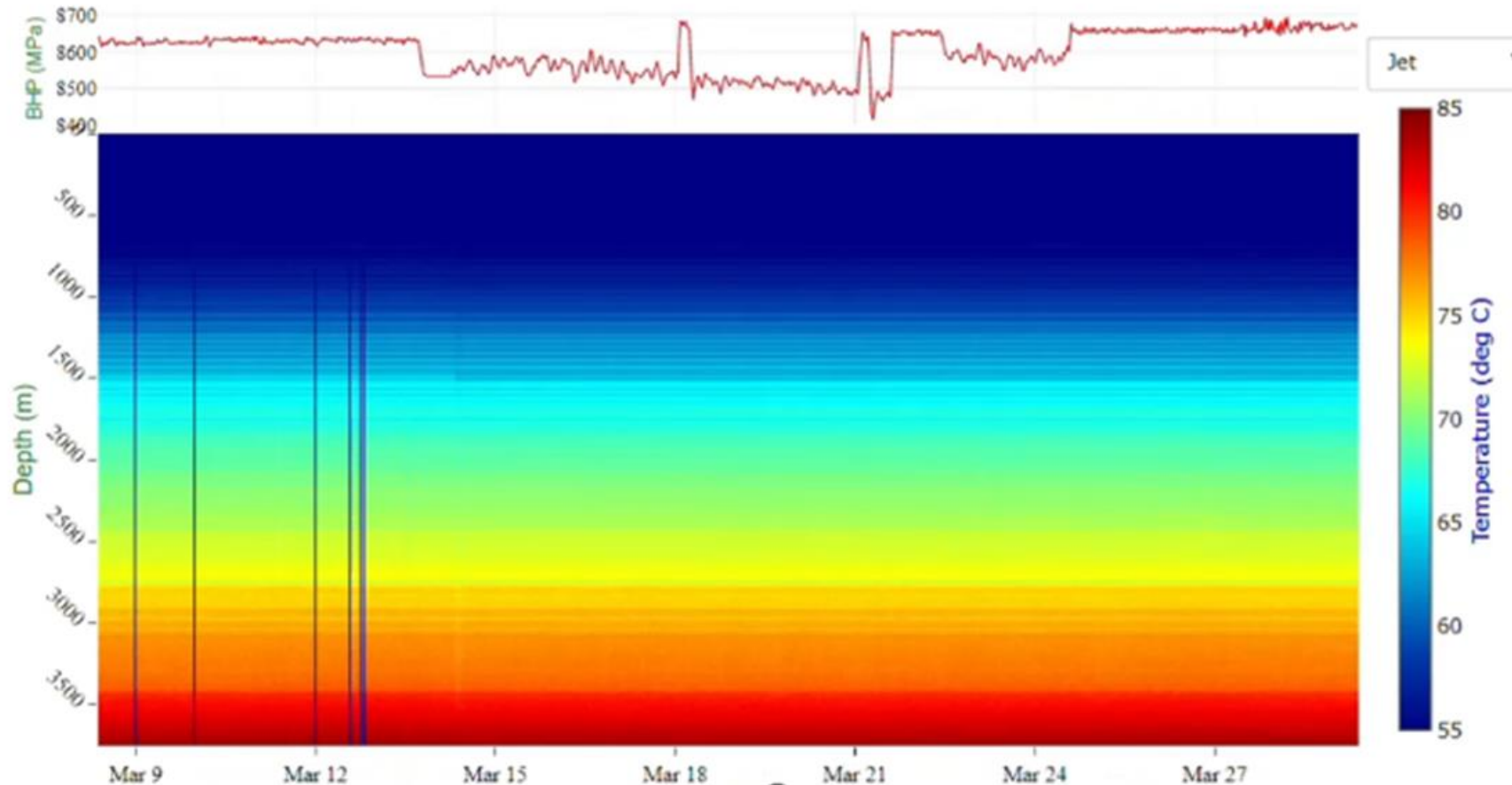


ADH Provide Real Time Drilling Measurements – WOB, Torque, MWD Logs to enable real time wellbore stability calculations

Real-Time Bottom Hole Sensor Data with Fiber Optic Sensing Data (Distributed Temperature Sensing)

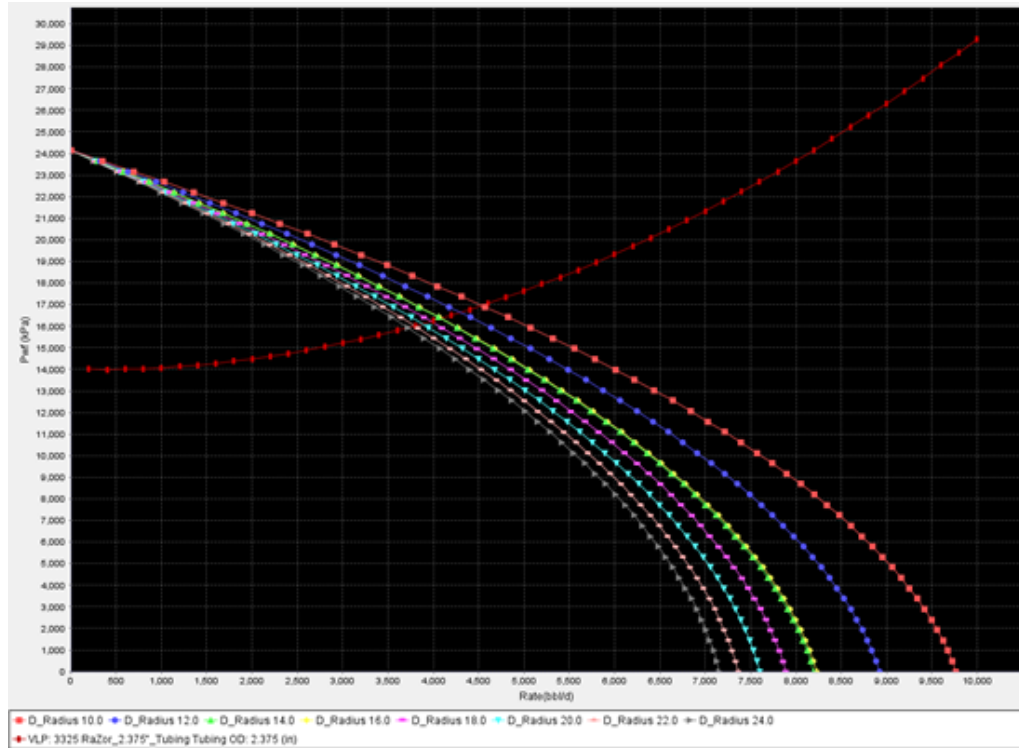
DTS

DTS Integration with Aveva Data Hub

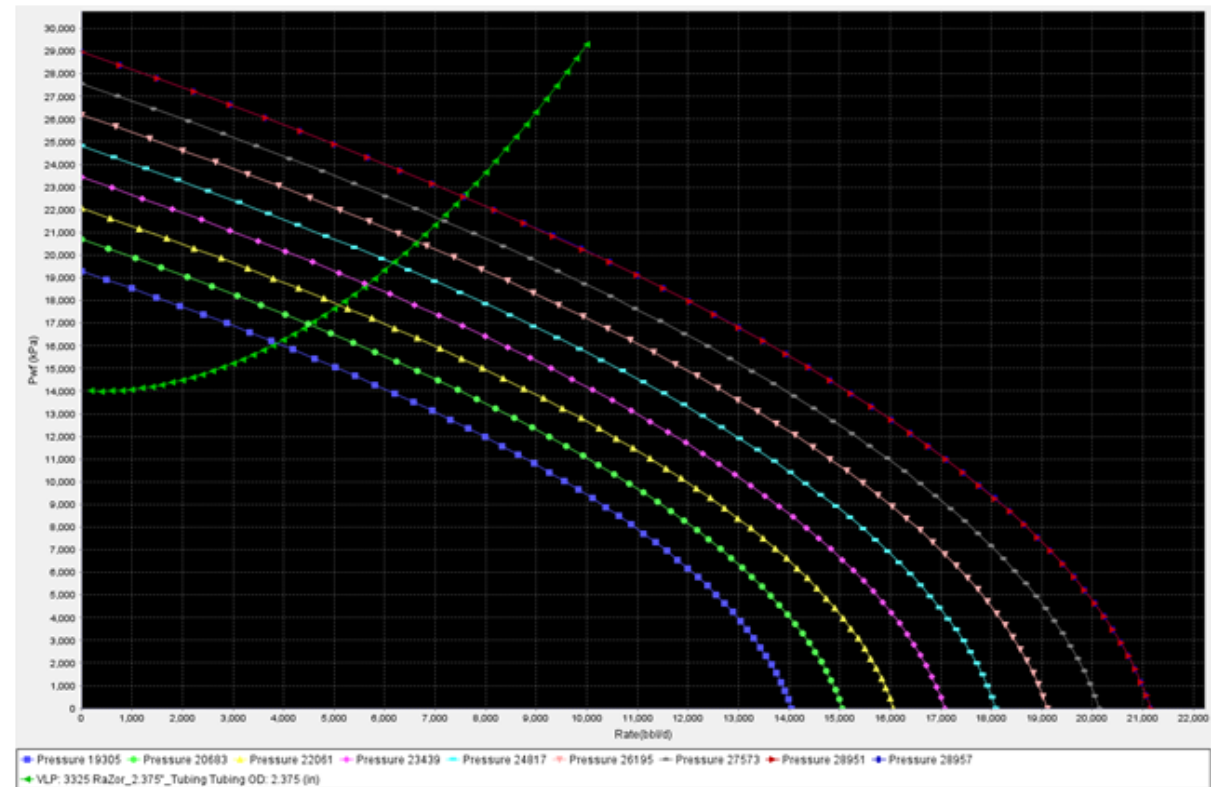


Prediction of Optimal Completion Design

Integration of Real-Time Data from ADH (OSI PI Data BHP, BHT etc.)



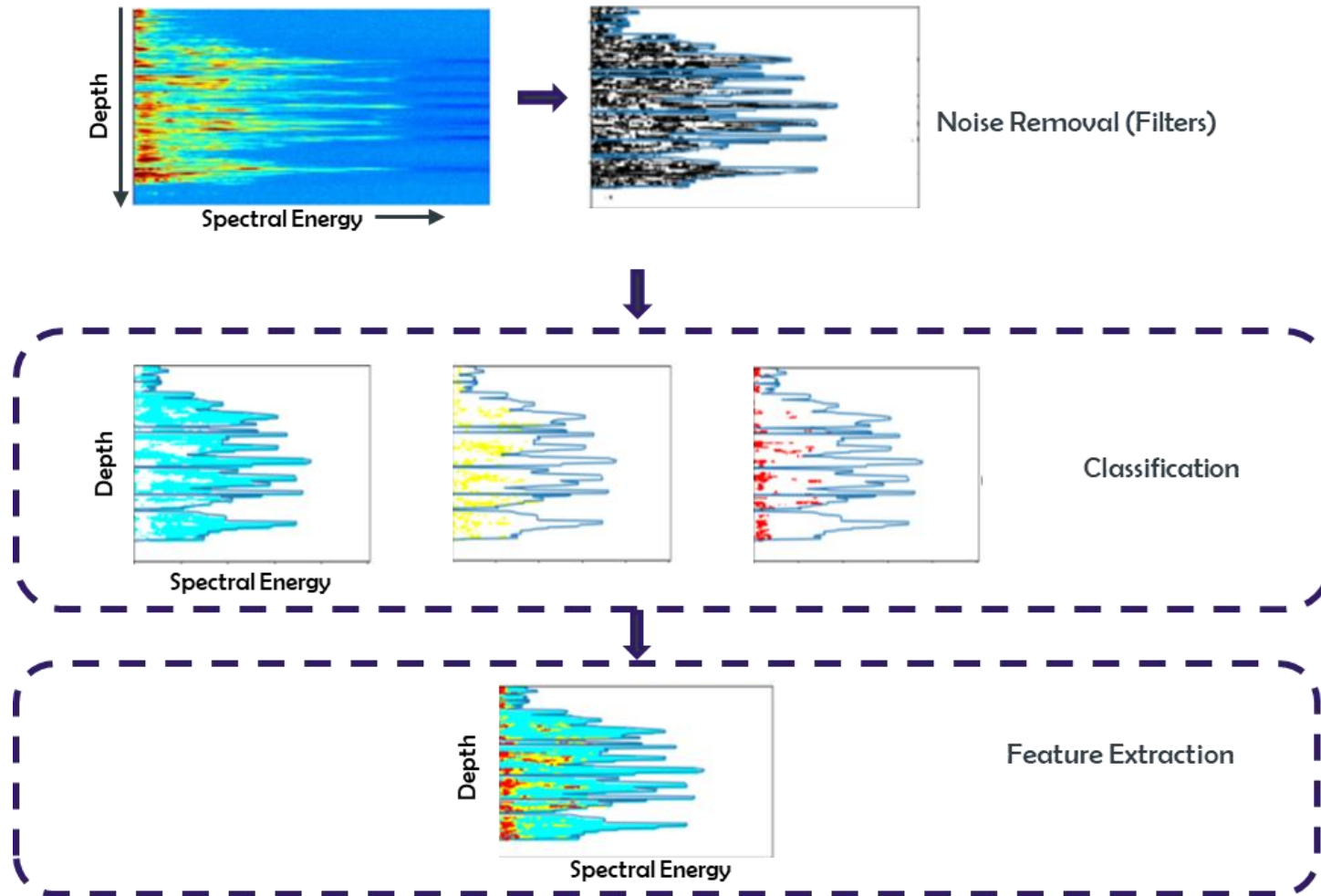
Static Model



Updated Reservoir Flow with Real Time BHP, BHT from ADH

Distributed Acoustic Sensing - Machine Learning on the Edge

Production Surveillance, Frac monitoring, Asset Monitoring



Wellbore Event Features

Spectral Energy

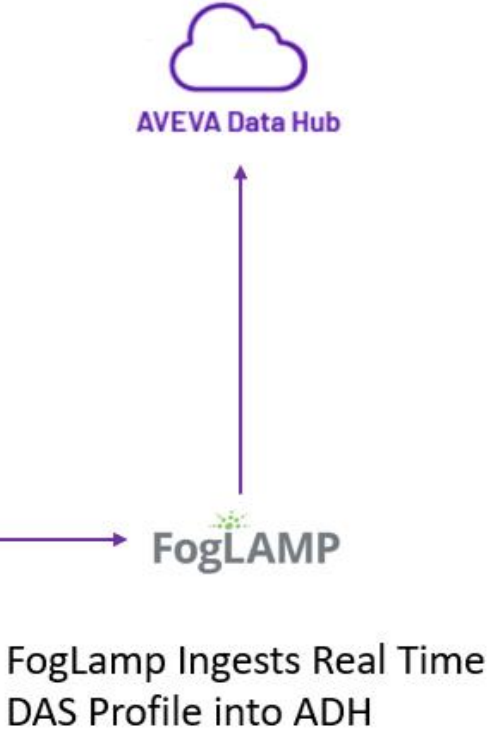
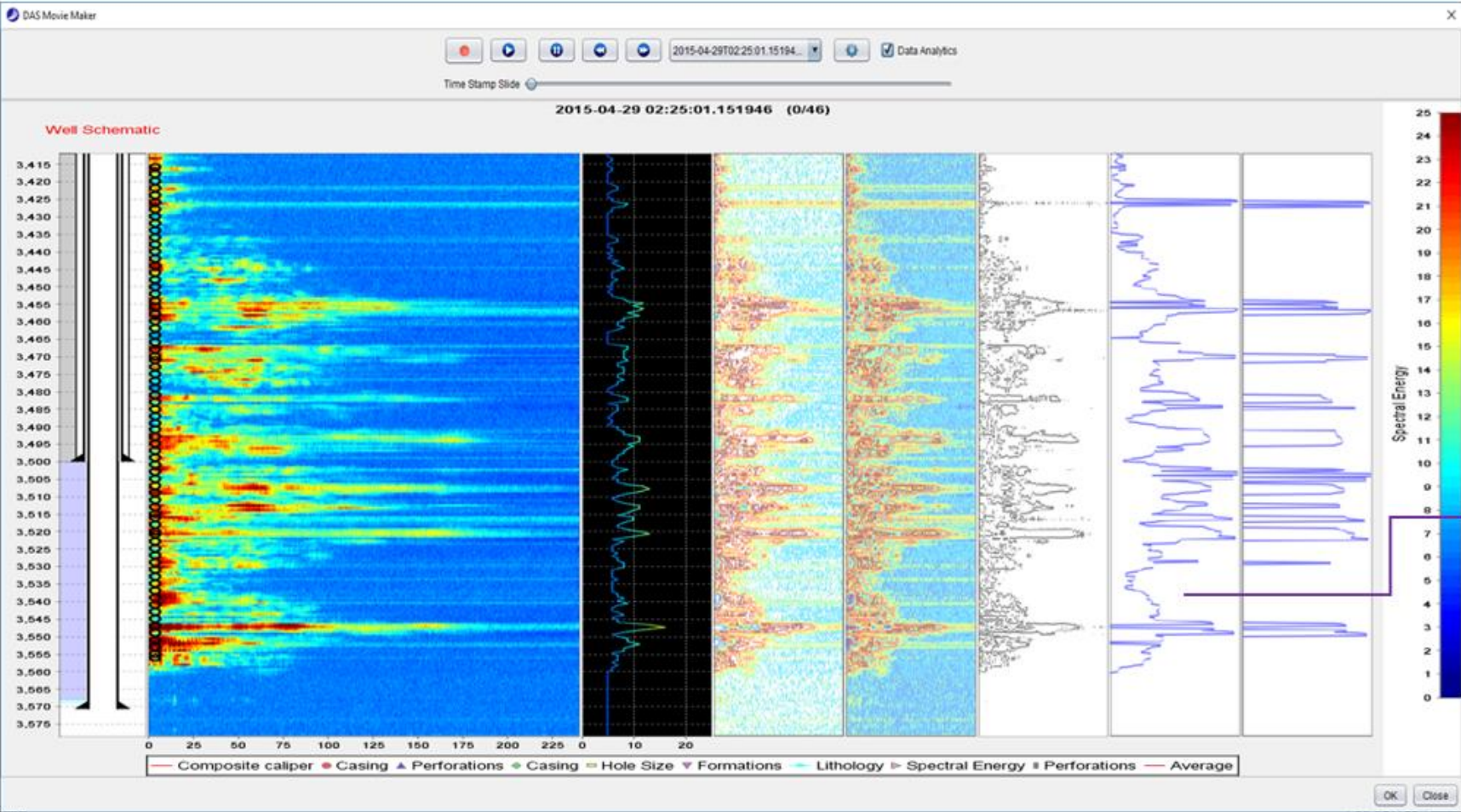
FogLAMP

Fiber Optic Interrogator

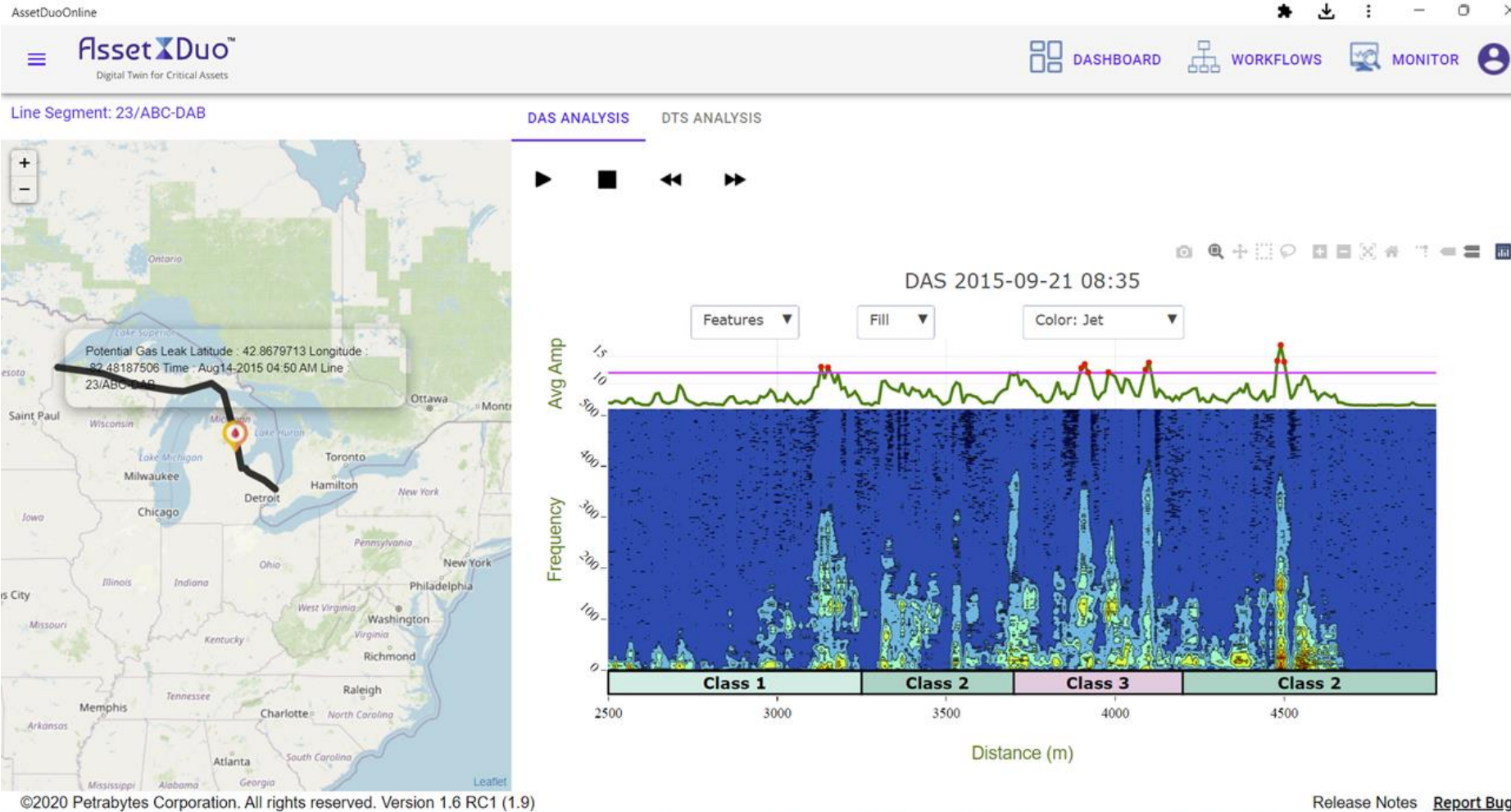


Distributed Acoustic Sensing - Processing on Fledge and aggregation in ADH

Production Surveillance, Frac monitoring, Asset Monitoring



Pipeline Monitoring with DAS (Acoustic Sensing)



FogLamp ingests Real Time DAS profile into ADH to detect events on pipelines with continuous monitoring



Sashi Gunturu

Founder and CEO

- Petrabytes Corporation
- sashigunturu@petrabytes.com

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