UPDATED

whitson

Forecasting in whitson+

DCA, Auto-Forecast & Type Well

Mathias Carlsen | Mohamad Dahouk

Course held Virtually

4 December 2024

Main objective: Click every button and not rush.

Small Courses throughout the Year

- Half-day courses (4 hrs)
- Hands-on focus with software and theory
- 7 Different Virtual Courses, 8 am – 12 pm CST
  - ~~PVT & Phase Behavior – 14 Feb 2024~~
    Recording: https://youtu.be/qxqzl8B_I2A
    Slides: https://shorturl.at/gzBNW
  - ~~Bottomhole Pressure Calculations – 24 April 2024~~
    Recording: https://youtu.be/0pvojymb-5U
    Slides: https://shorturl.at/wLWZ9
  - ~~Analytical & Numerical RTA – 26 June 2024~~
    Recording: https://youtu.be/A2Ov8P6GrEI?feature=shared
    Slides: https://shorturl.at/XVS7H
  - ~~Flowing material balance – 21 Aug 2024~~
    Recording: https://youtu.be/7T3KPIc-MqM?feature=shared
    Slides: https://shorturl.at/eIlc7
  - ~~Nodal Analysis – 2 October 2024~~
    Recording: https://youtu.be/s5a0wM-dJYU?feature=shared
    Slides: https://shorturl.at/eTwBL
  - ~~Well Tests (CPG & DFIT) – 16 October 2024~~
    Recording: https://youtu.be/bEpl19bK9uM
    Slides: https://shorturl.at/qQO3r
  - DCA & Type Wells – 4 December 2024

Send e-mail to carlsen@whitson.com if you haven't received the invite to the courses.

Need Course Certificate?

Contact carlsen@whitson.com


whitson

CERTIFICATE
OF
ATTENDANCE

John Doe

has successfully completed

RTA in whitson+

1/2-day Course held Virtually
14 July 2022

whitson

Mathias Lia Carlsen
GM Americas
www.whitson.com

Training

https://whitson.com/training/

SEP 18 2024 — whitson+ software course
1-Day, In person course - Houston
8 am-16 pm Central Time (CT)
Register

OCT 02 2024 — Nodal Analysis in whitson+
Virtual 1/2 Day Course
8-12 am Central Time (CT) | 7-11 am Mountain Time (MDT) | 3-7 pm Central European Summer Time (CEST)
Register

OCT 16 2024 — Well Tests (CPG & DFIT) in whitson+
Virtual 1/2 Day Course
8-12 am Central Time (CT) | 7-11 am Mountain Time (MDT) | 3-7 pm Central European Summer Time (CEST)
Register

DEC 04 2024 — DCA & Type Wells in whitson+
Virtual 1/2 Day Course
8-12 am Central Time (CT) | 7-11 am Mountain Time (MDT) | 3-7 pm Central European Time (CET)
Register

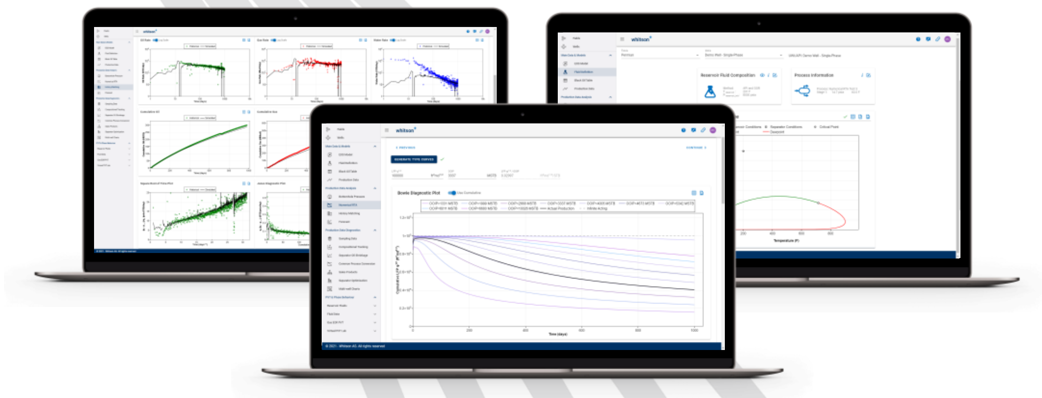
FEB 13 2025 — PVT & Phase Behavior in whitson+
Virtual 1/2 Day Course
8-12 am Central Time (CT) | 7-11 am Mountain Time (MDT) | 3-7 pm Central European Time (CET)
Register

APR 24 2025 — Bottomhole pressure calculations in whitson+
Virtual 1/2 Day Course
8-12 am Central Time (CT) | 7-11 am Mountain Time (MDT) | 3-7 pm Central European Summer Time (CEST)
Register

JUN 25 2025 — Analytical and Numerical RTA in whitson+
1/2 Day Course
8-12 am Central Time (CT) | 7-11 am Mountain Time (MDT) | 3-7 pm Central European Summer Time (CEST)
Register

AUG 20 2025 — Flowing material balance in whitson+
Virtual 1/2 Day Course
8-12 am Central Time (CT) | 7-11 am Mountain Time (MDT) | 3-7 pm Central European Summer Time (CEST)
Register

An all-in-one solution



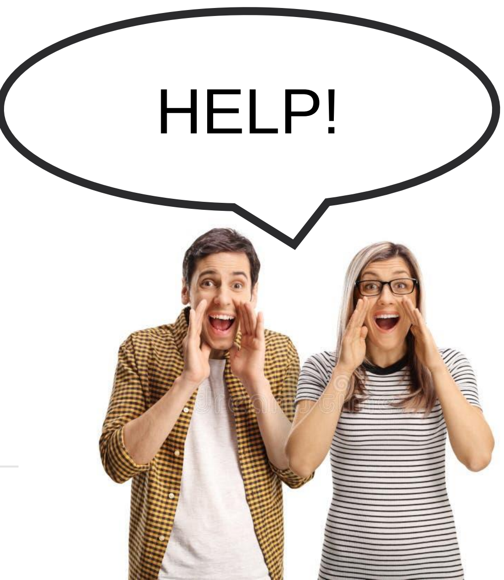
Web-based solution

- ✓ DCA & Type Well
- ✓ PVT
- ✓ BHP Calculations
- ✓ FMB
- ✓ RTA
- ✓ Reservoir Simulation
- ✓ Nodal Analysis
- ✓ Well Testing (CPG, DFIT)

General Support

whitson^{+} software

support@whitson.com (2 min response time)



Software Basics

Access to whitson+

NOT YOUR COMPANY DOMAIN

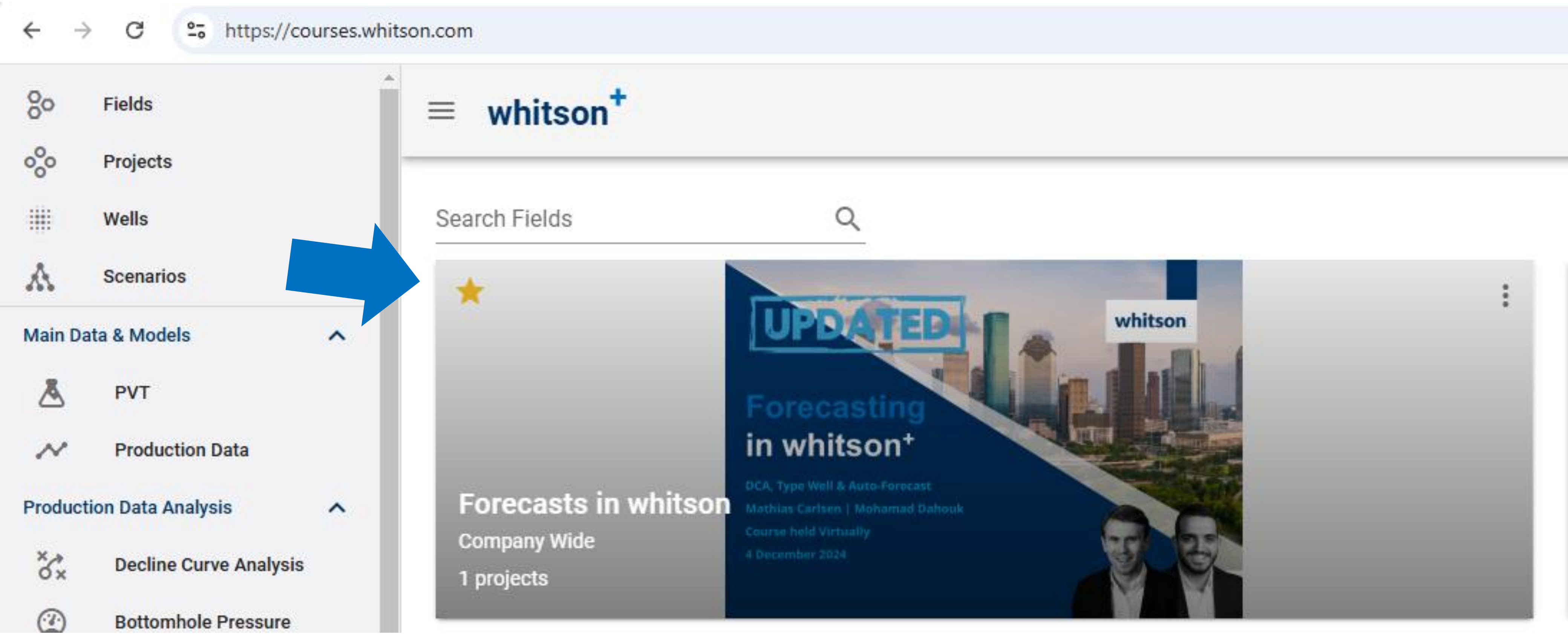
www.courses.whitson.com

Username: your e-mail

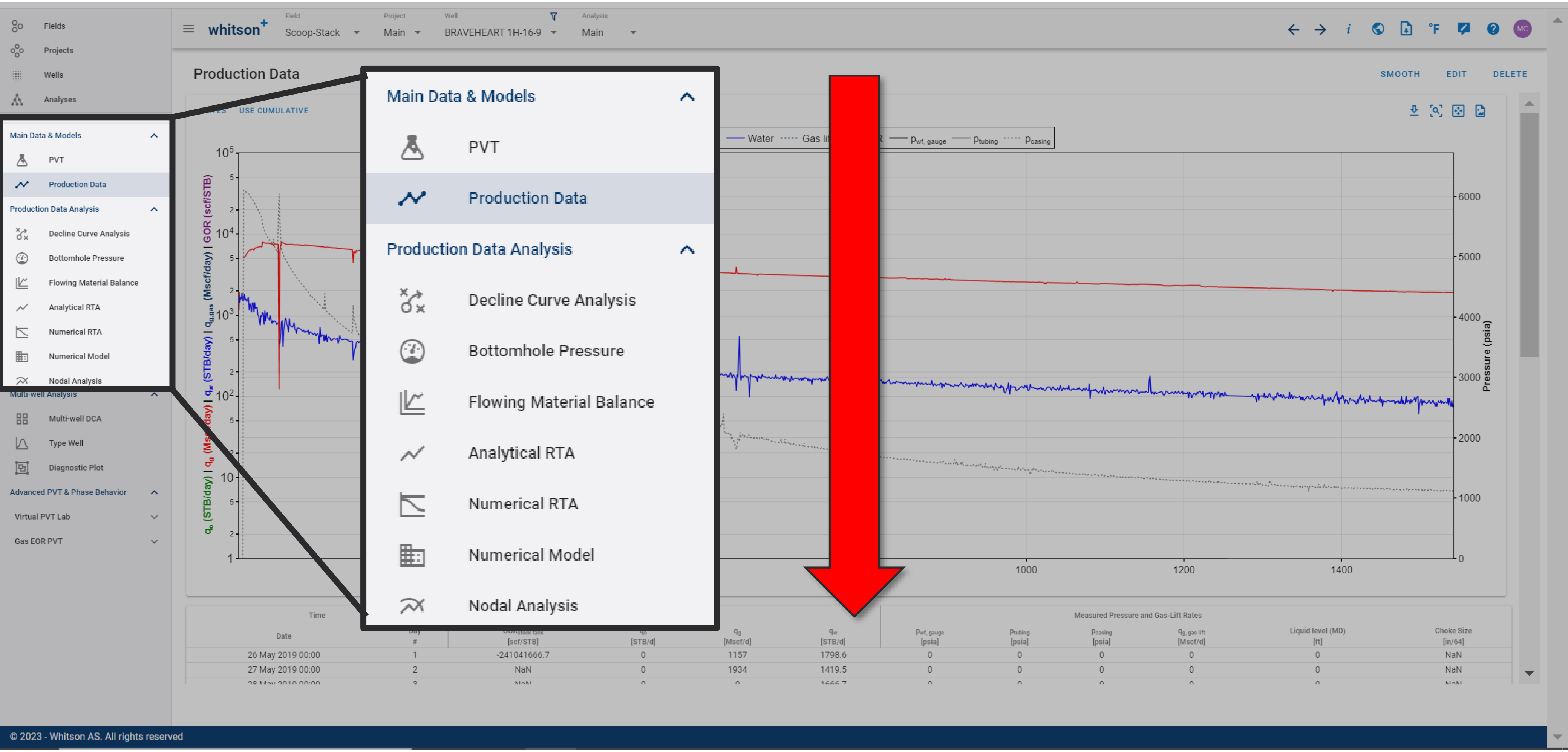
Password: WhitsonDCA2024*

*Send an e-mail to dahouk@whitson.com if you need help to login.

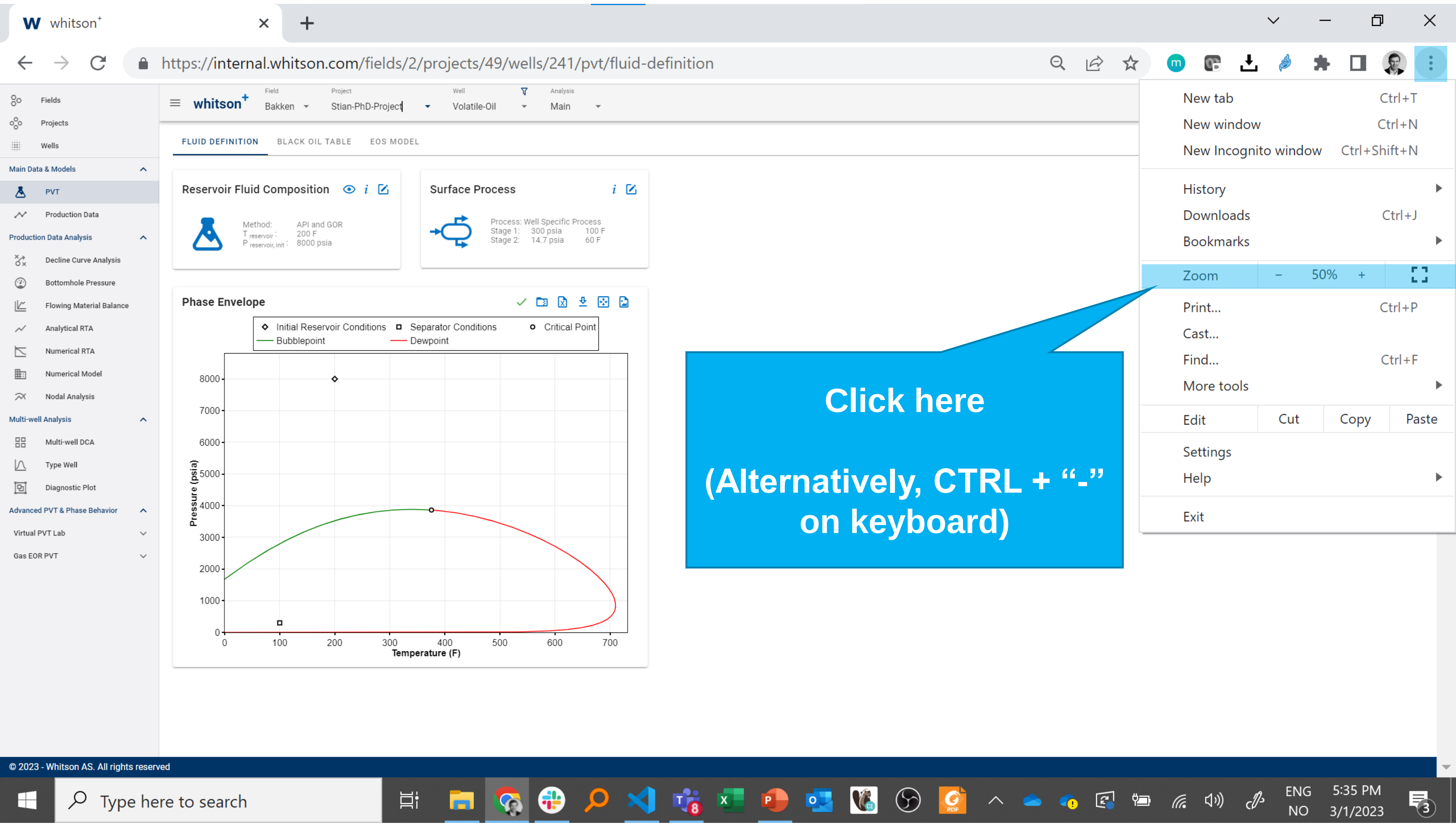
Access to whitson+



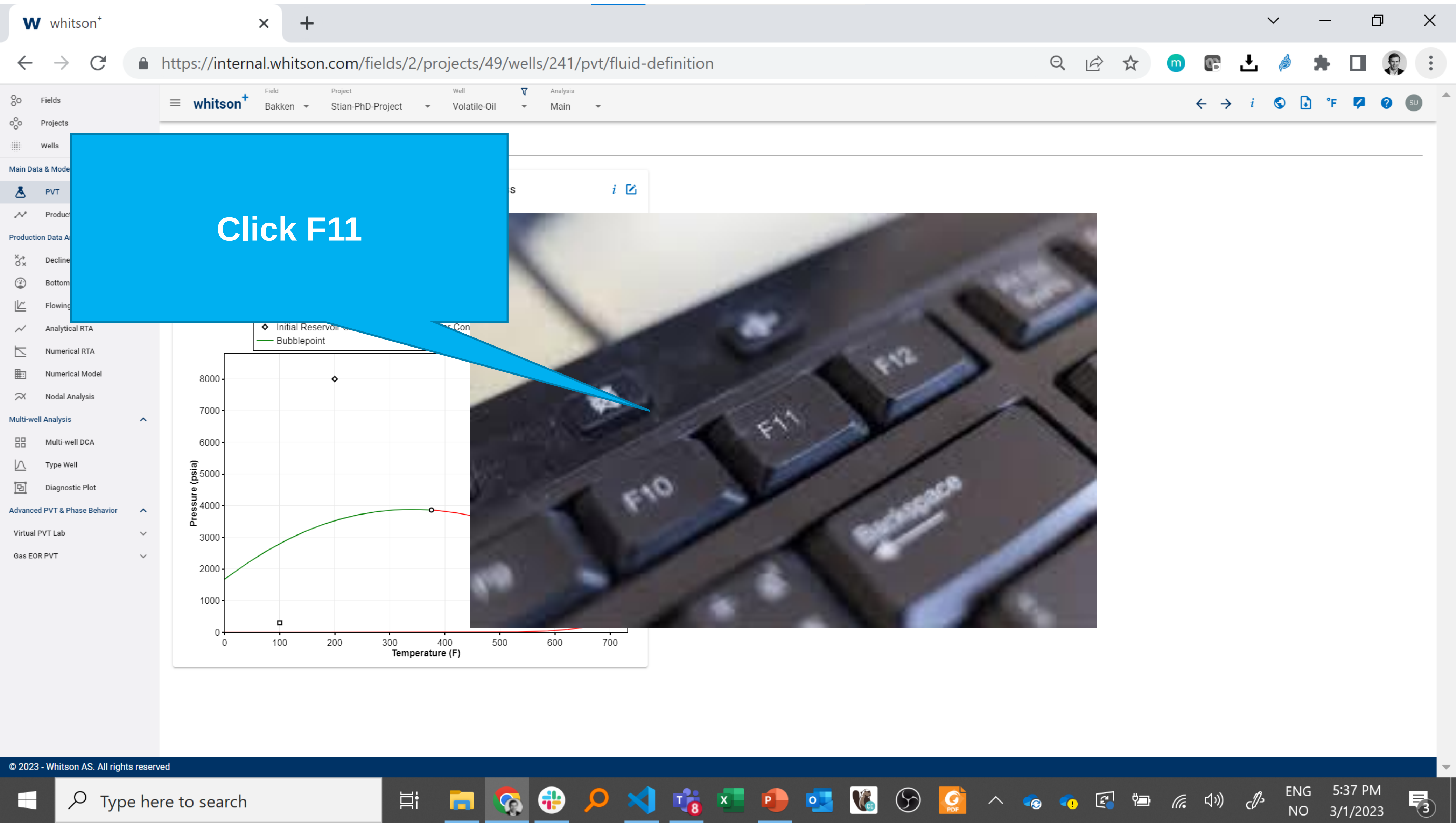
Software Structure: Top Down



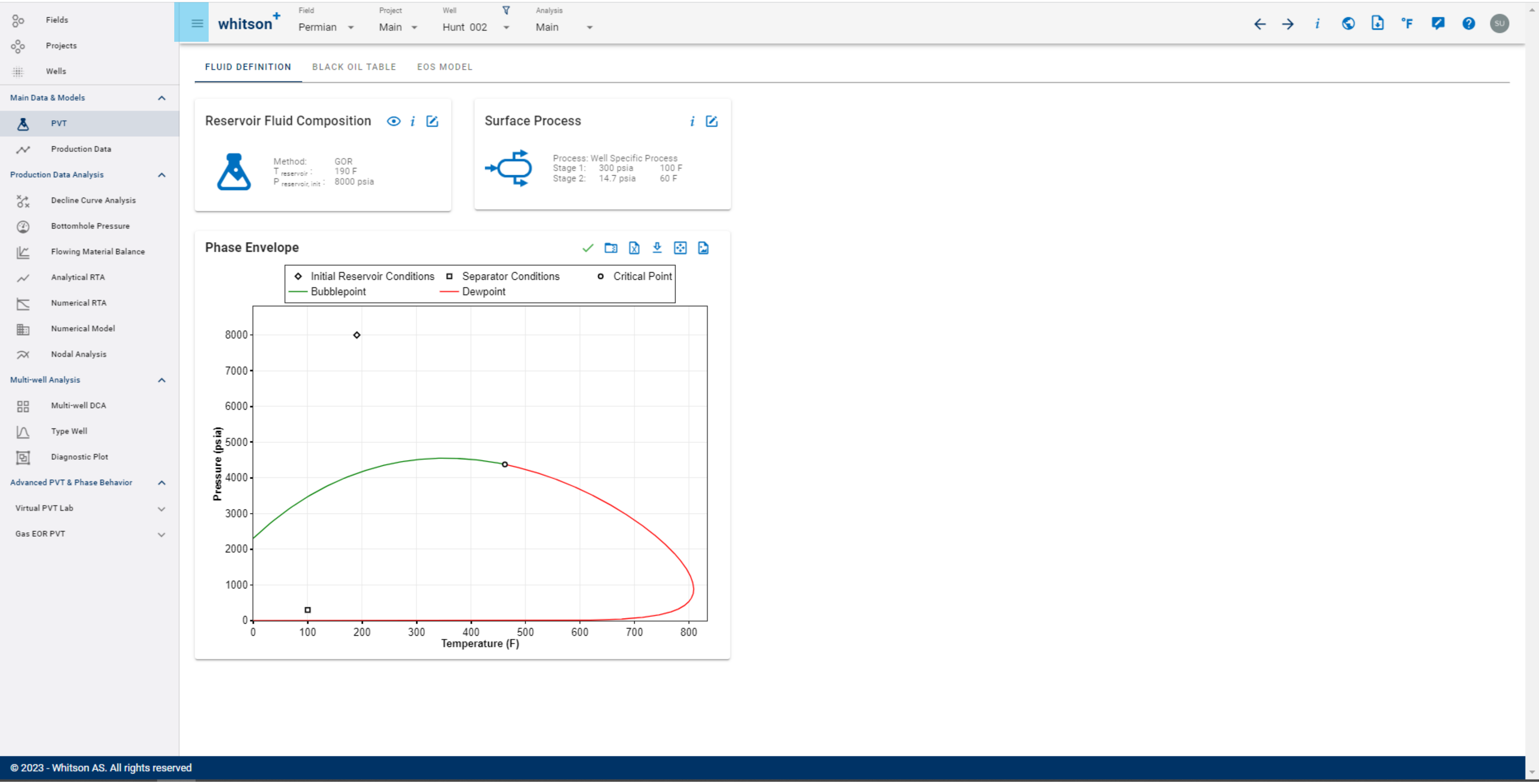
whitson+: Set Zoom to 70-80%



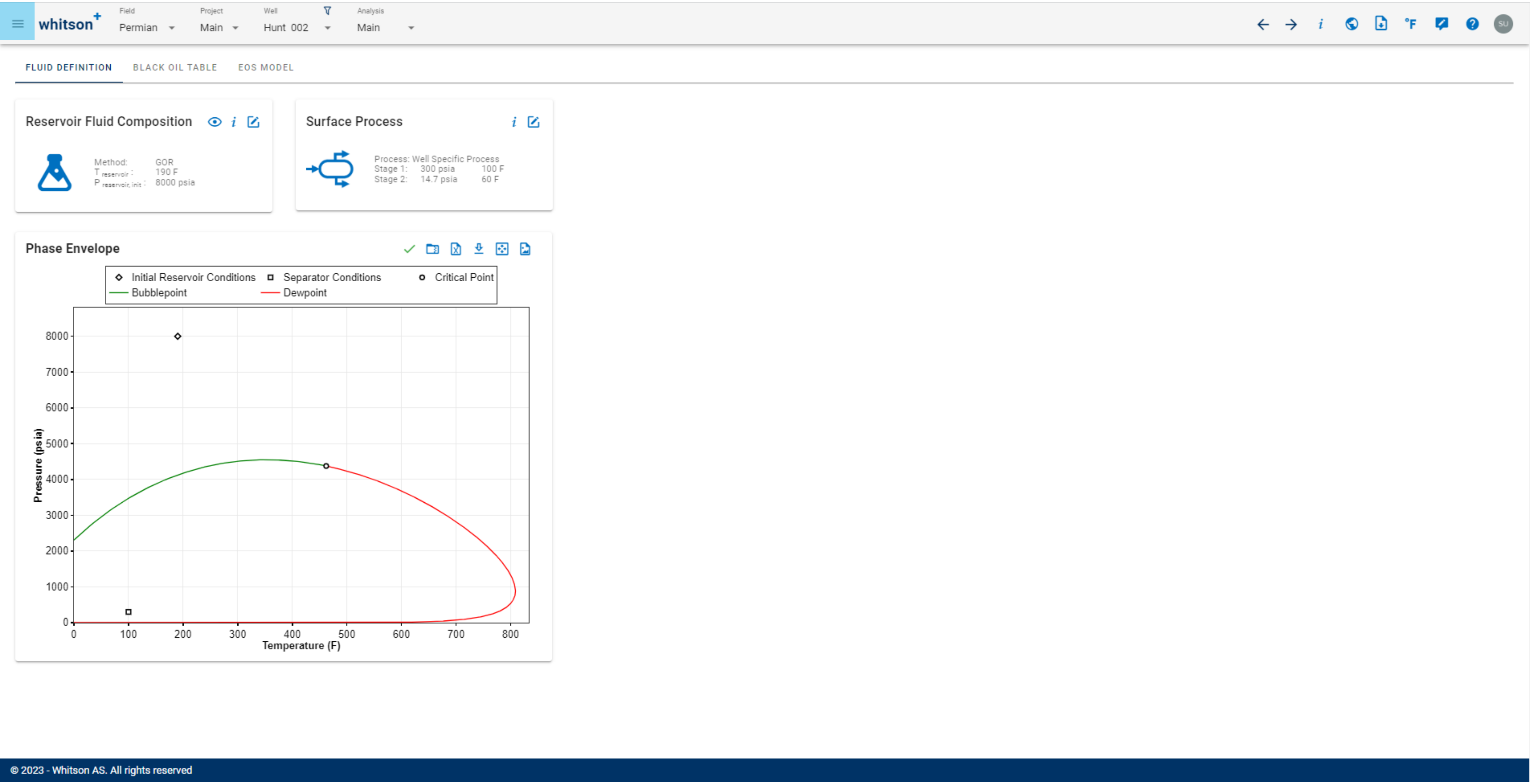
whitson⁺: Maximize Screen by "F11"



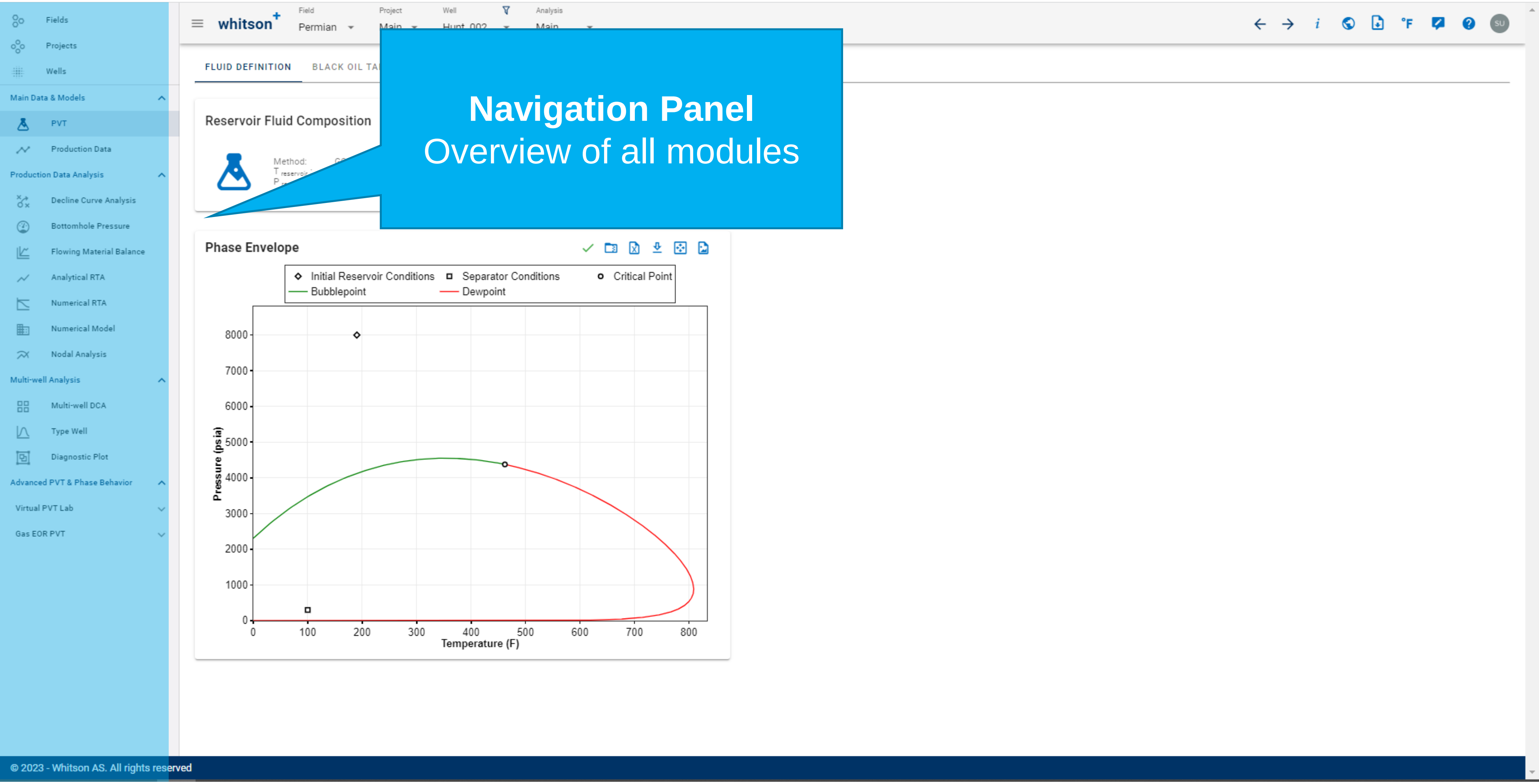
whitson⁺: More Screen Real Estate



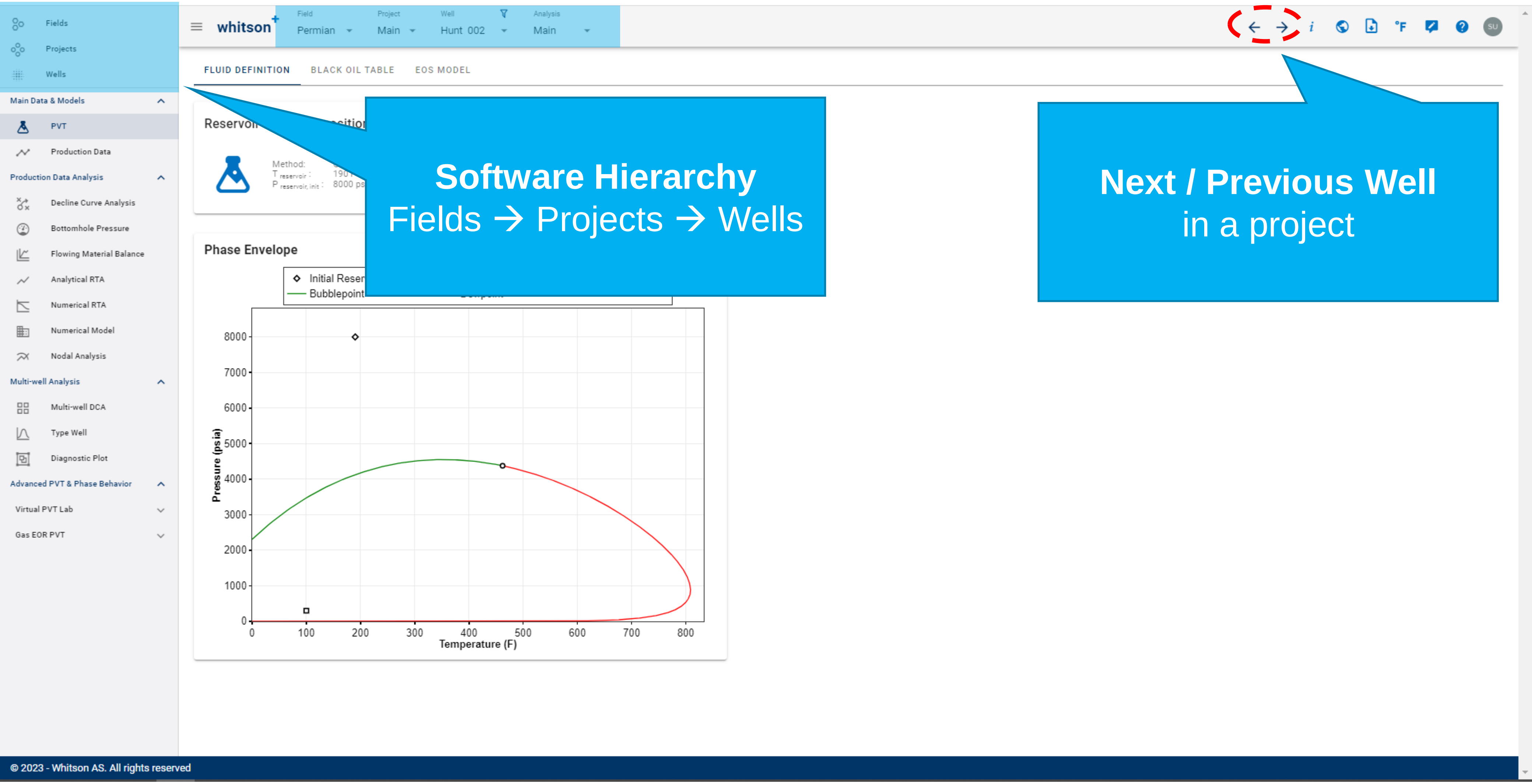
whitson⁺: More Screen Real Estate



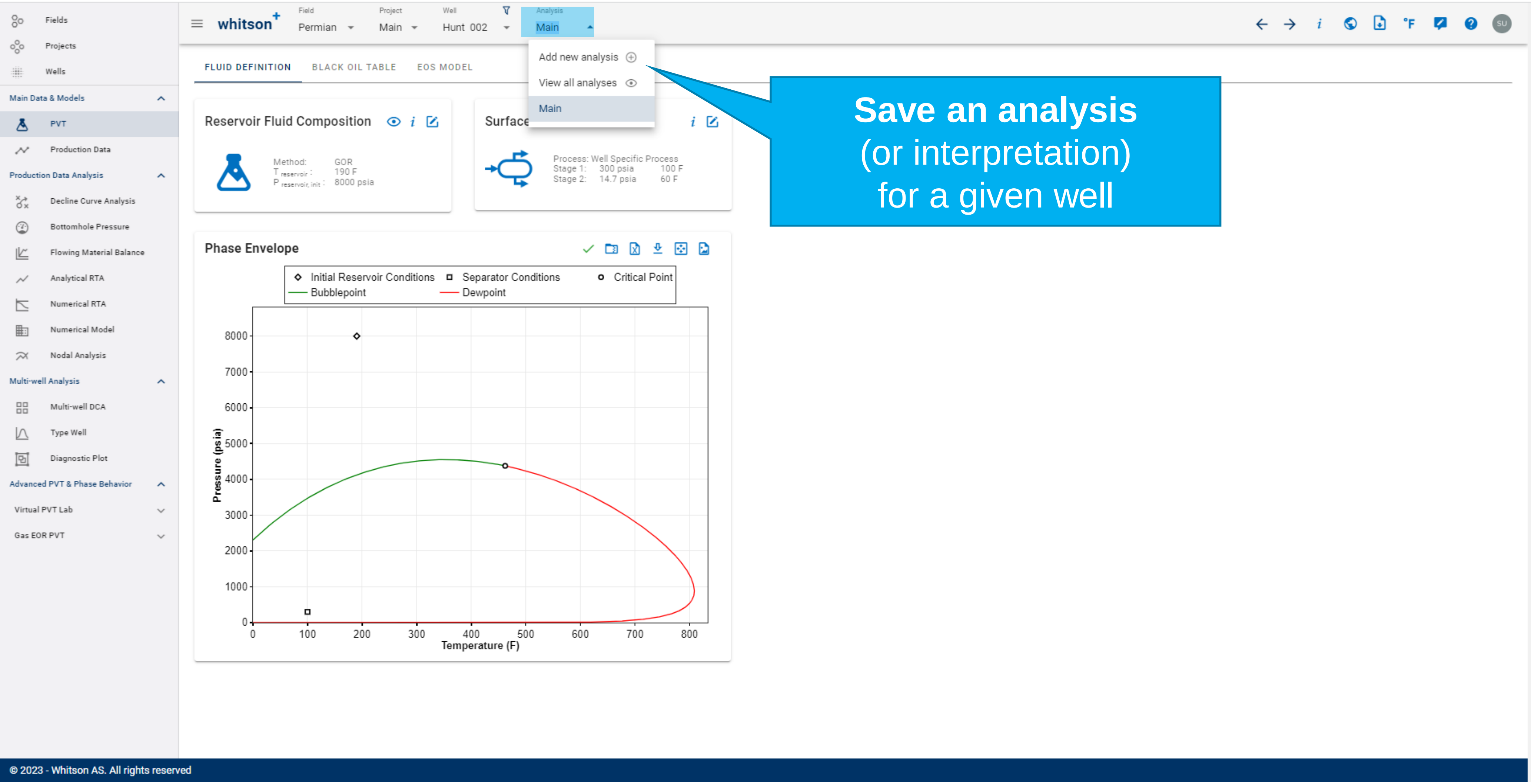
whitson+: Navigation Panel



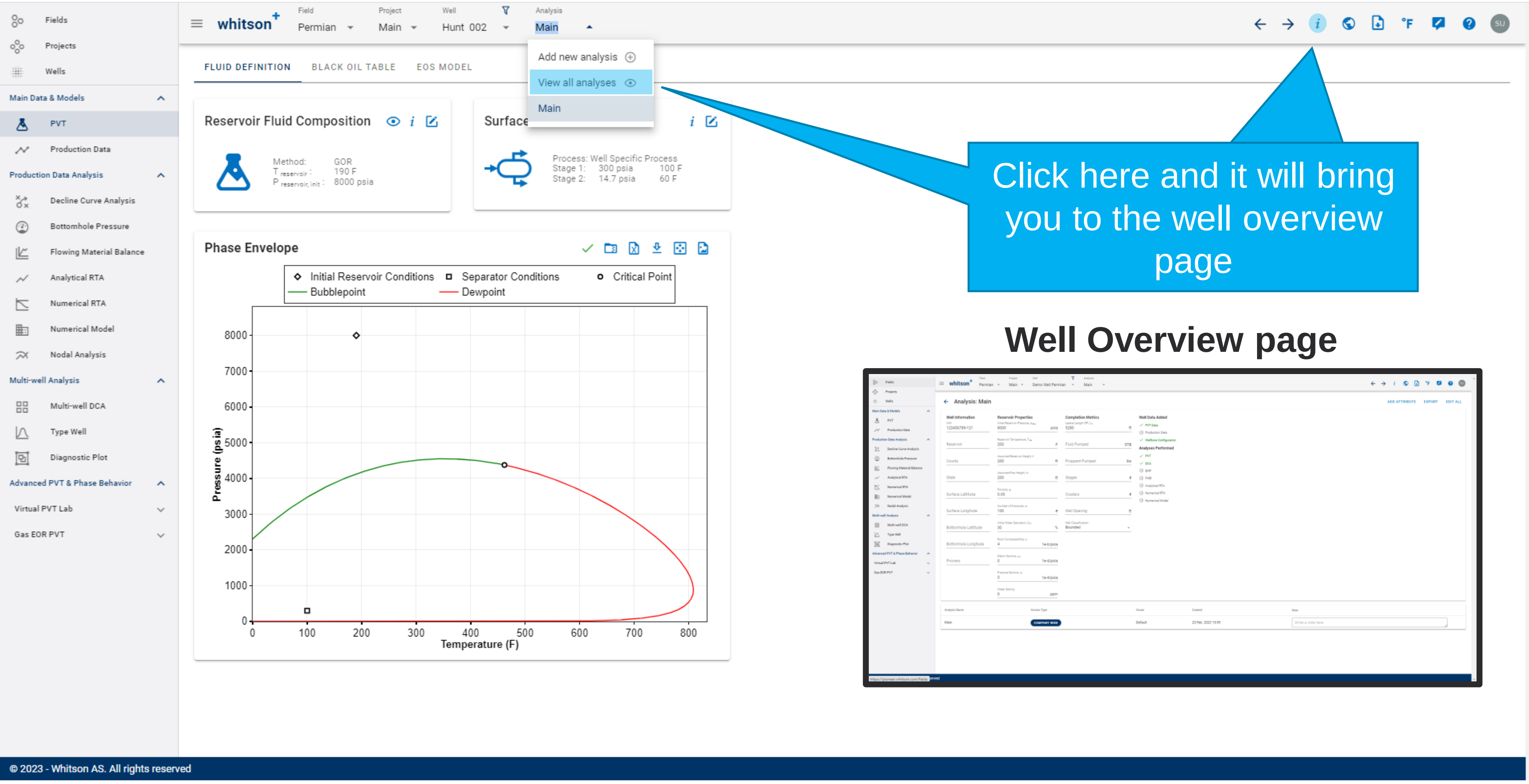
whitson⁺: Software Hierarchy



whitson⁺: Create Multiple Analyses for a Well



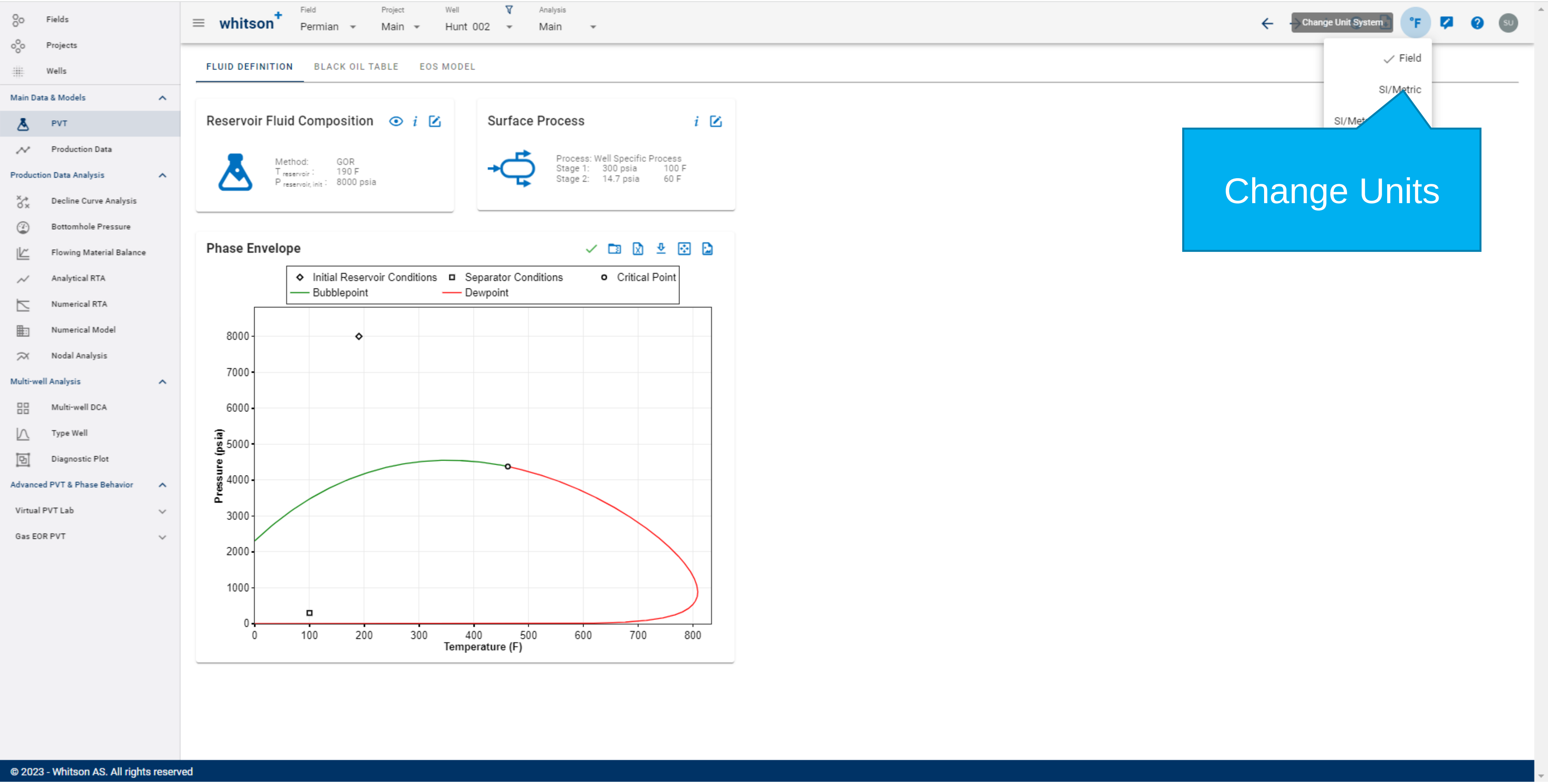
whitson⁺: Create Multiple Analyses for a Well



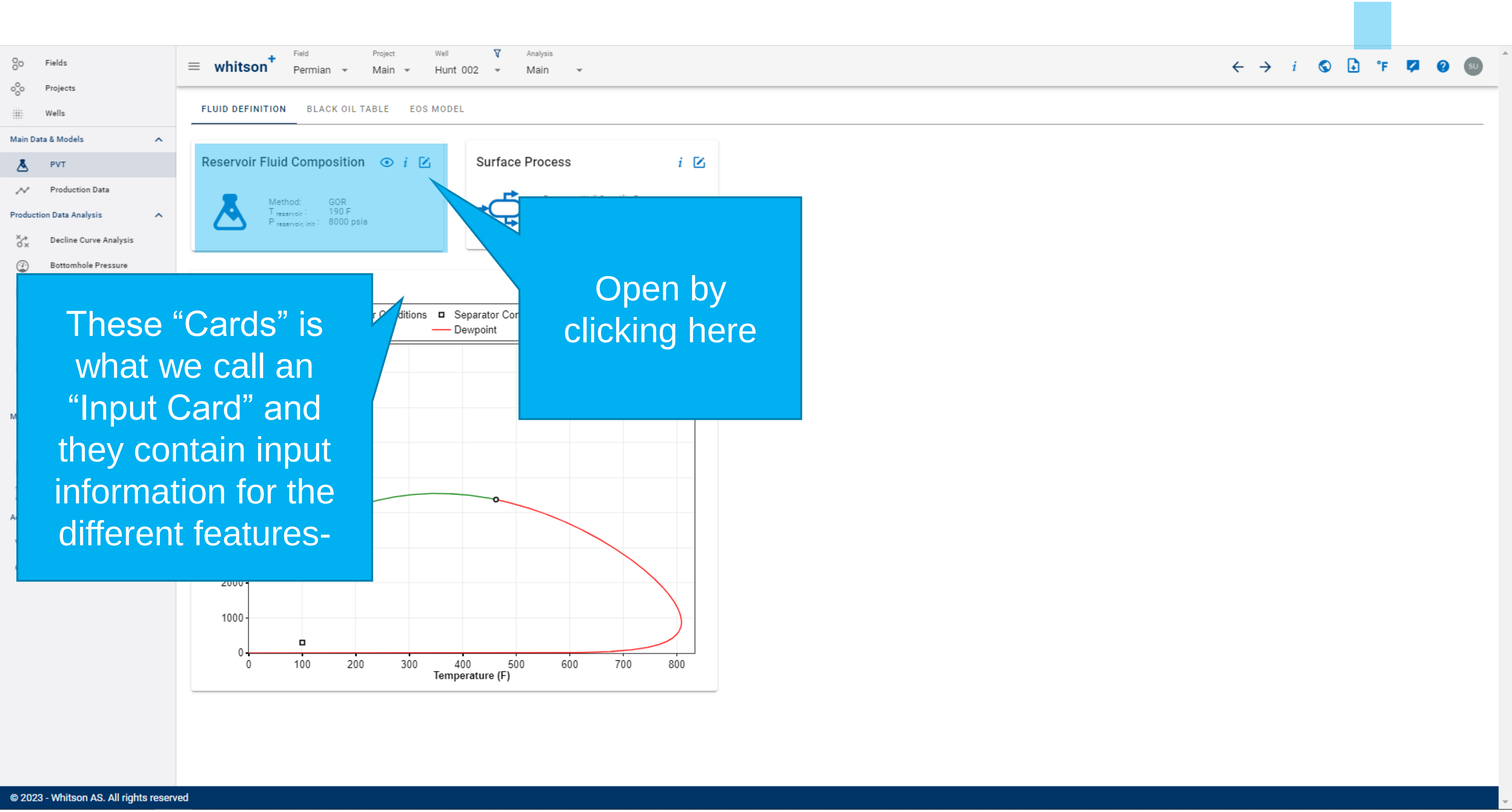
Click here and it will bring you to the well overview page

Well Overview page

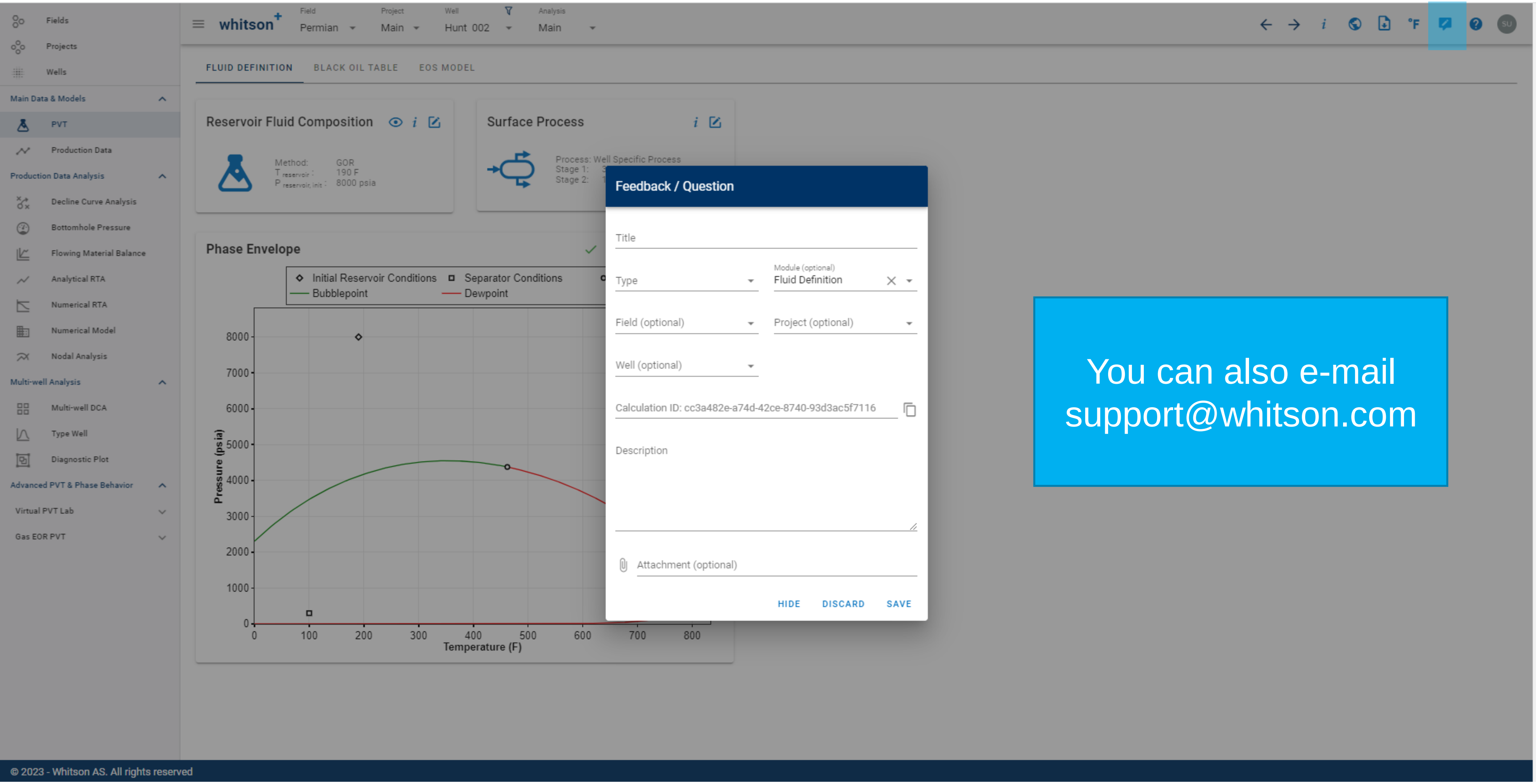
whitson⁺: Change Units



whitson+: Input Card

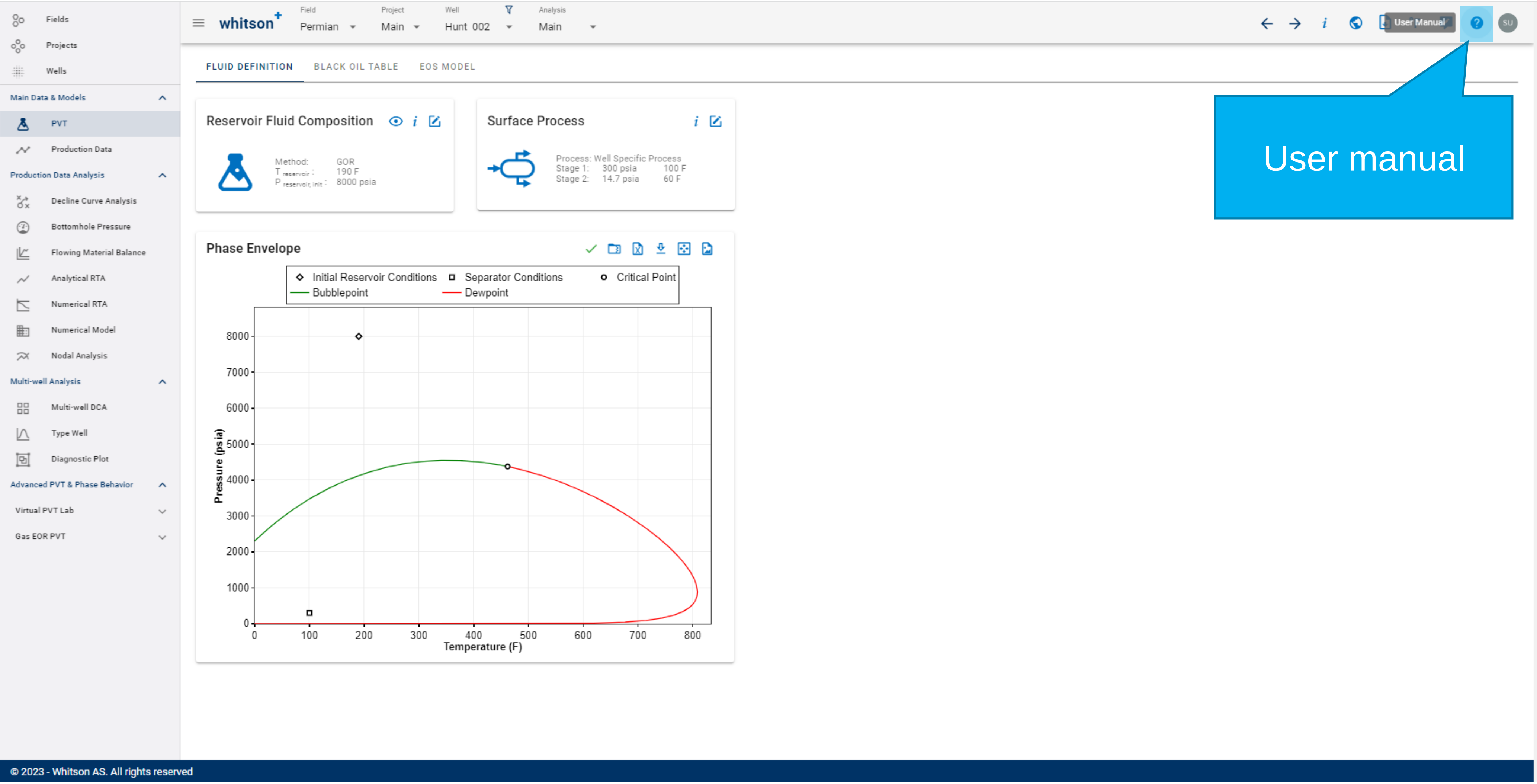


whitson+: Support Ticket



You can also e-mail support@whitson.com

whitson⁺: Manual



Important Shortcut: Refresh

- Refresh shortcut: “CTRL + R”

- Use if you experience
  - Bad connection
  - The browser is “stuck”

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Decline Curve Analysis

DCA: Outline

1. Arps
2. Fetkovich
3. Segment Types
4. Decline Rate Type
5. Limiting Decline Rate, d_{lim}
6. Ratio forecasting

Flow Regimes 1.01

Infinite acting flow ends as pressure transient reaches *one* reservoir boundary

↑ ↑ ↑ ↑ ↑

Transitional flow (period in between)

↓ ↓ ↓ ↓ ↓

Boundary dominated flow starts when the wellbore pressure response is affected by *all* reservoir boundaries

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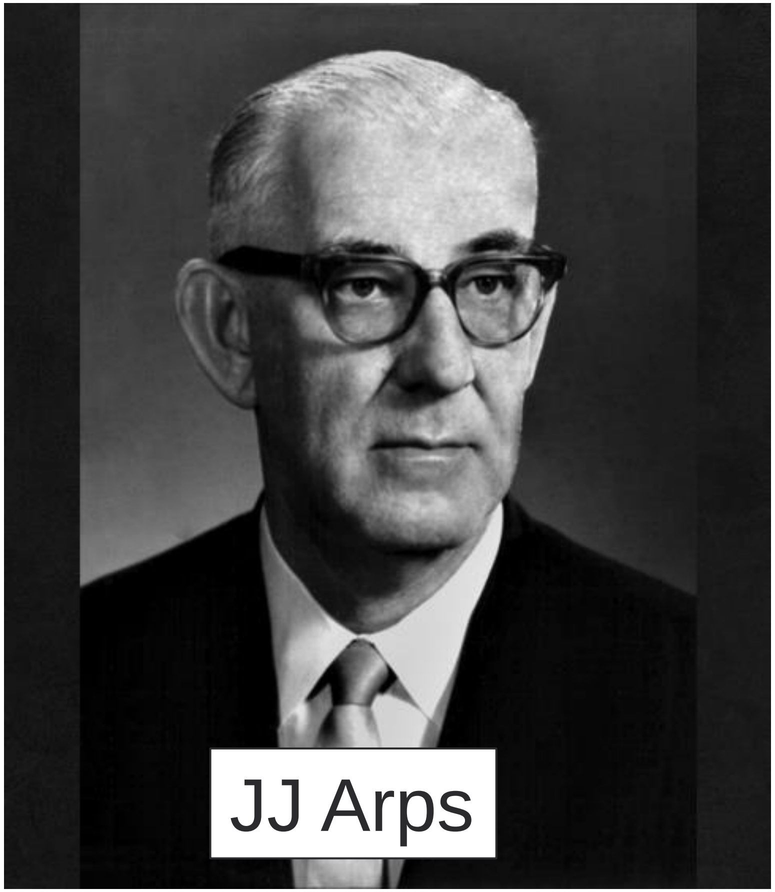
Decline Curve Analysis (DCA)



JJ Arps

$$q(t) = q_i\left(1 + b a_i t\right)^{-1/b}$$

q_i = initial flow rate

a_i = nominal decline rate at time zero

b = rate exponent

$q(t)$ = flow rate at time t

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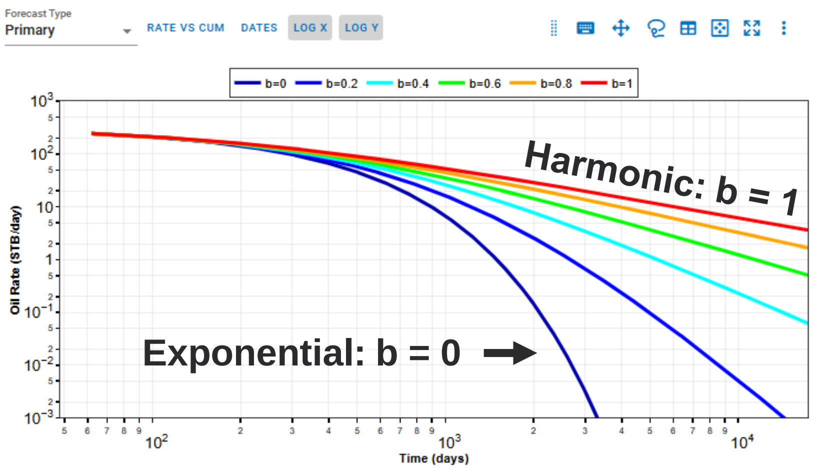
Decline Curve Analysis (DCA)



Exponential (b=0)

$$q(t) = q_i e^{-a_i t}$$

$$N(\infty) = \frac{q_i}{a_i}$$

Harmonic (b=1)

$$q(t) = q_i (1 + a_i t)^{-1}$$

$$N(\infty) = \infty$$

Hyperbolic (0<b<1)

$$q(t) = q_i (1 + b a_i t)^{-1/b}$$

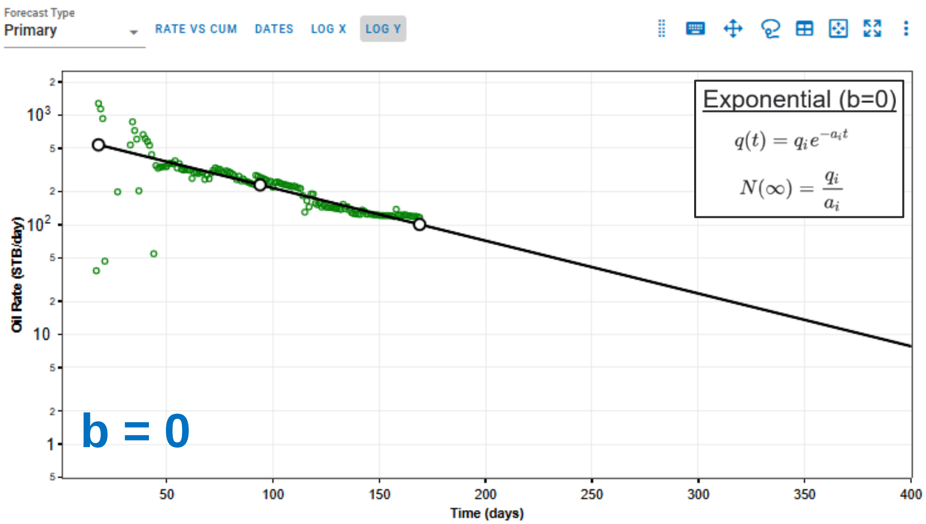
$$N(\infty) = \frac{q_i}{a_i} \frac{1}{1-b}$$

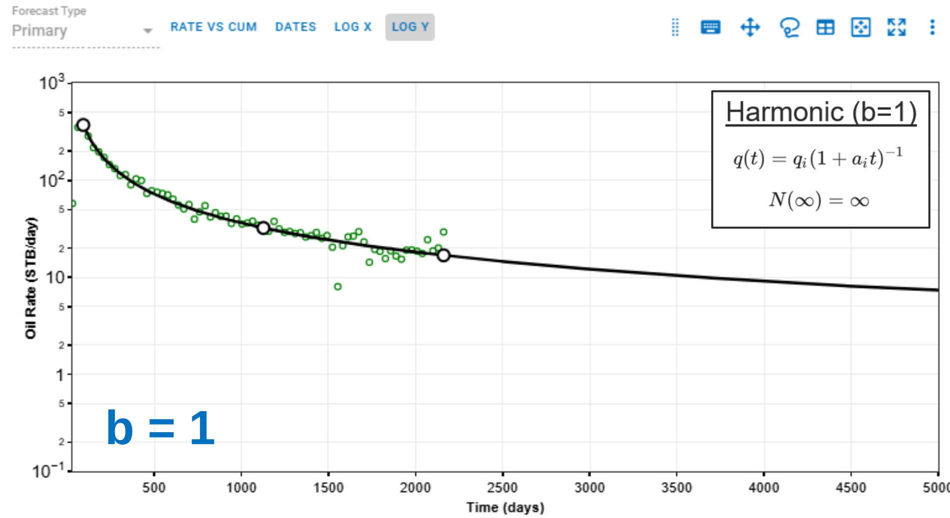
Beyond Hyperbolic (b>1)

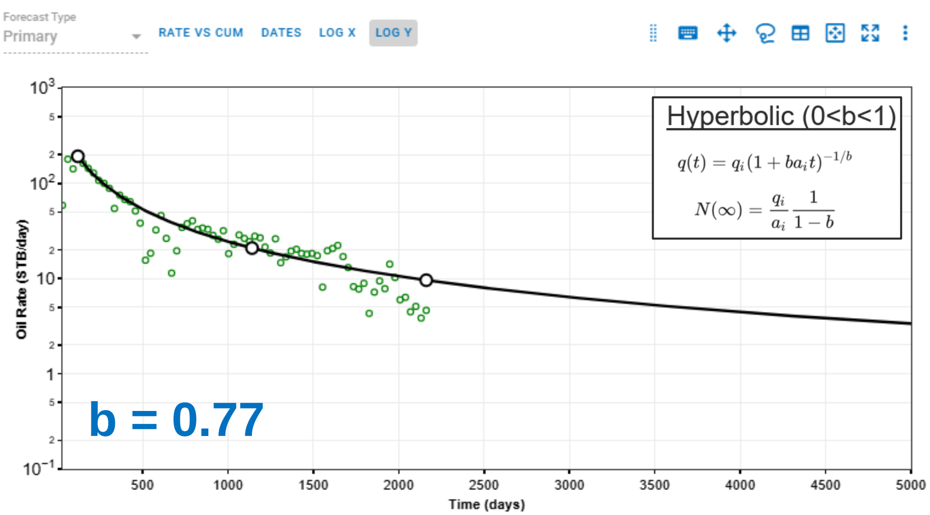
$$q(t) = q_i (1 + b a_i t)^{-1/b}$$

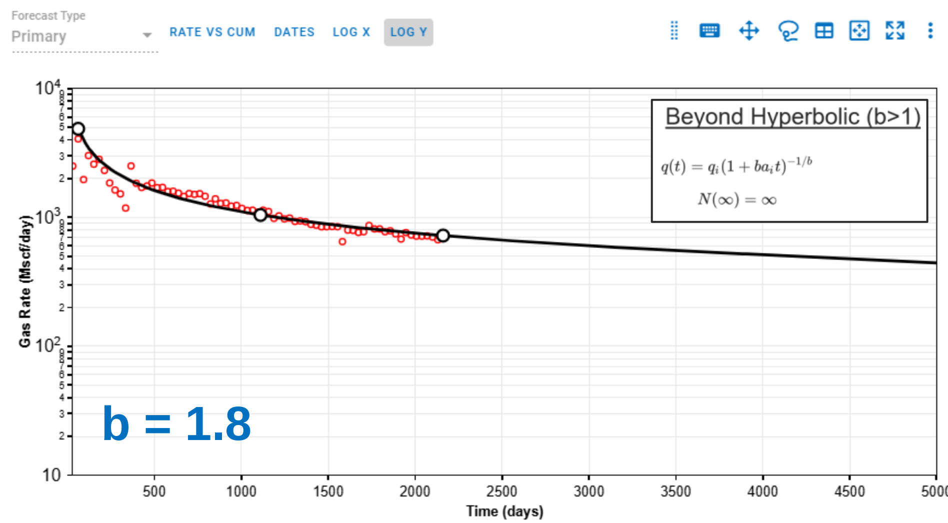
$$N(\infty) = \infty$$

Decline Curve Analysis (DCA)

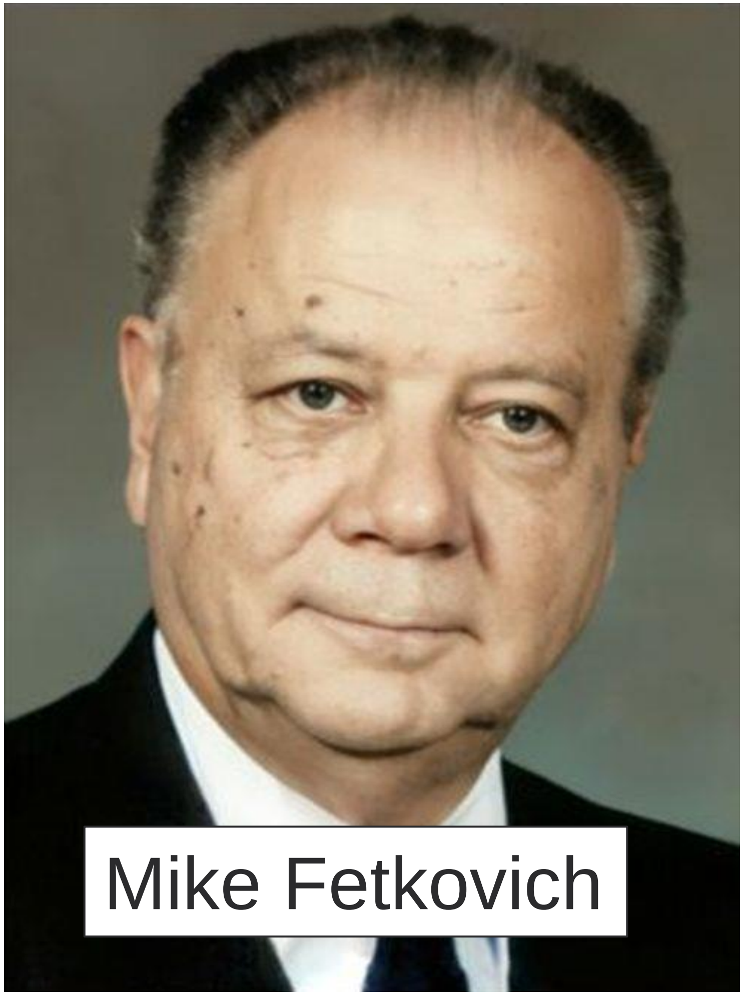








DCA: Fetkovich



Tied DCA to reservoir/physical parameters

Inherent assumption that p_{wf} is constant

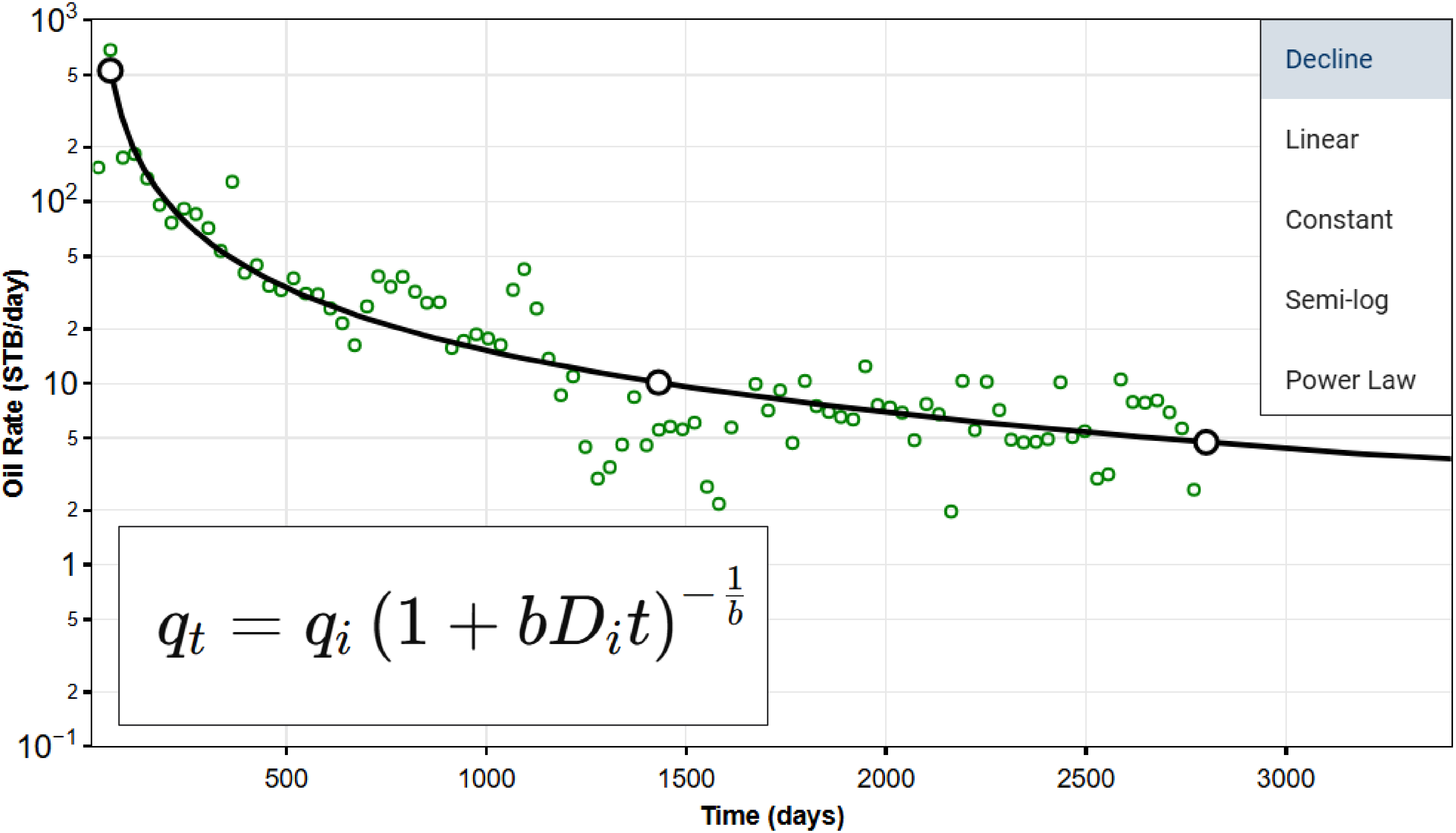
b ~ Recovery Efficiency

low b → low recovery efficiency
high b → high recovery efficiency

Boundary Dominated Flow
b = 0 Single-phase oil, or gas at high pressure
b = 0.1-0.4 solution gas drive
b = 0.4-0.5 single-phase gas flow
b = 0.5-1: layered reservoirs

Infinite Acting / Transitional
b >= 1: infinite acting, or transitional flow

Segment Type: Decline (Arps)



$$q_t = q_i \left(1 + bD_i t\right)^{-\frac{1}{b}}$$

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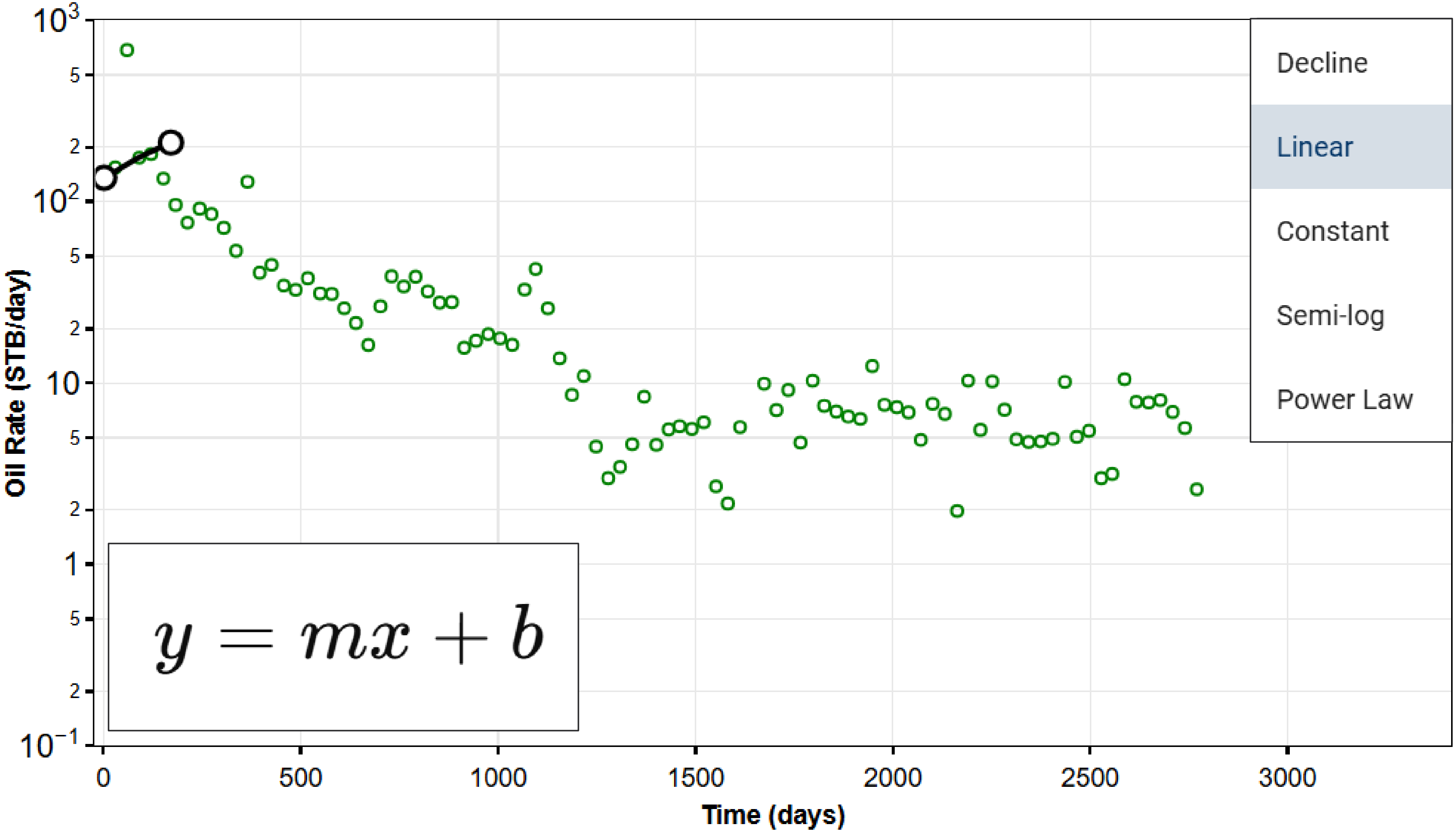
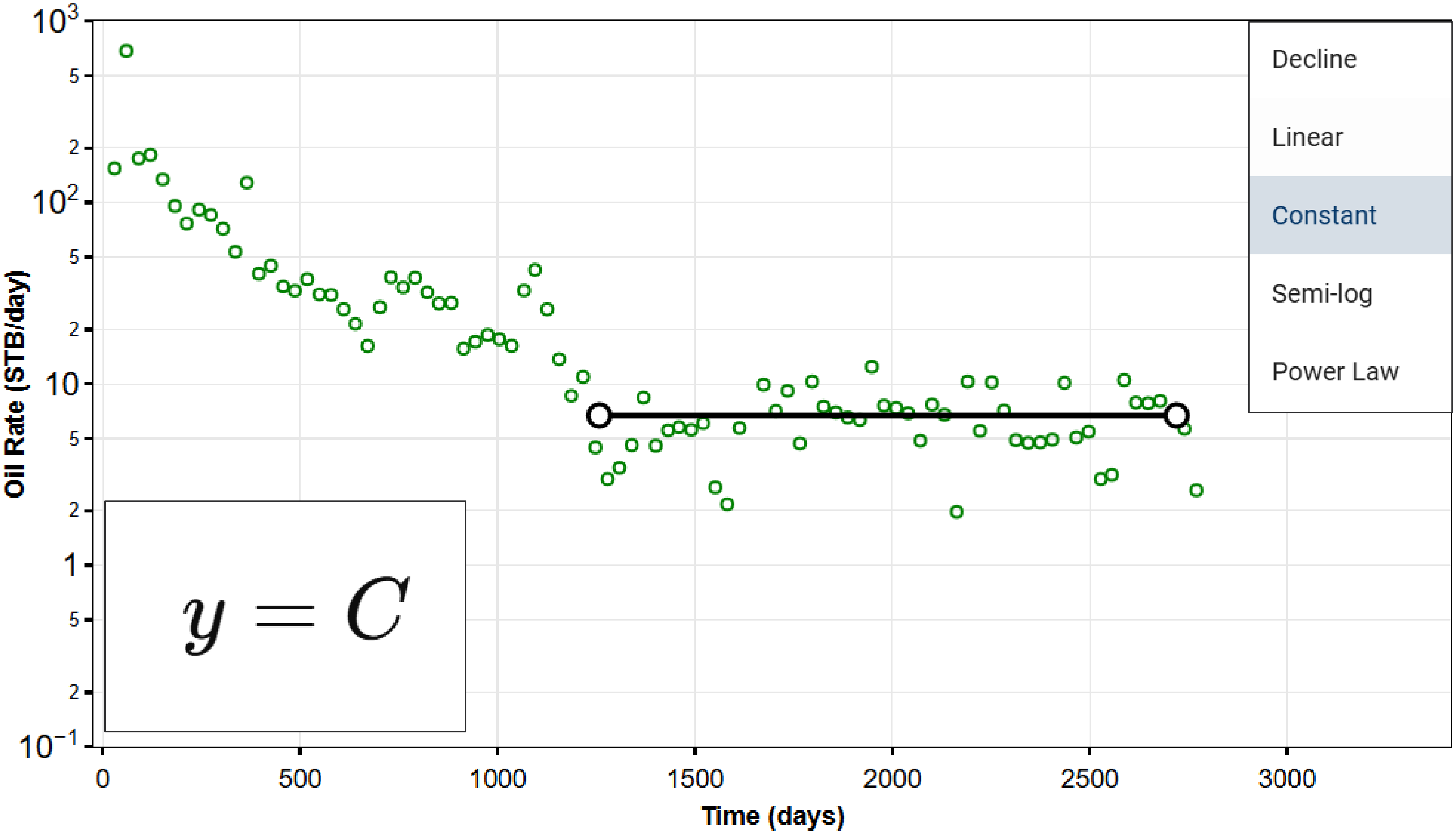
Segment Type: Linear



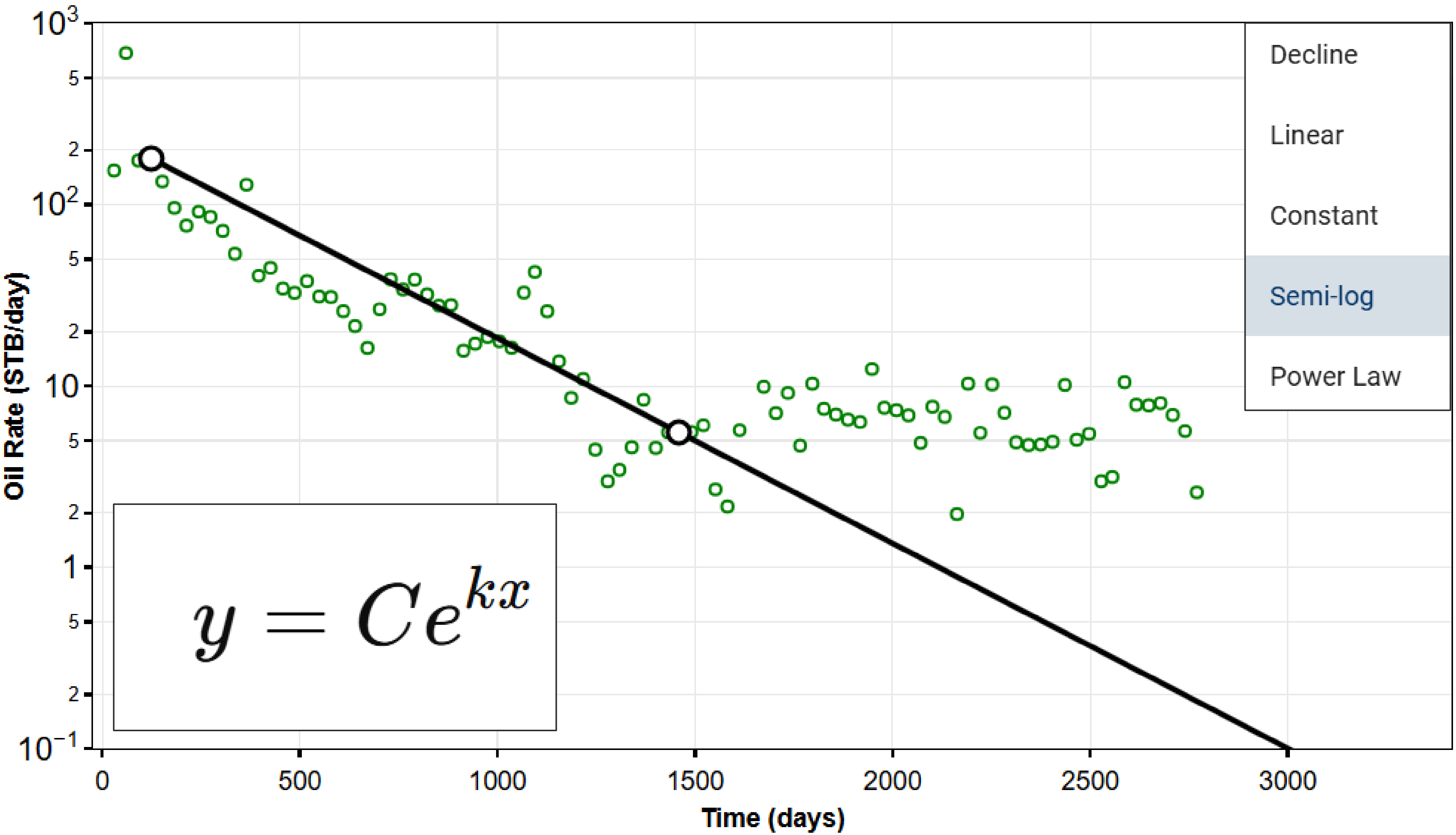
$$y = mx + b$$

Segment Type: Constant



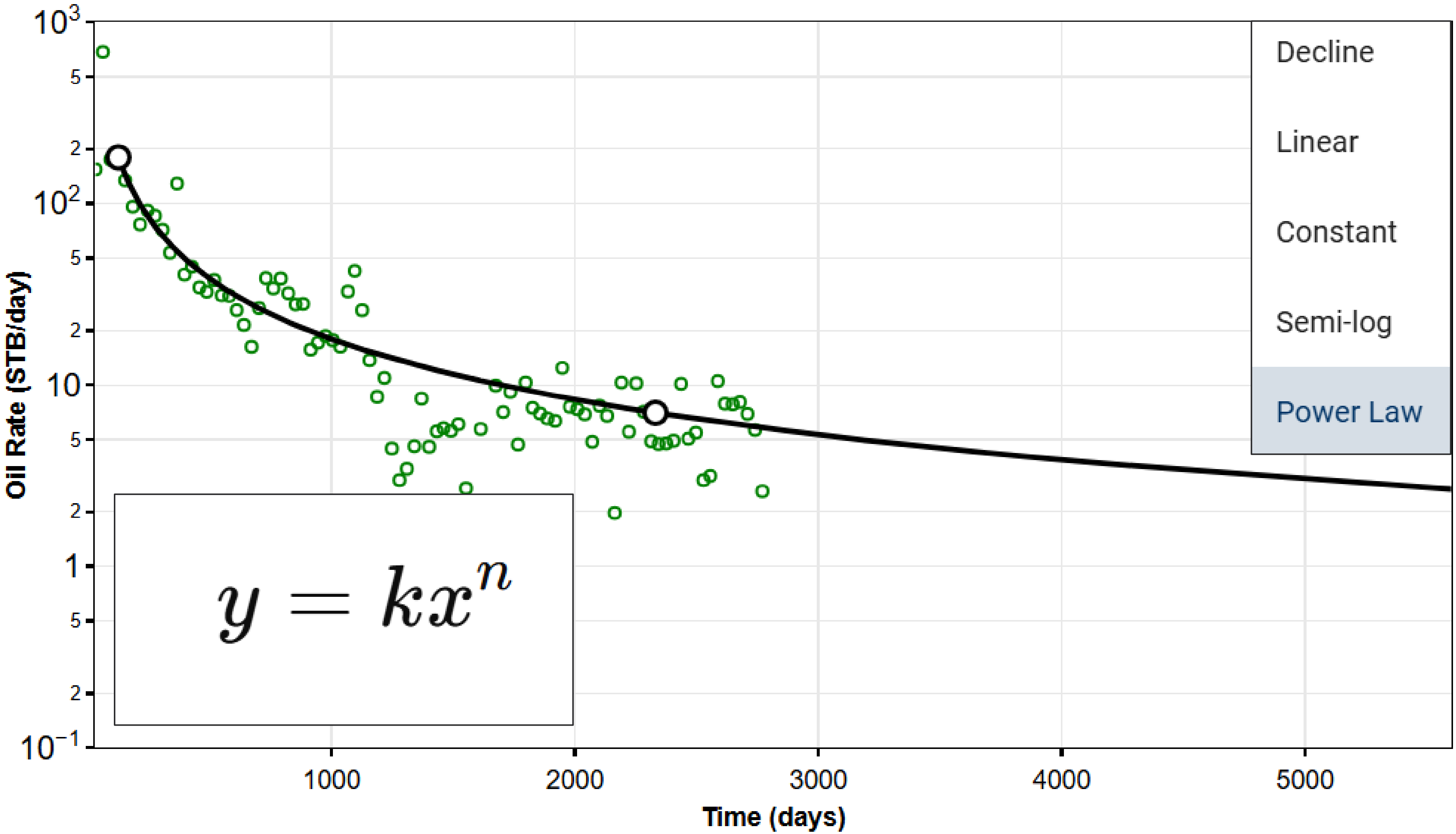
$$y = C$$

Segment Type: Semi-Log



$$y = Ce^{kx}$$

Segment Type: Power Law



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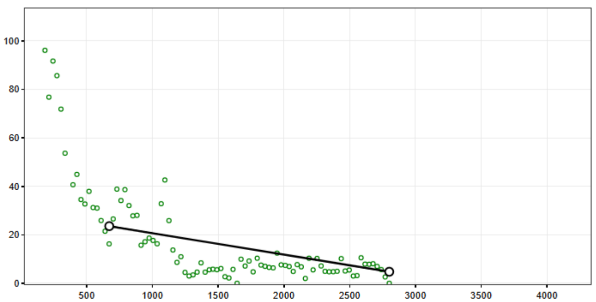
DCA: Segment Types & Straight Lines

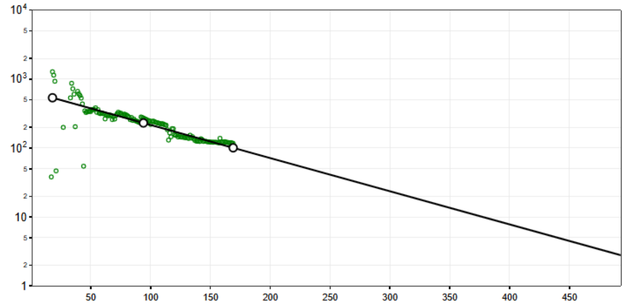
Linear



Linear?
Straight line on a Cartesian plot.

$$y = mx + b$$

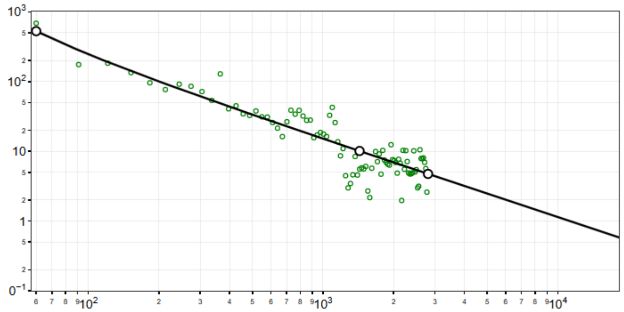
Semi-Log



Exponential?
Straight line on a semi-log plot.

$$y = Ce^{kx}$$

Log-Log



Power-law? Arps?
Straight line on a log-log plot.

$$q_t = q_i \left(1 + bD_i t\right)^{-\frac{1}{b}}$$

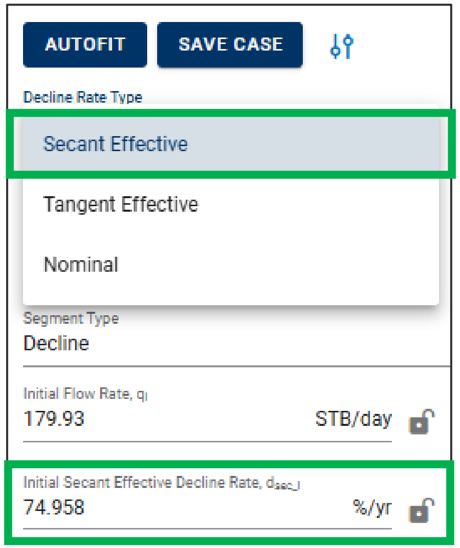
assume $bD_i t >> 1$

$$q_t \approx q_i \left(bD_i t\right)^{-\frac{1}{b}}$$

DCA: Decline Rate Type

$$q(t) = q_i(1 + ba_i t)^{-1/b}$$

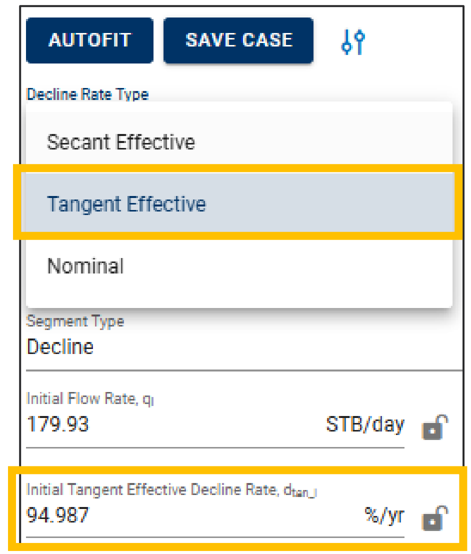
Secant Effective



$$d_{sec} = 100(1 - (a_i b + 1)^{-1/b})$$

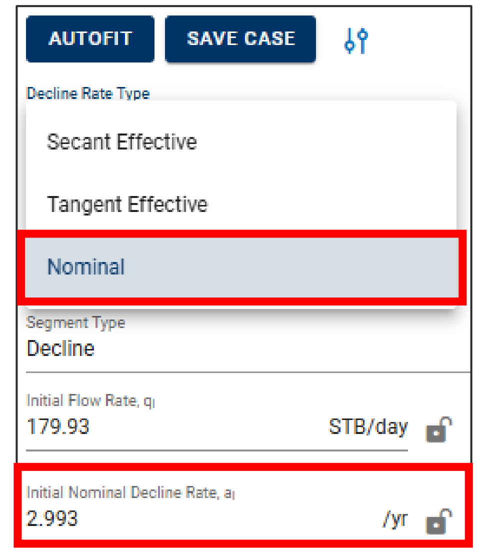
Default in whitson+

Tangent Effective



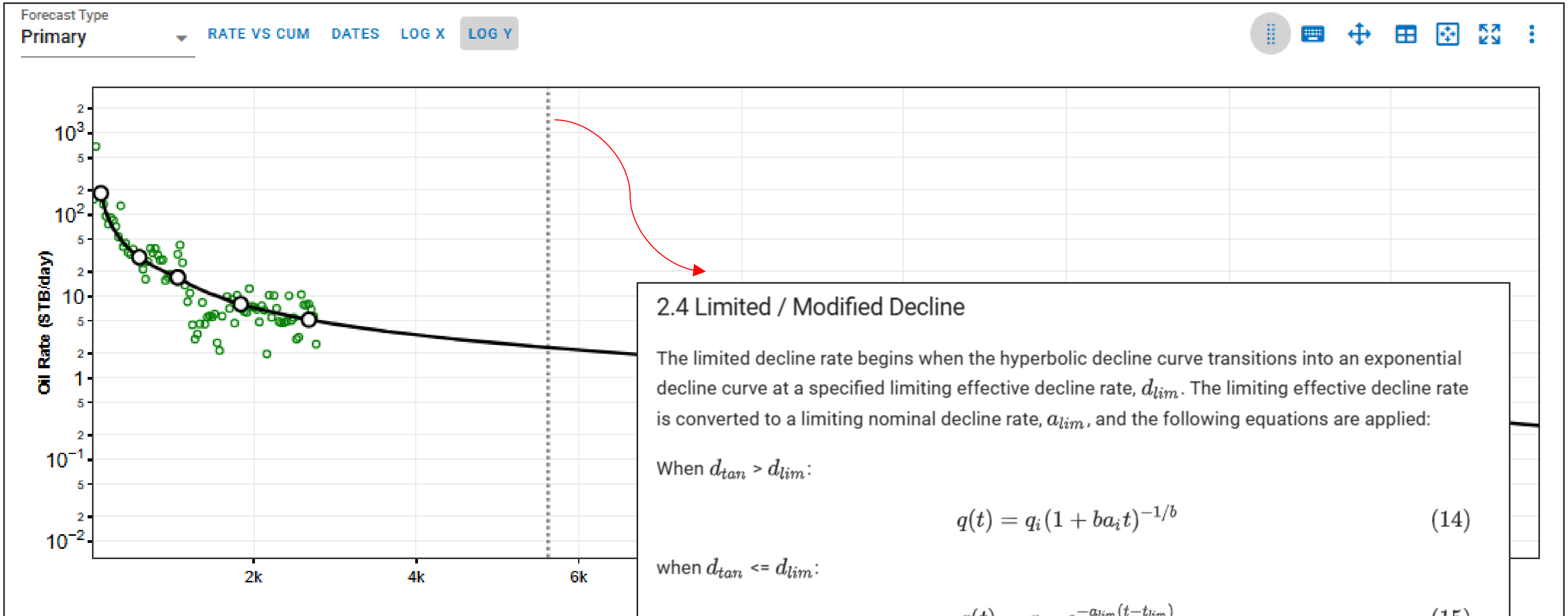
$$d_{tan} = 100(1 - e^{-a_i})$$

Nominal



$$a_i$$

DCA: Limiting Decline Rate



2.4 Limited / Modified Decline

The limited decline rate begins when the hyperbolic decline curve transitions into an exponential decline curve at a specified limiting effective decline rate, d_{lim}. The limiting effective decline rate is converted to a limiting nominal decline rate, a_{lim}, and the following equations are applied:

When $d_{tan} > d_{lim}$:

$$q(t) = q_i(1 + ba_i t)^{-1/b} \tag{14}$$

when $d_{tan} <= d_{lim}$:

$$q(t) = q_{lim}\, e^{-a_{lim}(t - t_{lim})} \tag{15}$$

where

$$q_{lim} = q_i \frac{q_i}{q_{lim}}^{1/b} \tag{16}$$

$$t_{lim} = \frac{\frac{q_i}{q_{lim}}^{b} - 1}{ba_i} \tag{17}$$

DCA: Hotkeys

whitson
Field
Forecasts in whitson
Project
Type Well
Well
HALEY 9-13-9 4H
Scenarios
Main
HOTKEYS
DCA
Perform autofit
Alt + Enter
Save case
Ctrl + s
Plot Navigation
Shift entire DCA segment
Alt + Drag
Zoom
Click + Drag
Reset zoom
Double Click
General Navigation
Switch well
PgUp/PgDn
Cycle to next phase
Shift + s
Change phase
Shift + O/G/W
OIL
GAS
WATER
AUTOFIT
SAVE CASE
EXPORT
Decline Rate Type
Secant Effective
Remaining Reserves (RRo)
21.15 MSTB
EURo
112.52 MSTB
Np
91.37 MSTB
DCA Segments
ADD SEGMENT
Segment 1
Segment 2
Link to Previous Segment
Segment Type
Decline
Initial Flow Rate, qi
17.09 STB/day
Final Flow Rate, qf
4.47 STB/day
Secant Effective Decline Rate, dsec
51.293 %/yr
Rate Exponent, b
2
Start Day
1067
End Day
2617
Start date (mm/dd/yyyy)
02/01/2018
End date (mm/dd/yyyy)
05/01/2022
Forecast
Total Production Period
50 yrs
Limiting Secant Effective Decline Rate, dsec_lim
6 %/yr
Oil cutoff rate
STB/day
Forecast End Date
02/17/2065
Saved Cases
IMPORT TYPE WELL
VIEW CASES
Name
Updated By
Date
EUR (MSTB)
Show
Color
Forecast Type
Primary
RATE VS CUM
DATES
LOG X
LOG Y
Oil Rate (STB/day)
Time (days)
Secondary Plot
All streams
LOG Y1
USE CUM
GOR
WOR
WGR
OGR
BHP
CHOKE
GAS LIFT
Oil
Gas
Oil Forecast
Gas Forecast
HALEY 9-13-9 4H | 35017246700000 | DEVON ENERGY PRODUCTION CO LP | 4672 ft | 2526.97 lbs/ft | 49.42 STB/ft
CUMp | RR | EUR | EUR/ft (MSTB & MMscf): 91.37 | 21.15 | 112.52 | 24.08 4623.08 | 3685.34 | 8308.42 | 1778.34
b | dsec: 2.000 | 51.293% 1.346 | 67.619%
Errorrate | Errorcum: 0.60% | 0.35% 0.51% | 2.44%
qo (STB/day) | qg (Mscf/day)

Ratio Forecasting: Power-Law

Given Arps Hyperbolic functions for oil rate and gas rate, we take the late-time asymptotic form where $D_i bt \gg 1$ and simplify to a PowerLaw function.

$$q_o = q_{i,0}\left(1 + D_{i,o}b_{i,o}t\right)^{-\frac{1}{b_{i,o}}} = \frac{q_{i,o}\left(D_{i,o}b_{i,o}\right)^{-\frac{1}{b_{i,o}}}}{t^{\frac{1}{b_{i,o}}}} = \frac{\alpha_o}{t^{\frac{1}{b_{i,o}}}}$$

$$q_g = q_{i,g}\left(1 + D_{i,g}b_{i,g}t\right)^{-\frac{1}{b_{i,g}}} = \frac{\alpha_g}{t^{\frac{1}{b_{i,g}}}}$$

We can then compute GOR as the ratio of the two simplified functions:

$$GOR = \frac{q_g}{q_o} = \frac{\alpha_g}{\alpha_o}\frac{t^{\frac{1}{b_{i,o}}}}{t^{\frac{1}{b_{i,g}}}} = \frac{\alpha_g}{\alpha_o}t^{\frac{1}{b_{i,o}}-\frac{1}{b_{i,g}}}$$

Noting that the Power Law slope $n = -\frac{1}{b}$:

$$GOR = \frac{q_g}{q_o} = \frac{\alpha_g}{\alpha_o}\frac{t^{-\frac{1}{b_{i,o}}}}{t^{-\frac{1}{b_{i,g}}}} = \frac{\alpha_g}{\alpha_o}t^{n_o - n_g}$$

Finally, a_o and a_g are constants, so define $c = \frac{a_g}{a_o}$. Define $m = n_o - n_g$:

$$GOR = ct^m$$

We note that this implies:

$$m = \frac{1}{b_{i,o}} - \frac{1}{b_{i,g}}$$

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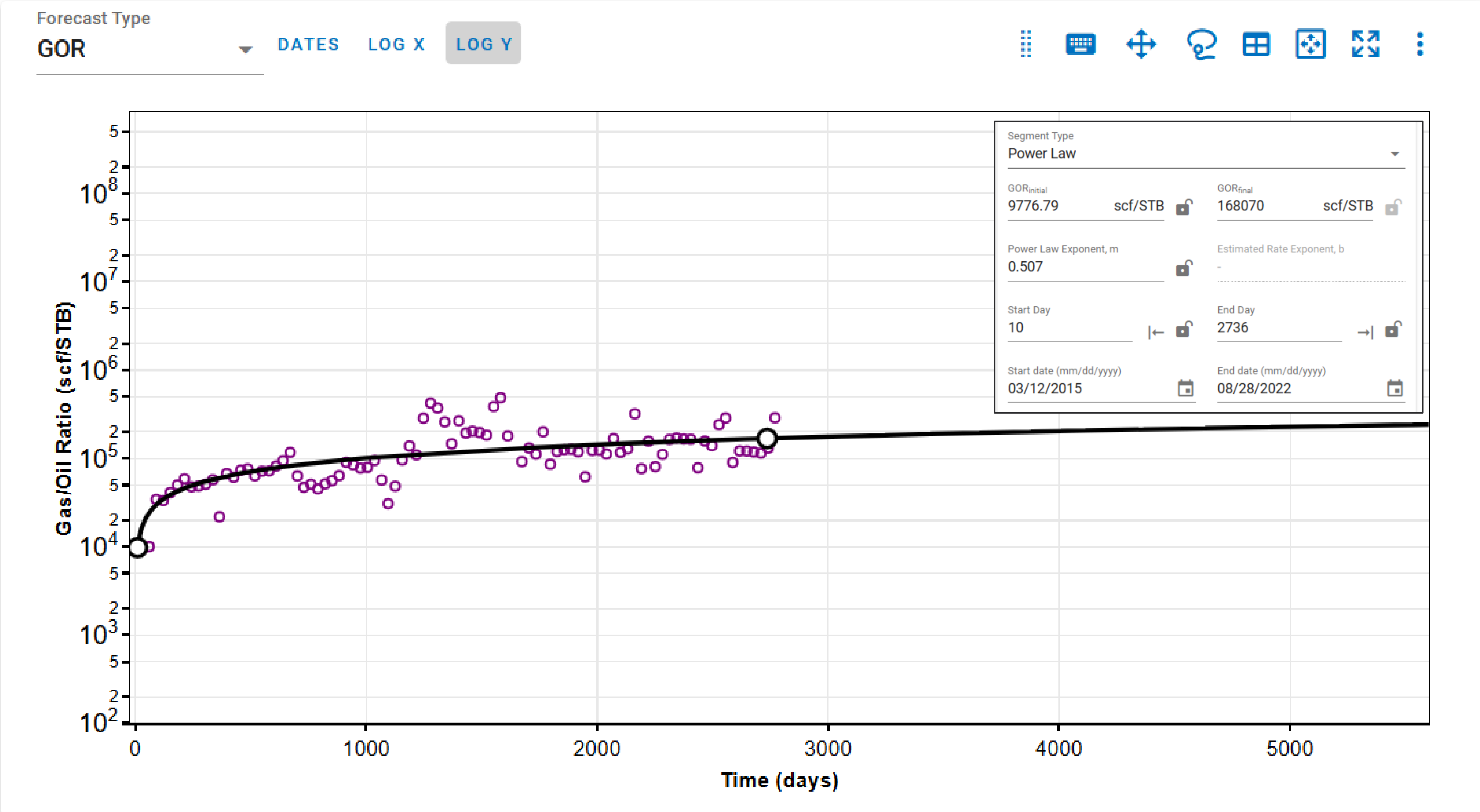
Ratio Forecasting: Power-Law

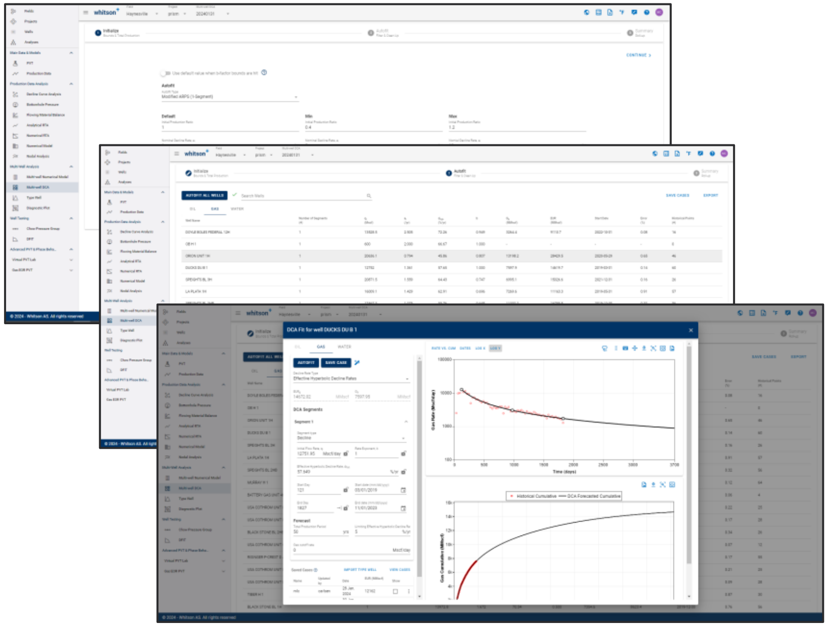


Auto-Forecast

Auto-Forecast: Outline

1. Initialize
2. Autofit, Review & Save
3. Roll-up

Auto-Forecast: Overview



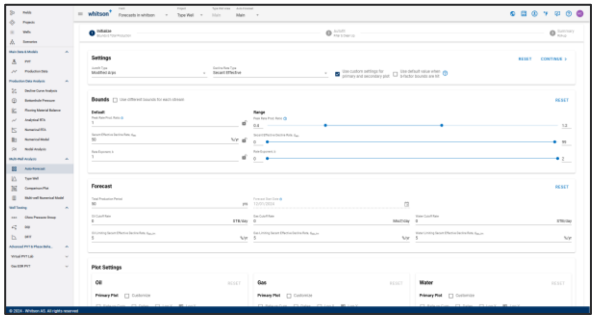
Provide a complementary set of tools and insights that can not be achieved by looking at production history alone.

Used to e.g.

- Characterize uncertainty
- Validate manual forecasts
- Starting point for manual forecasts
- Complete type well datasets with a variable prod history

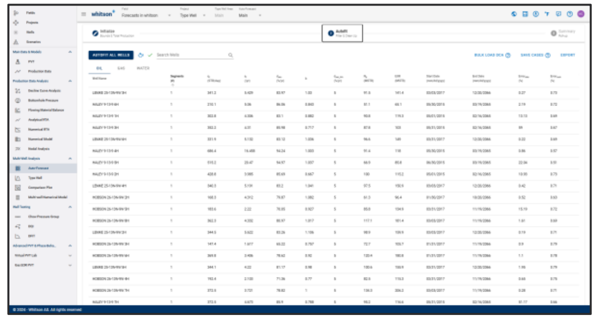
Auto-forecast: Workflow

Initialize



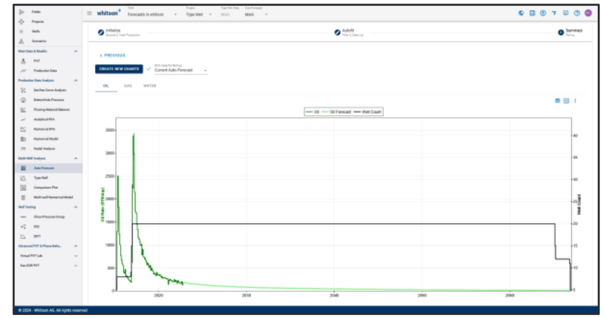
Set up your workflow by defining parameters and forecast settings.

Autofit



Autofit data, review results, save, and export to multiple formats.

Roll-up



Primarily used for data quality checks with visual analysis.

Type Well

Type Well: Outline

1. Why are Type Wells Important?
2. Type Wells vs Type Curves
3. Normalization
4. Condensing Time
5. Survivor Bias
6. Truncation Using Sample Size Cut-ff
7. Forecast the Average vs Average the Forecasts
8. Representing Uncertainty

Why are Type Wells Important?

- Inform production forecasts or economic evaluations
- Scope out plays
- Build understanding of production-influencing factors (e.g. completion parameters, subsurface parameters)
- Reduce risk / uncertainty
- Justify and support multi-million dollar decisions

Clarification: Type Well vs Type Curve

- "Type Wells" are often referred to as "Type Curves".

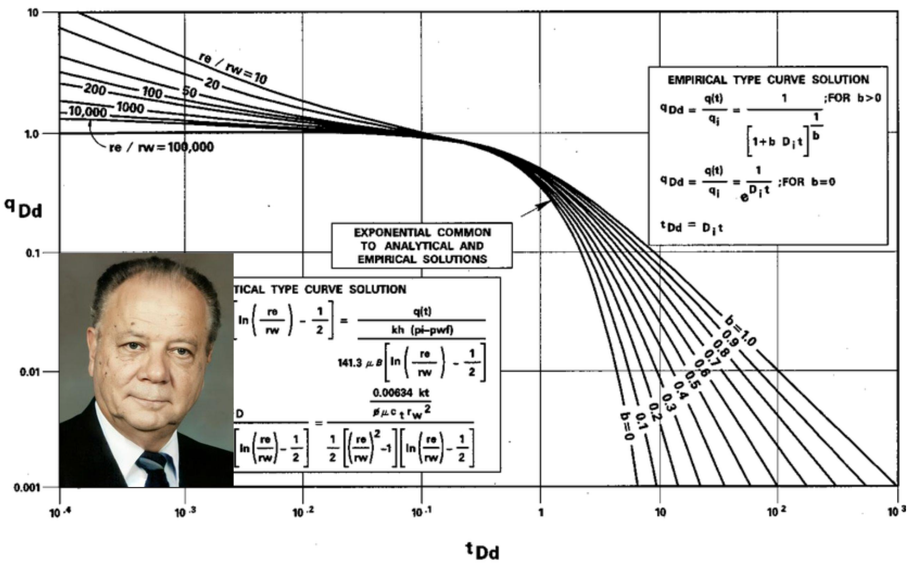
- "Type Curves" refer to idealized production plots (based on equations and/or numerical simulation) to which actual production results are compared.

- "Type Wells" are based on actual well production data and represent a **typical**[1] production profile for a collection of wells for a specified duration.

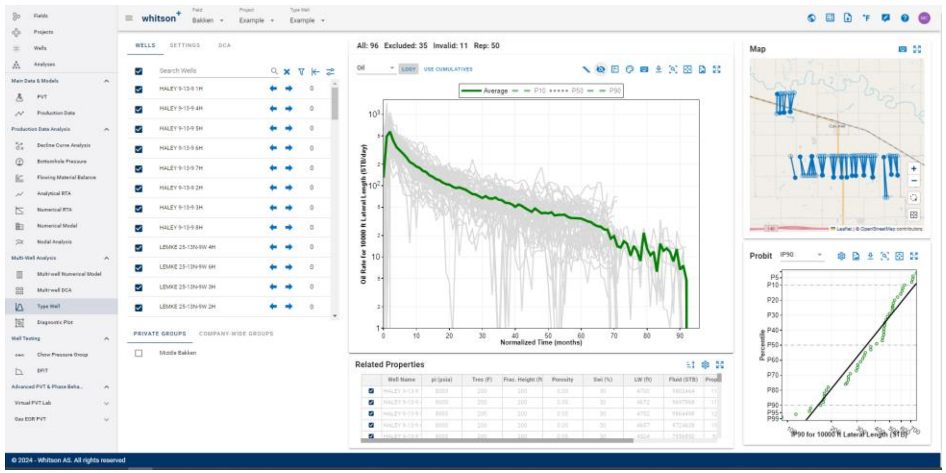
[1] The arithmetic average of a group of wells are commonly applied to estimate a type well. That said, experts (e.g. David Fulford) would argue that P50 is a better choice.

Clarification: Type Curve vs Type Well

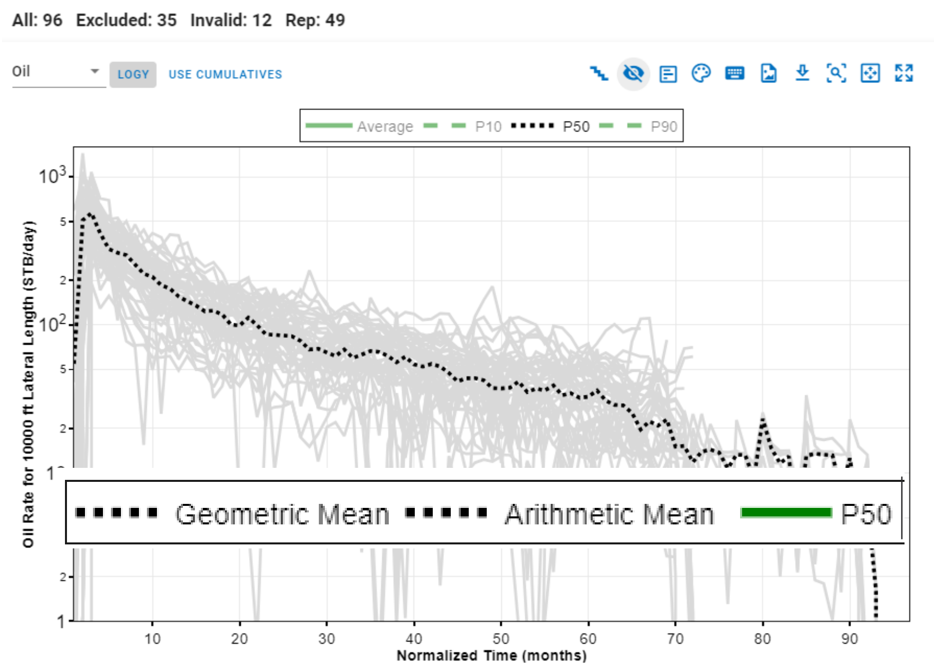
Type Curve



Type Well



Type Well Averaging: Geometric, Arithmetic, P50?

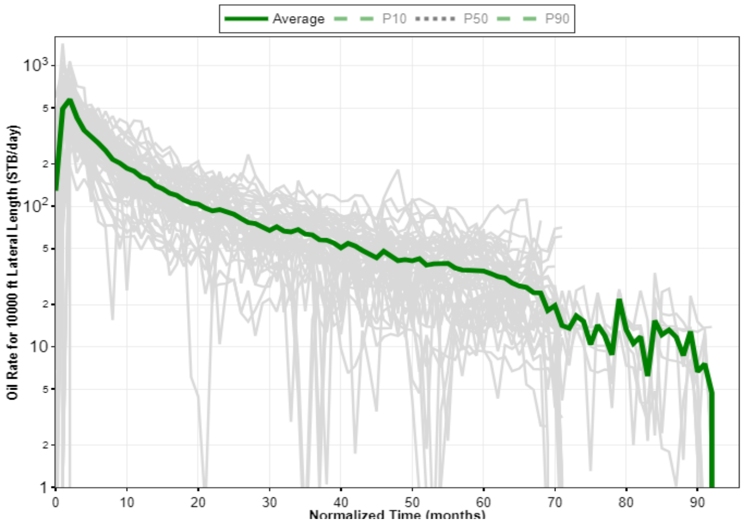


- The **arithmetic mean** is highly biased by outliers and is not reliable to use as a basis for a type well profile nor (by itself) as a diagnostic.
- The **geometric mean** is less biased by outliers, but susceptible to skewness in low values.
- The **P50 (recommended)** presents the least biased representation as it is wholly unaffected by values, only ordering.

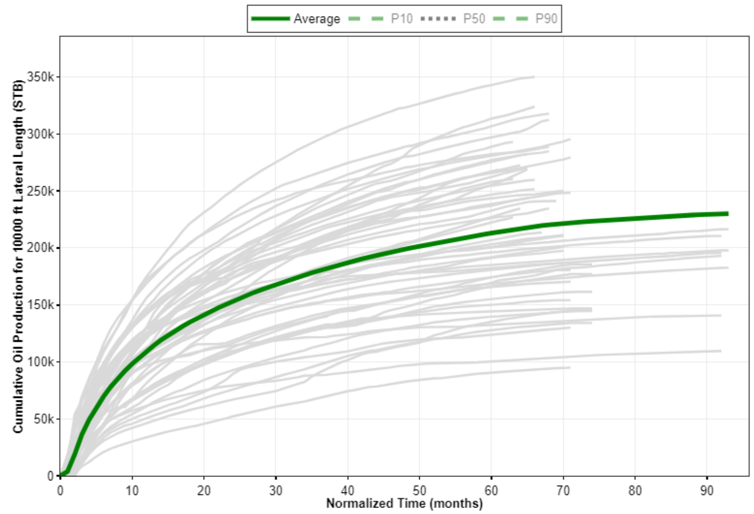
Source: David Fulford

Type Well: Charts

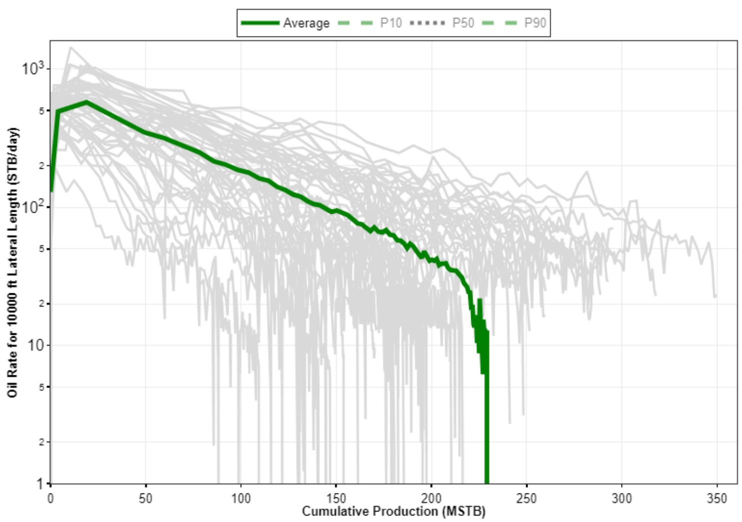
Rate vs Time



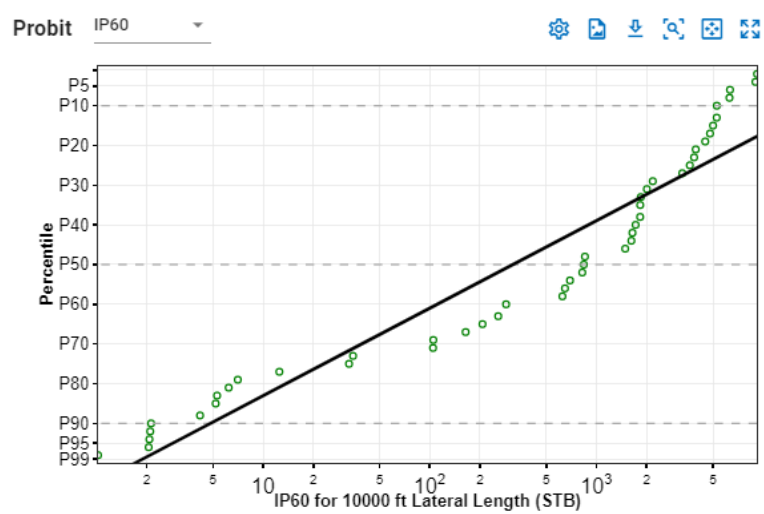
Cum vs Time



Rate vs Cum



Probit



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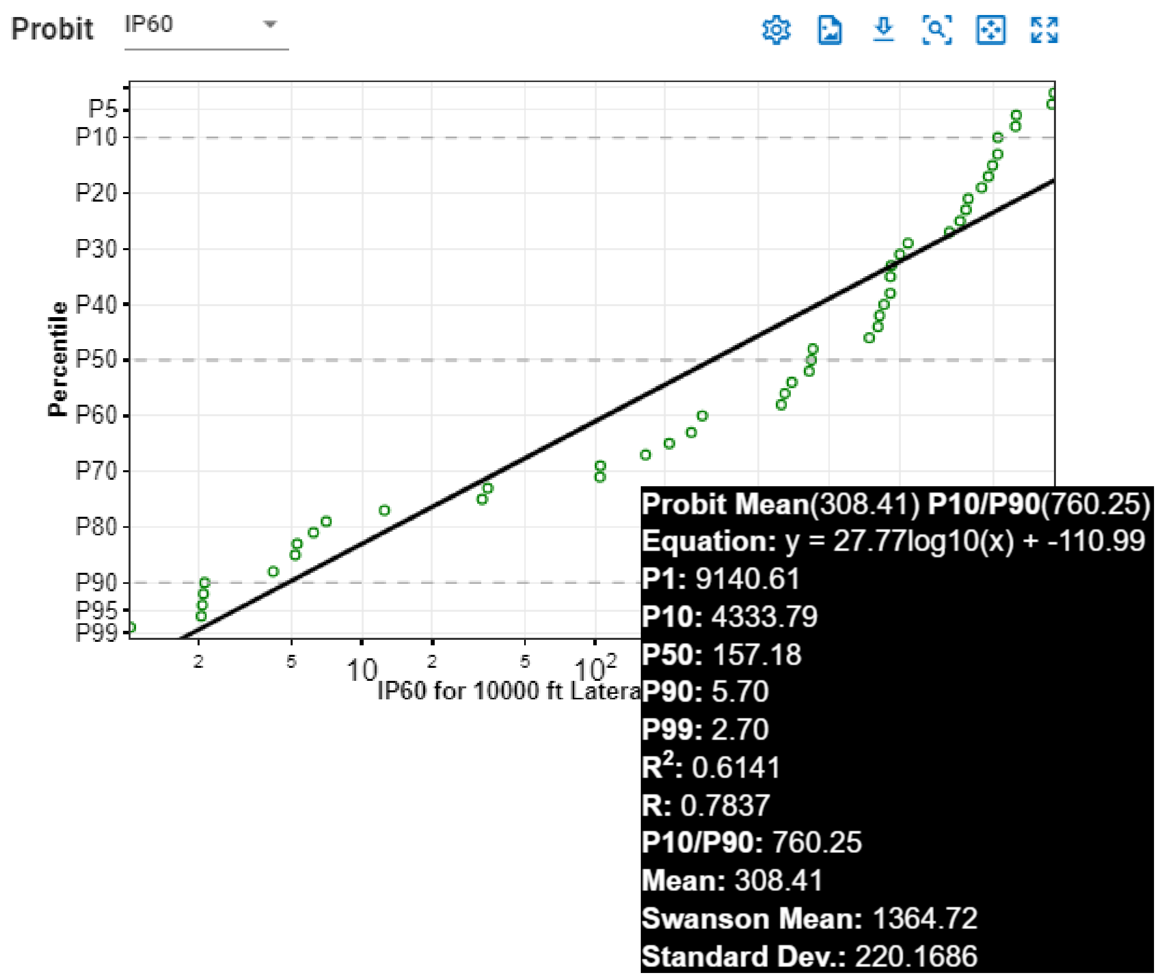
Type Well: Probit



- Represent the statistical distribution of something (e.g. EUR, IP60, physical parameter) at a point in time.
- The shape can help to determine if the results trend towards a lognormal distribution.
- A “probit best fit” regression can yield statistical insights including a measure of uncertainty (e.g. P10/P90 ratio)

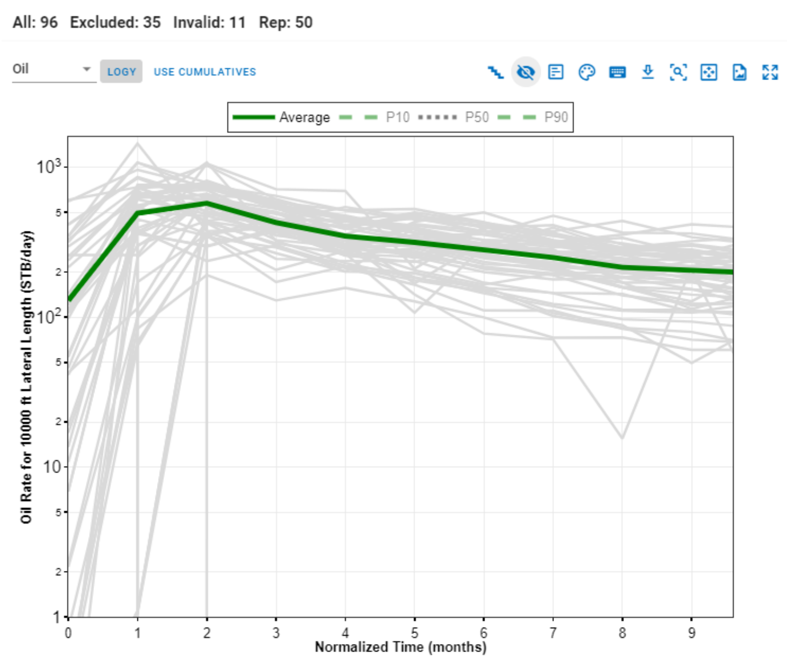
Type Well: Normalization

Normalization restructures data to improve comparability

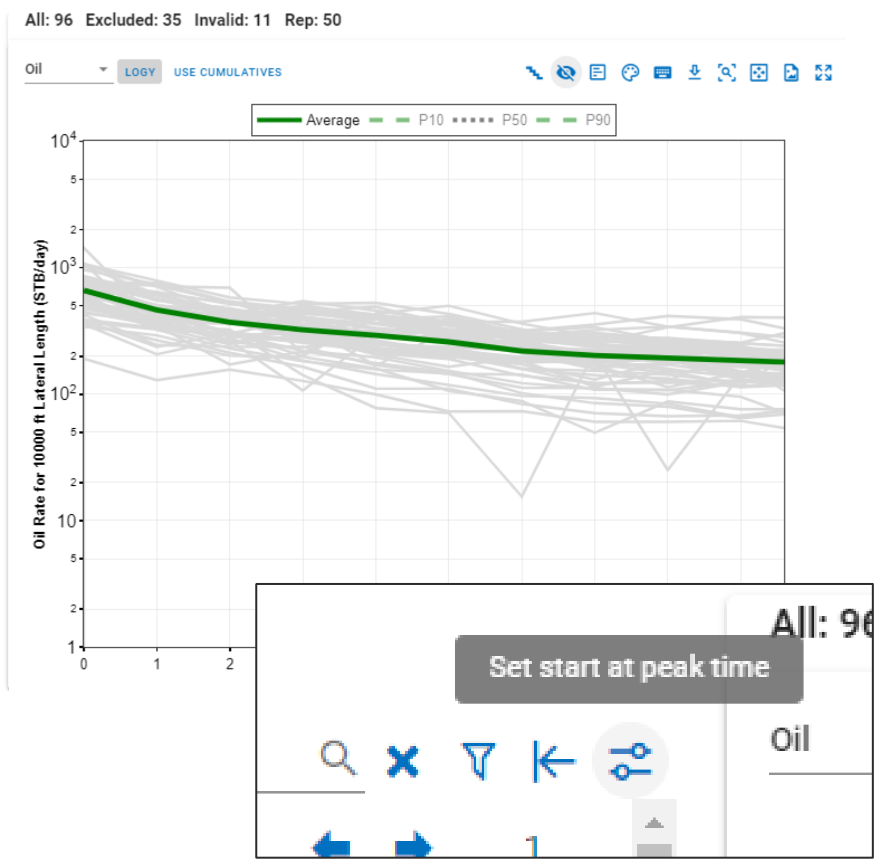
- Time Normalization
  - Alignment to a common date or event
  - Example: first production date or peak rate date
- Dimensional Normalization
  - Scaling production values relative to a well design parameter
  - Example: production/lateral length
- Advanced Normalization
  - E.g. non-linear scaling of laterals
  - Example: a 10,000 ft lateral is 1.8x better than a 5,000 ft

Type Well: Normalization

First Production



Peak Rate



Type Well: Normalization

Time Align on First Production

<u>Strength:</u> on larger well sets, communicates the production profile considering time to peak.

<u>Weakness:</u> may not accurately reflect production decline behavior.

Time Align on Peak Rate Date

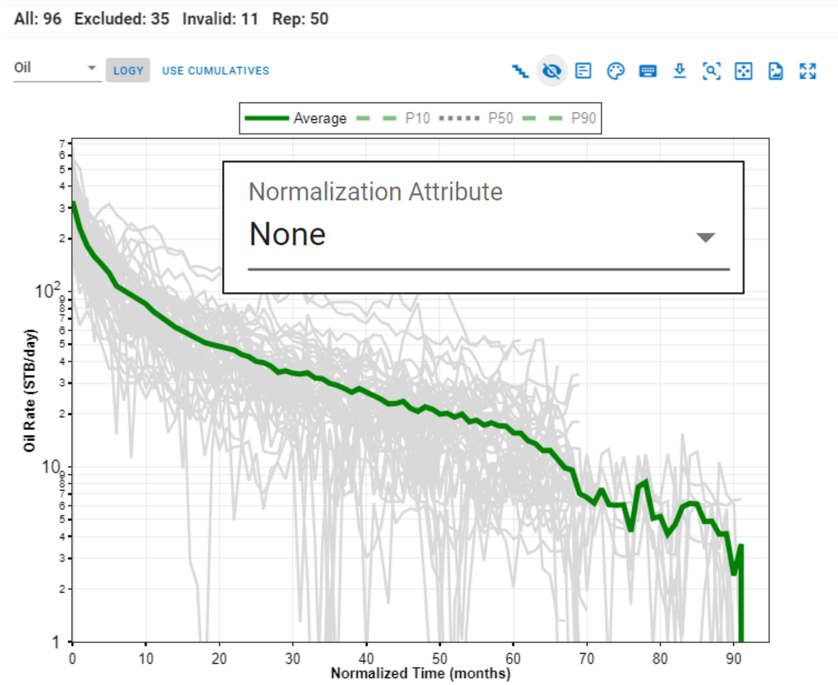
<u>Strength:</u> more accurately reflects production behavior.

<u>Weakness:</u> excludes ramp up time which might have a small impact on EUR but is important to first year revenue projection.

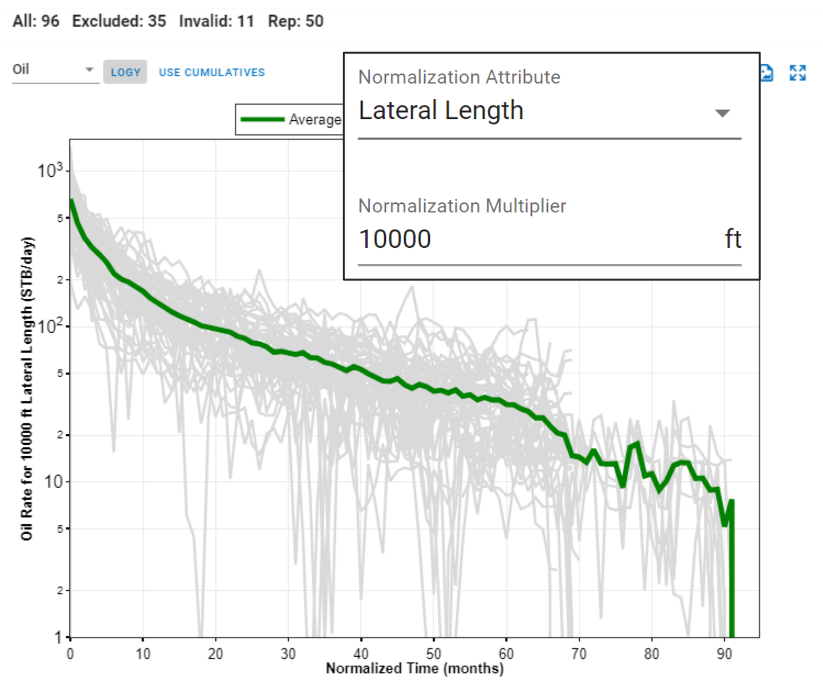
Type Well: Normalization

Dimensional normalization puts wells into a meaningful comparative context.

Not-Normalized



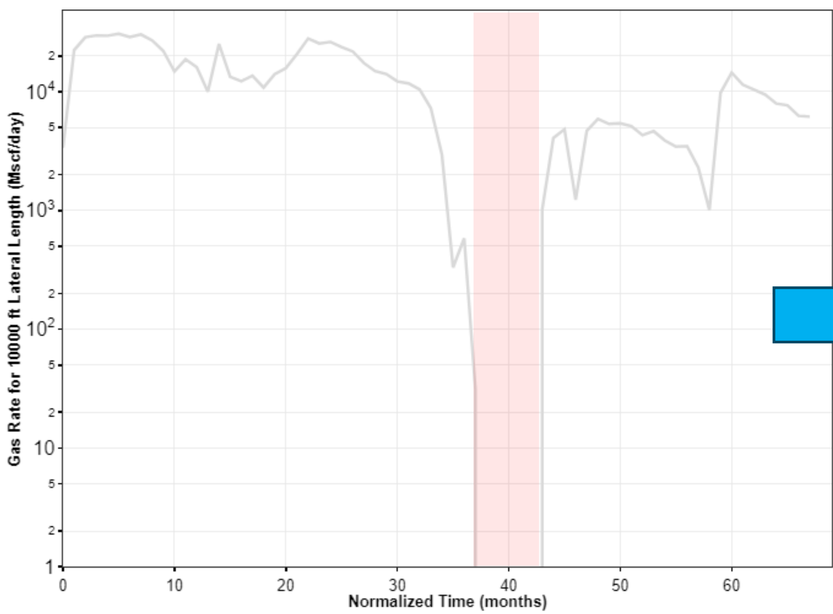
Normalized



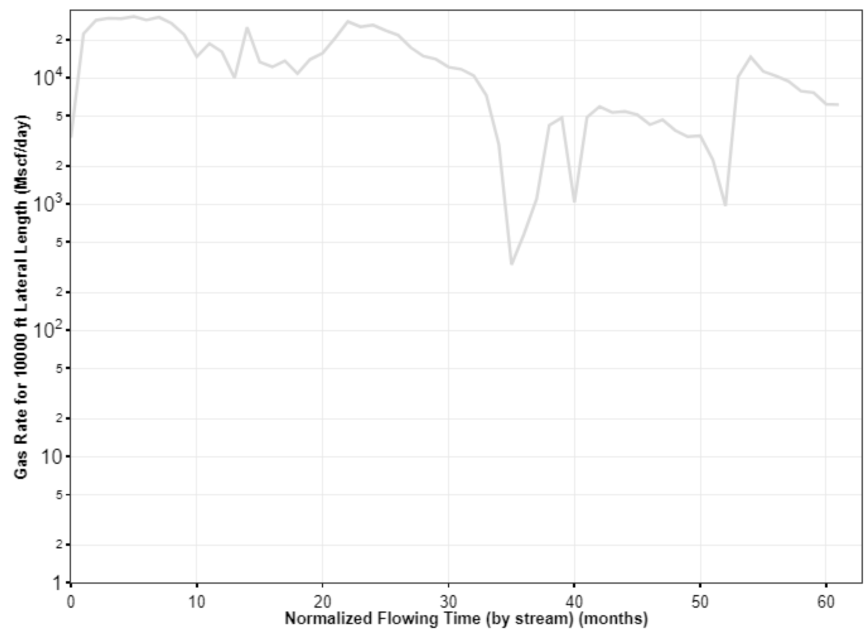
Type Well: Condensing Time

Flowing time only includes producing time steps

Normalized Time

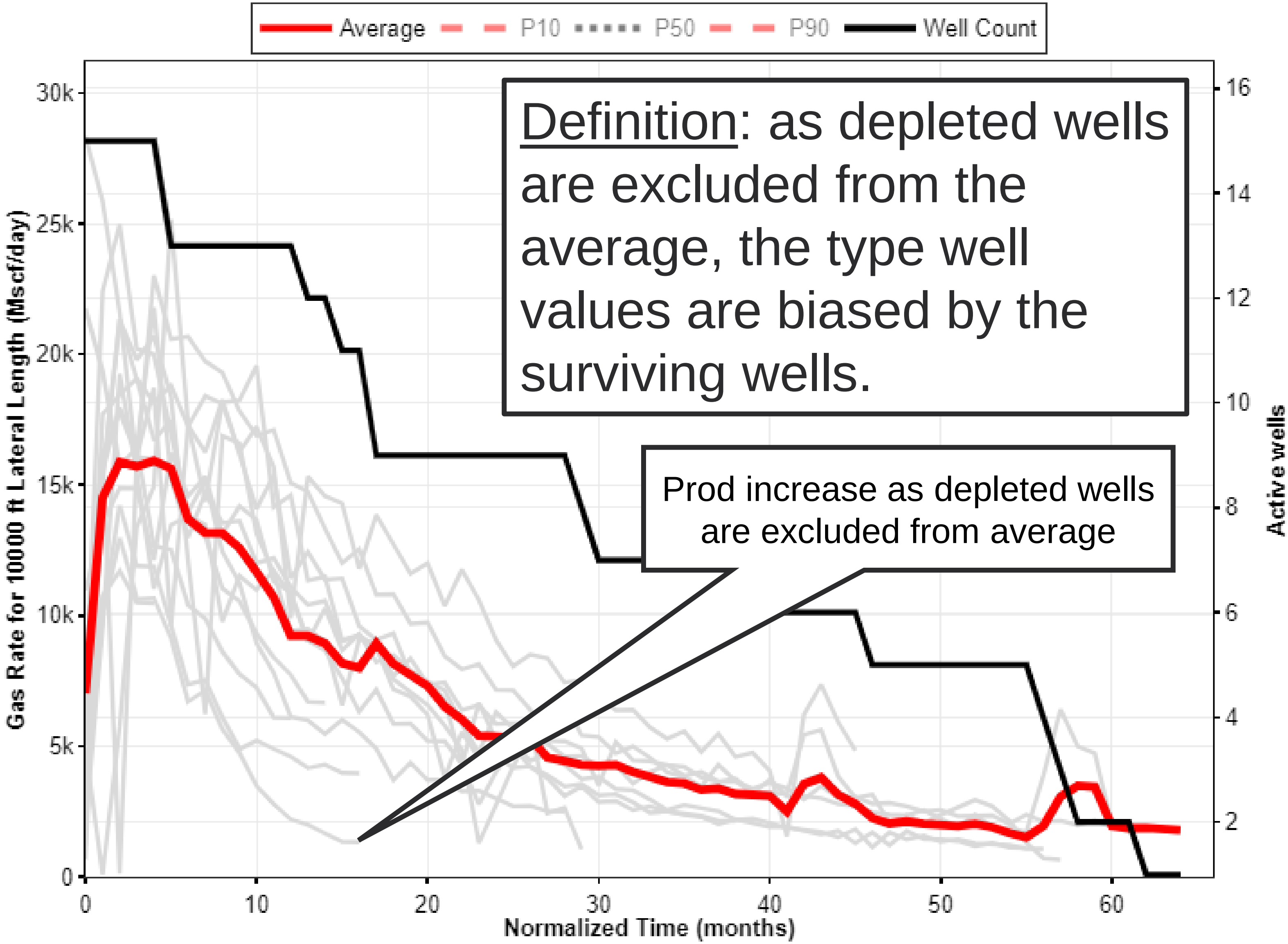


Normalized Flowing Time



Beware of flush production spikes when removing zero production time steps

Type Well: Survivor Bias



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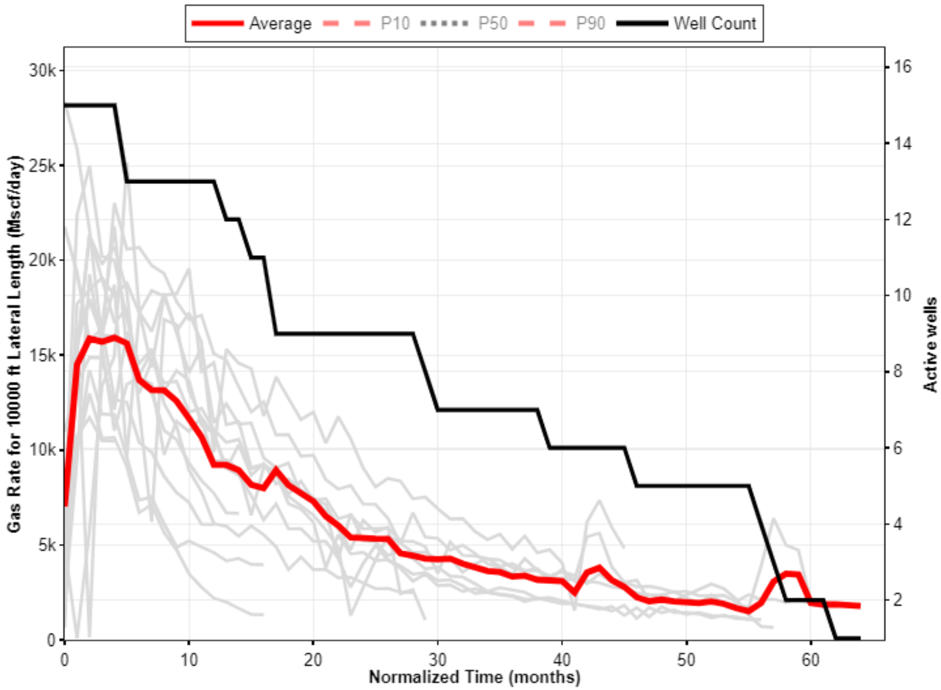
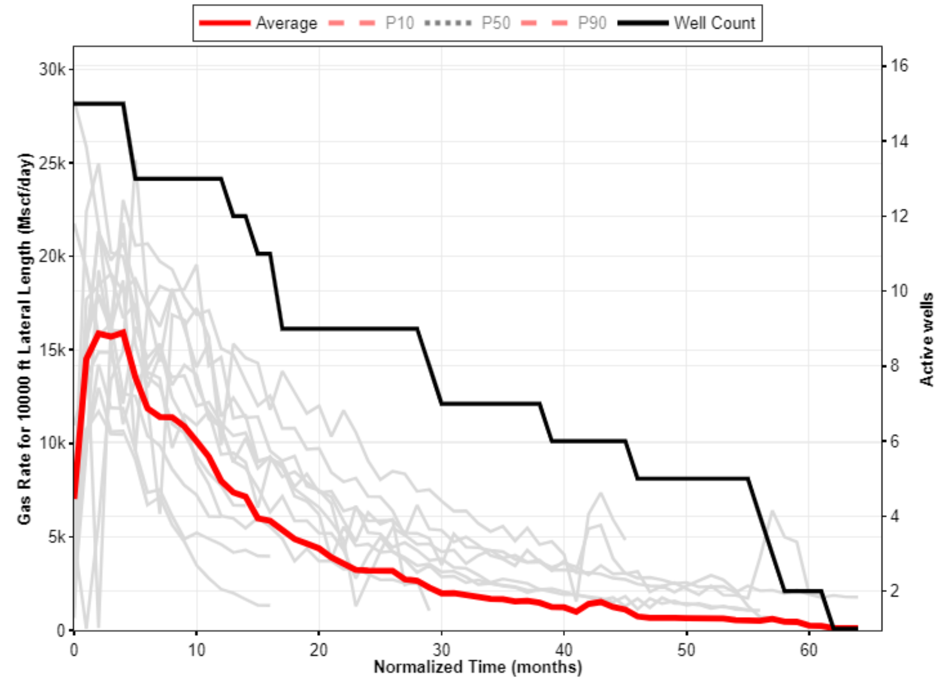
Type Well: Survivor Bias

☑ Include only producing wells in averaging calculation ?



☐ Include only producing wells in averaging calculation ?



Applying survivor bias controls will include zeros in the average for wells after they are identified as depleted (e.g. no production in last 12 months).

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Type Well: Truncation using Cut-offs

- Sample sets with a range of production history will have a late time portion biased by the older wells.
- “Sample size cut-off”: when producing wells contributing to average drops below as specific percentage.
- Common value are: 50% or greater.
- Common to select wells by vintage to ensure contributing wells have a similar amount of production history.

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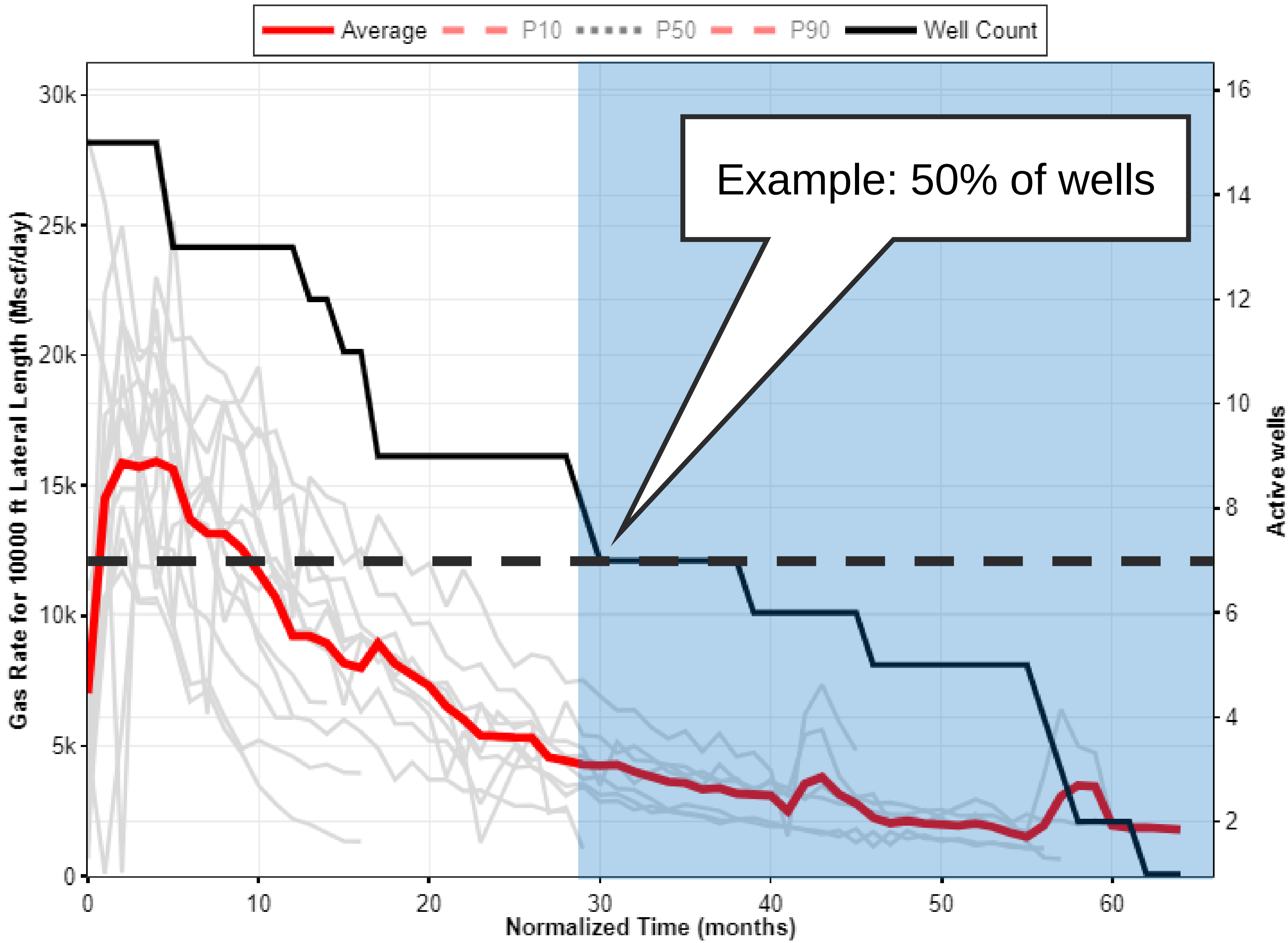
Type Well: Truncation using Cut-offs



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Forecast the Average vs. Average the Forecasts

Forecast the Average

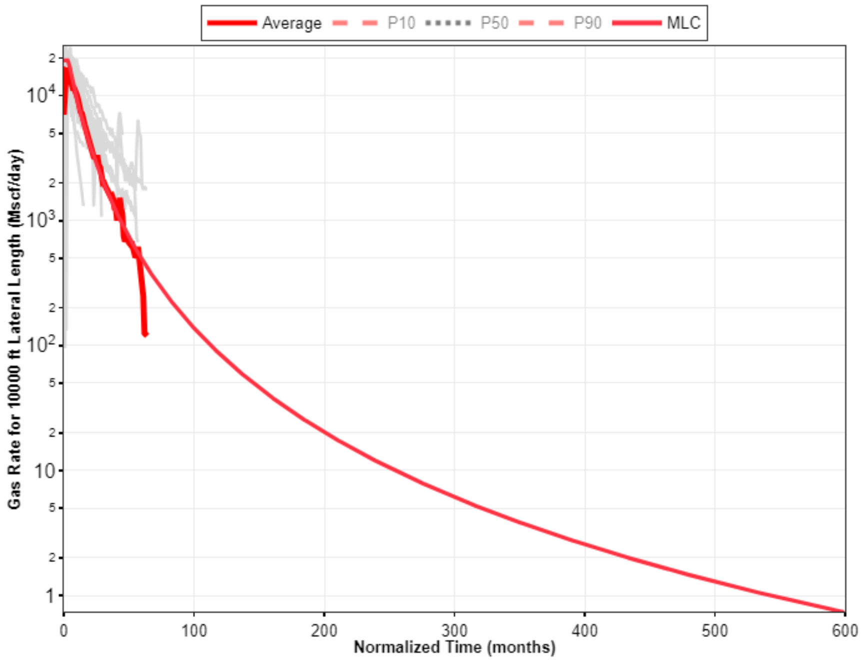
- Apply a decline to the truncated type well to obtain a full life profile of EUR
- Time effective, but does not provide distribution of EURs

Average the Forecasts

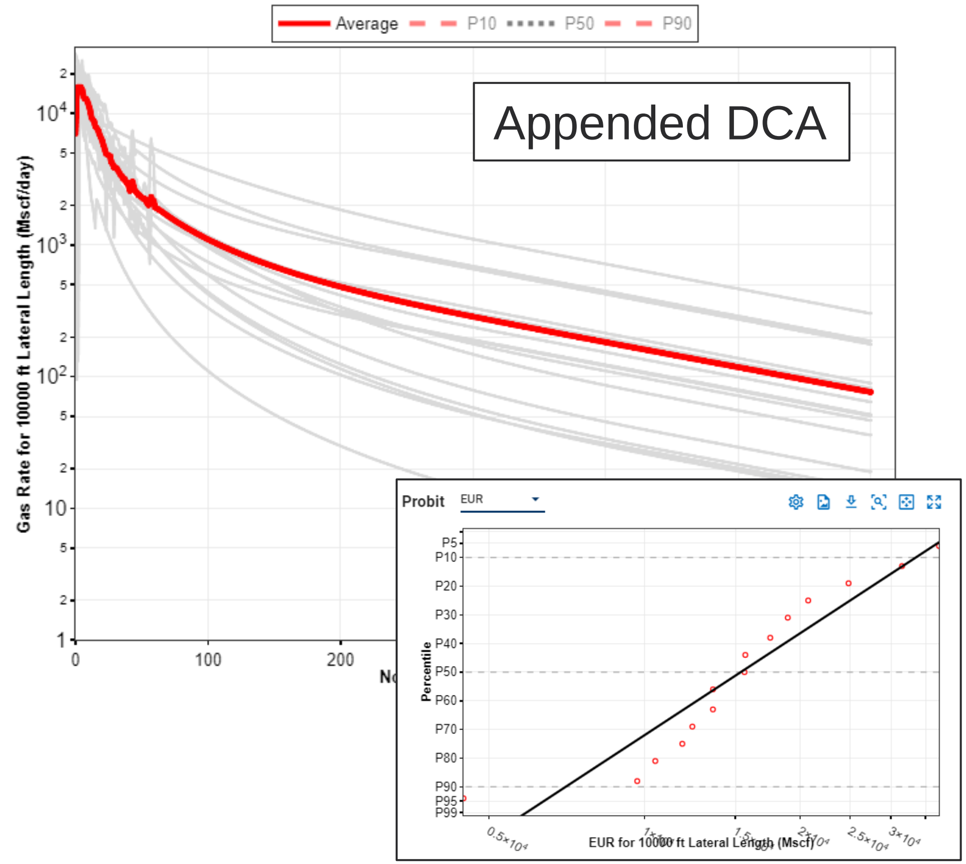
- Time consuming without auto forecast option
- Useful for statistical evaluation and P10/P90 quantification of EUR

Forecast the Average vs. Average the Forecasts

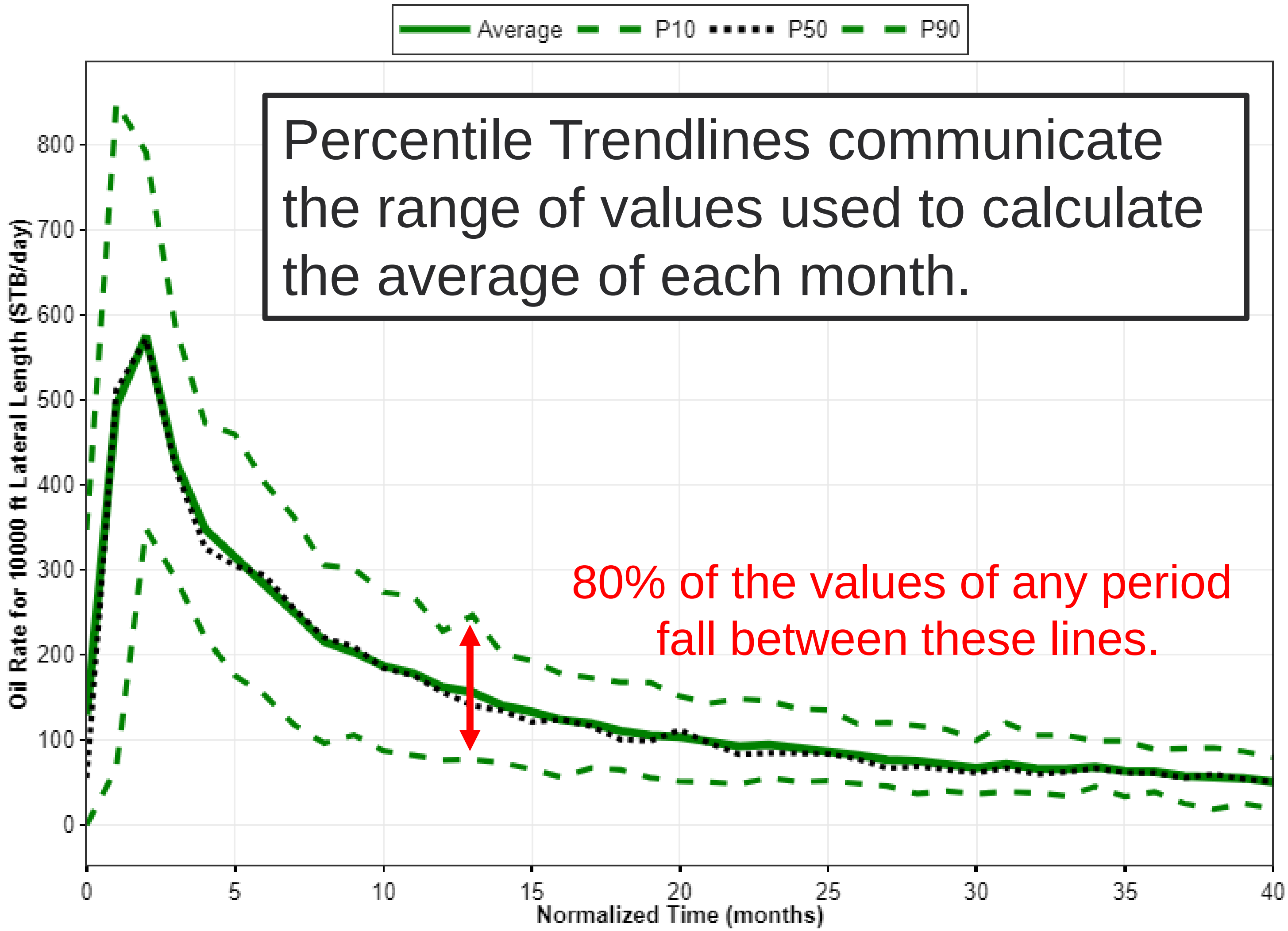
Forecasts the Average



Average the Forecasts



Type Well: Percentile Trendlines



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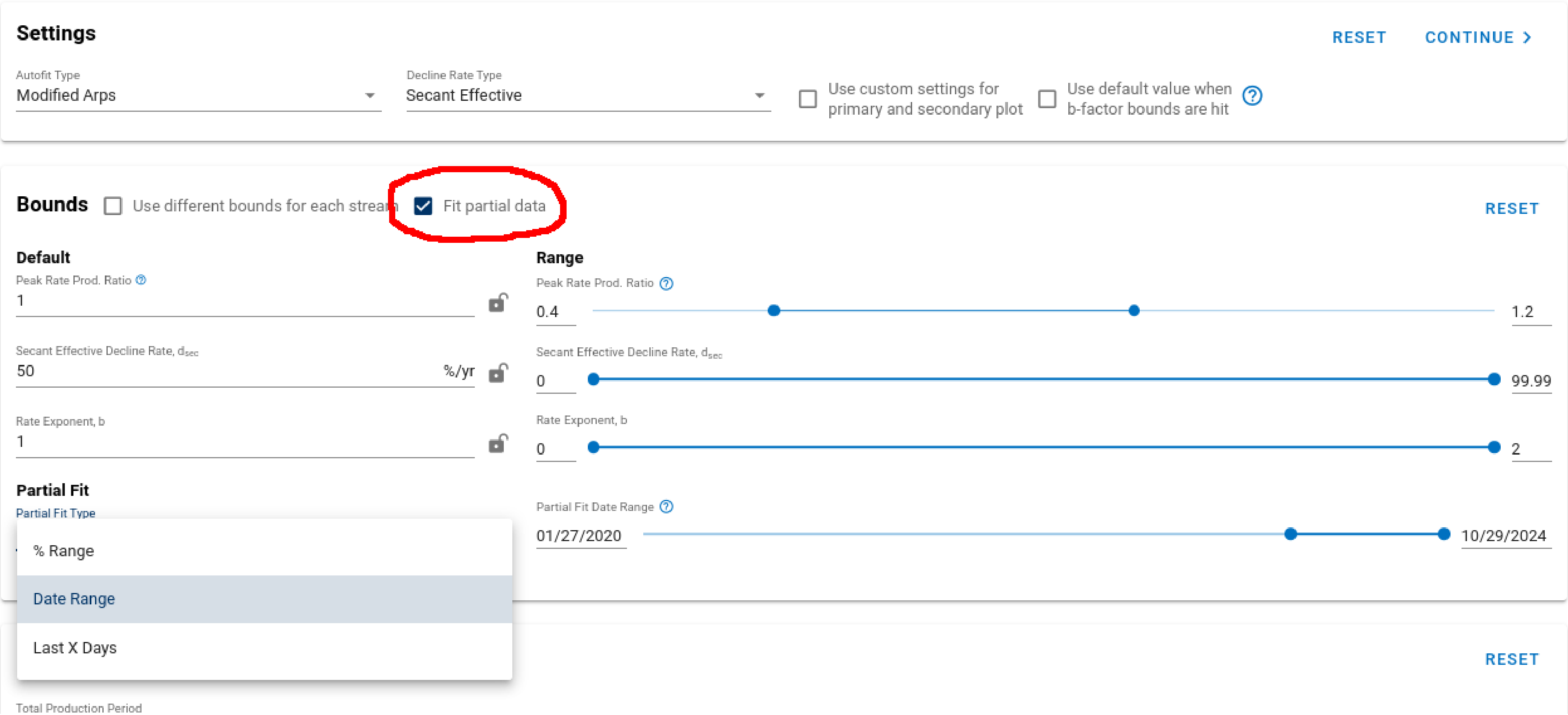
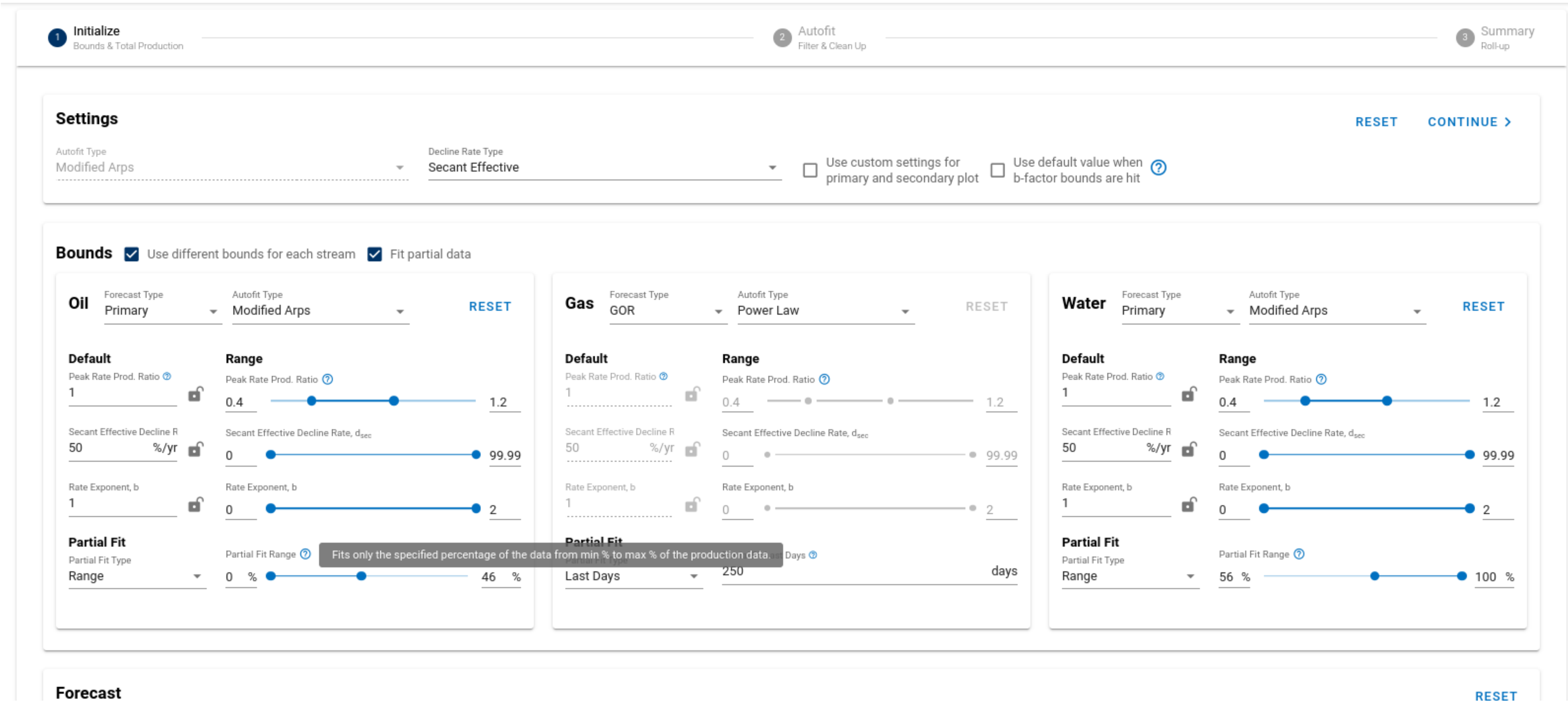
Next Release Preview

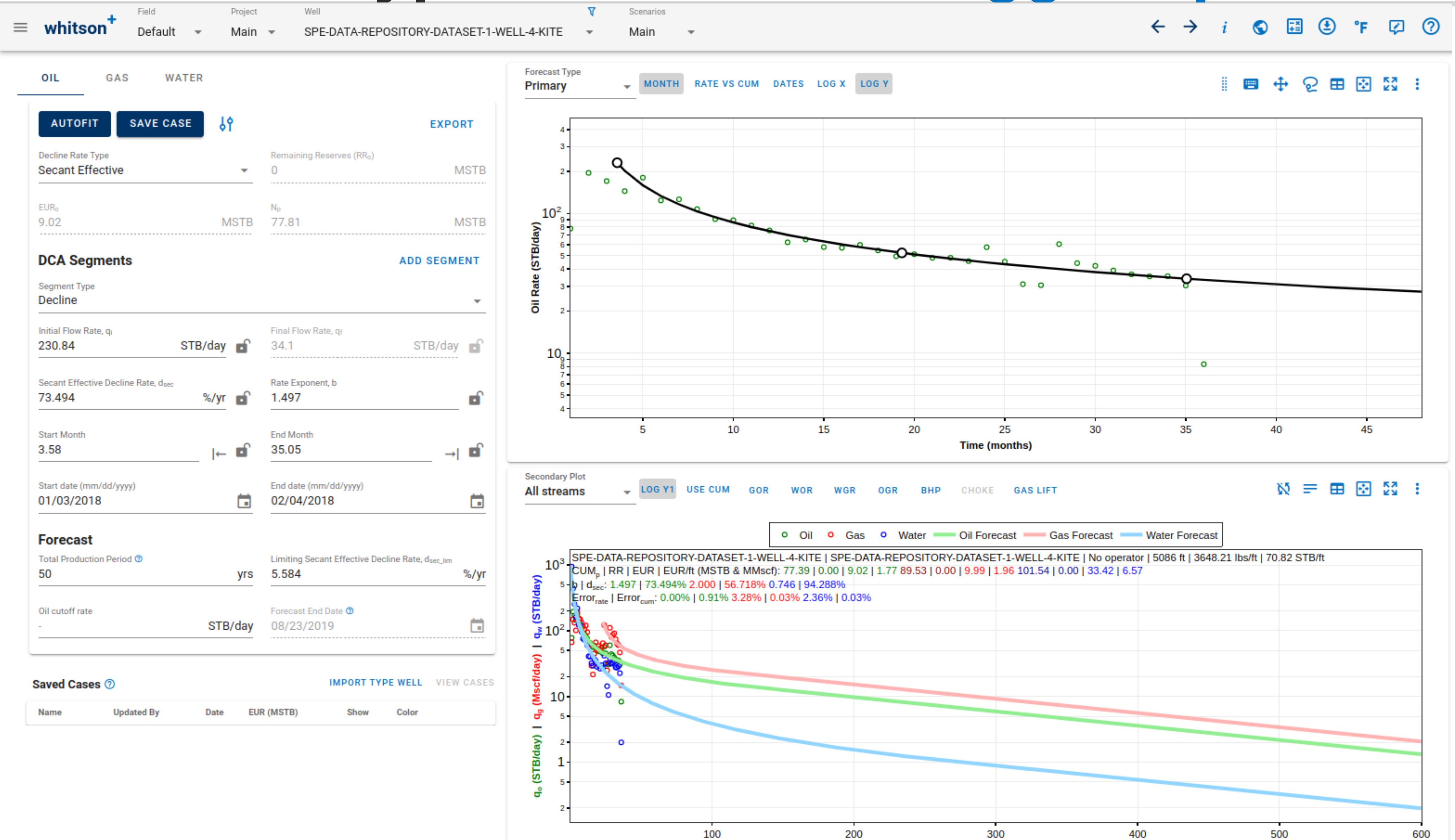
Release Preview: Partial Fit of Data



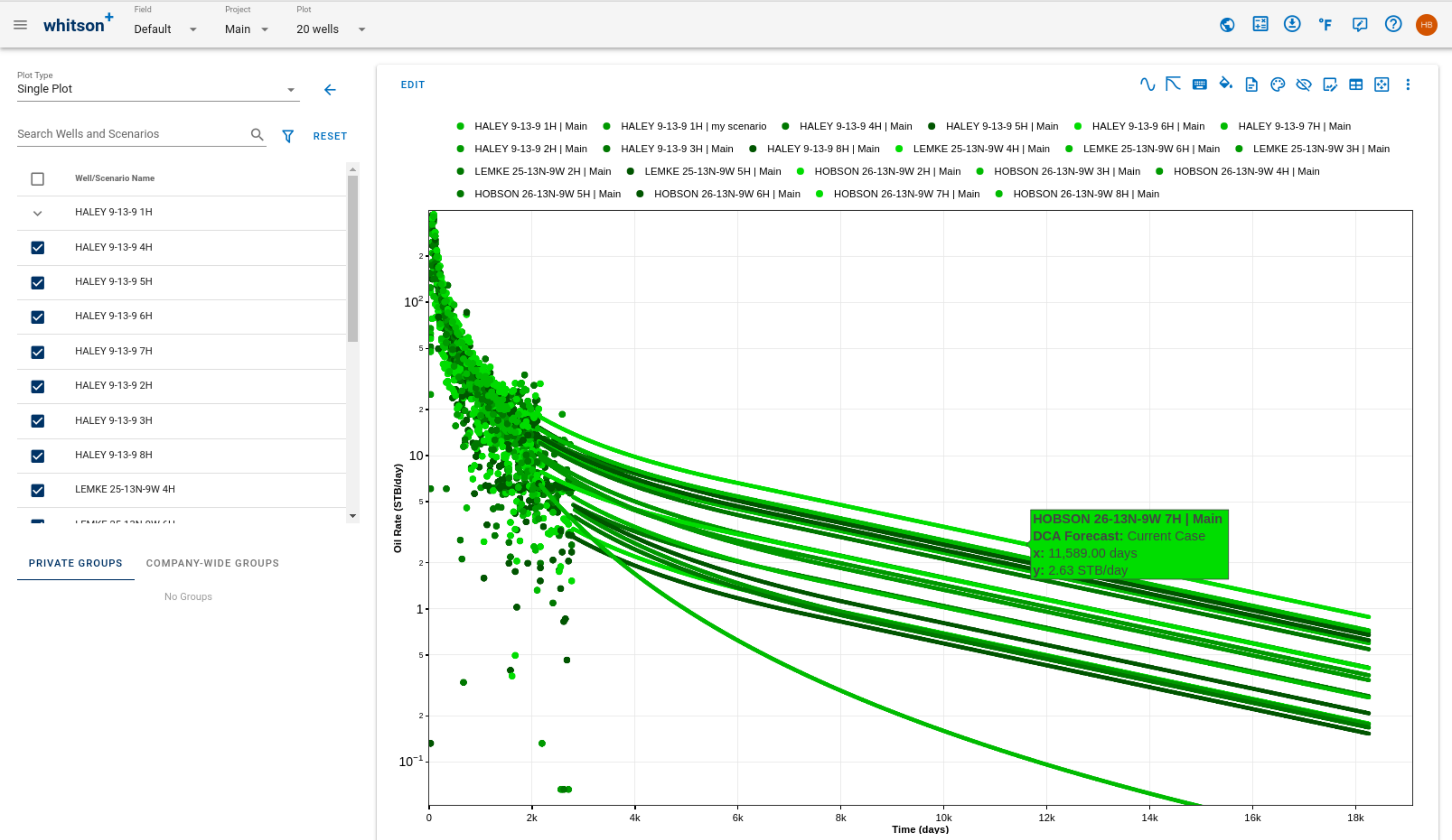
Auto-Forecast: Ratio-Forecast



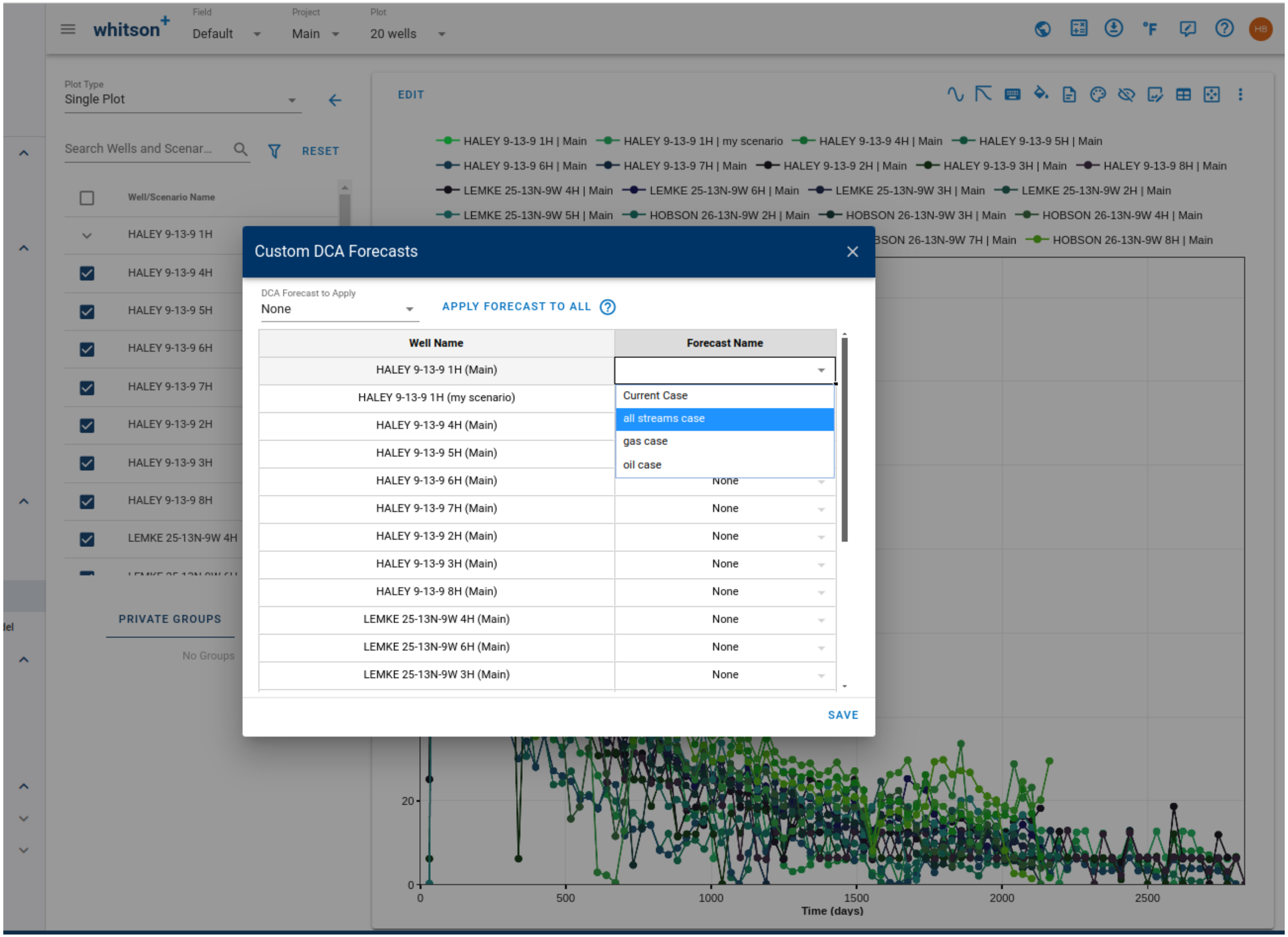
DCA & Type Well: Month Toggle Option



Comparison Plot: Append DCA



Type Well & Comp Plot: Append Mix



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Appendix

Arps Physical Significance

Appendix B: Providing Physical Significance to DCA Parameters

DCA parameters, i.e., q_i, D_i and b, represent underlying, physical parameters. To convince ourselves that this is the case, a single-phase oil well, producing at a constant bottomhole pressure is analyzed. The well is an idealized multi-fractured horizontal well (MFHW), as exemplified in Fig. 1, with negligible production beyond the fracture tips. Linear flow is perpendicular to the fractures. For such a model, there will first be a period of infinite acting flow (IAF). The duration of this period depends on parameters such as permeability and distance to the closest offset fracture. Boundary-dominated flow (BDF) occurs after pressure at the no-flow boundary between fractures declines to less than the initial reservoir pressure. For such a case, the generalized Arps equation **Eq. B1** can be tied to the analytical solutions for both infinite acting and boundary dominated flow periods as presented in **Eqs. B2-B8**.

$$q(t) = q_i(1 + bD_i t)^{-\frac{1}{b}}, \quad \text{(B1)}$$

$$q_i = \begin{cases} \frac{h x_f \sqrt{k}}{31.3 B_o}\sqrt{\frac{\varphi c_t}{\mu_o}}\, p_i - p_{wf} = \frac{LFP\sqrt{\varphi}}{125.2 B_o}\sqrt{\frac{c_t}{\mu_o}}\, p_i - p_{wf}, & t_{elf} < 0 \\ \frac{4 h x_f k}{141.2 B_o}\frac{p_i - p_{wf}}{\mu_o \pi y_e} = \frac{LFP\sqrt{k}}{141.2 B_o}\frac{p_i - p_{wf}}{\mu_o \pi y_e}, & t_{elf} \geq 0 \end{cases}, \quad \text{(B2)}$$

$$D_i(t) = \begin{cases} \frac{1}{2}, & t < t_{elf} \\ \frac{\pi^2}{4}\frac{0.00633k}{y_e^2 \varphi c_t \mu_o}, & t \geq t_{elf} \end{cases}, \quad \text{(B3)}$$

$$b(t) = \begin{cases} 2, & t < t_{elf} \\ 0, & t \geq t_{elf} \end{cases}, \quad \text{(B4)}$$

$$t_{elf} = \frac{y_e^2 \mu \phi c_t}{0.159\text{k}}, \quad \text{(B5)}$$

Decline Curve Analysis (DCA)

Type	Decline Rate	Producing Rate, q	Elapsed Time, t	Cum. Production, Q_t
Exponential	$a_t = ln(\frac{q_i}{q_t})/t$	$q_i e^{-a_i t}$	$ln(\frac{q_i}{q_t})/a_i$	$\frac{q_i - q_t}{a_i}$
Hyperbolic	$\frac{a_i}{a_t} = (\frac{q_i}{q_t})^b$	$q_i(1 + ba_i t)^{-1/b}$	$\frac{(q_i/q_t)^b - 1}{ba_i}$	$\frac{q_i}{a_i(1-b)}(1 - \frac{q_t}{q_i}^{1-b})$
Harmonic	$\frac{a_i}{a_t} = \frac{q_i}{q_t}$	$q_i(1 + a_i t)^{-1}$	$\frac{(q_i - q_t)}{a_i q_t}$	$\frac{q_i}{D_i} ln(\frac{q_i}{q_t})$

More info: https://manual.whitson.com/modules/well-performance/decline-curve-analysis/

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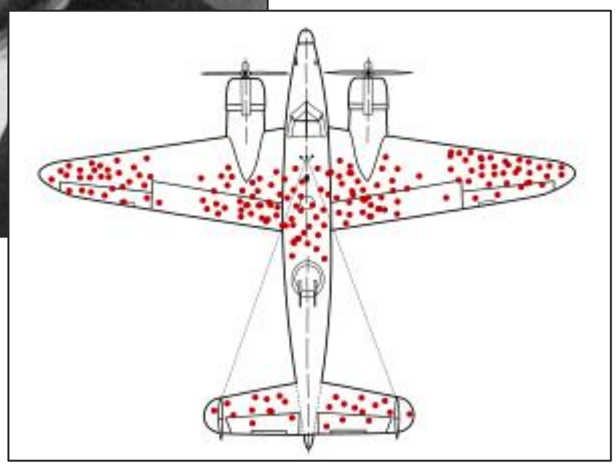
“How does the new well
compare against
the **type well**!?!?”

Type Well: Analogue Selection

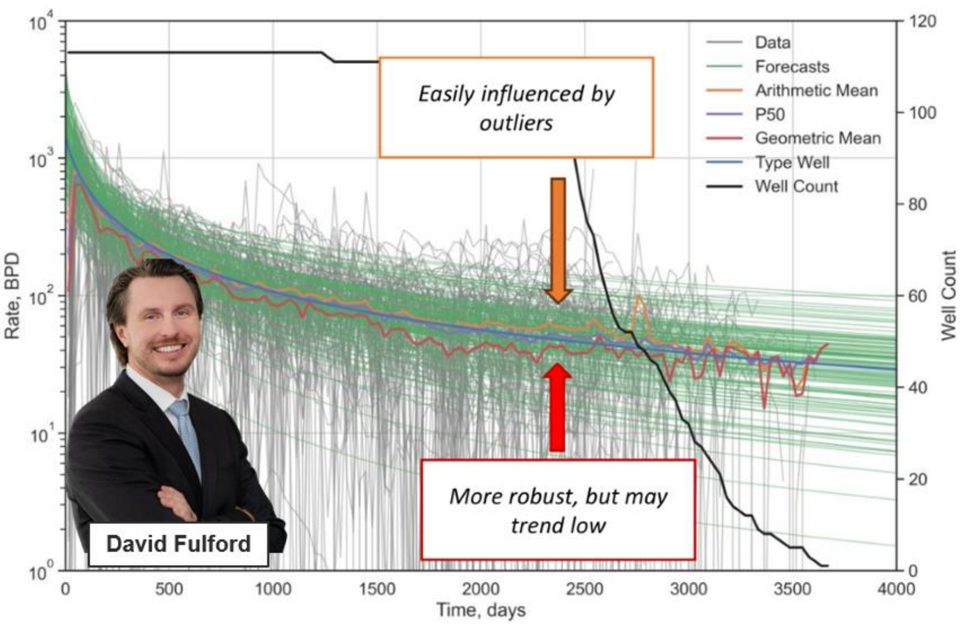
- Analogue wells should have a similarity on which a reasonable comparison may be made and represent the range of possible outcomes (i.e. don't just select the best wells).
- Selecting wells with similar characteristics may reduce the range of uncertainty.
- Common criteria:
    - Geology
    - Reservoir
    - Well Design
    - Well Density
    - Operational Design

Type Well: Survivor Bias



- In WWII, Abraham Wald, a math expert, looked at how to protect bombers from enemy fire.
- He and his team at Columbia University studied damage on returning planes.
- They suggested adding armor where planes had less damage due to survivorship bias.
- Wald advised reinforcing untouched areas, thinking those were at higher risk.

Type Well Averaging Diagnostic



- David Fulford has proposed a new diagnostic.
- The deviation of the arithmetic and geometric means from the P50 indicates data stability issues.
- Stable periods of history should be relied upon more than unstable periods of history.

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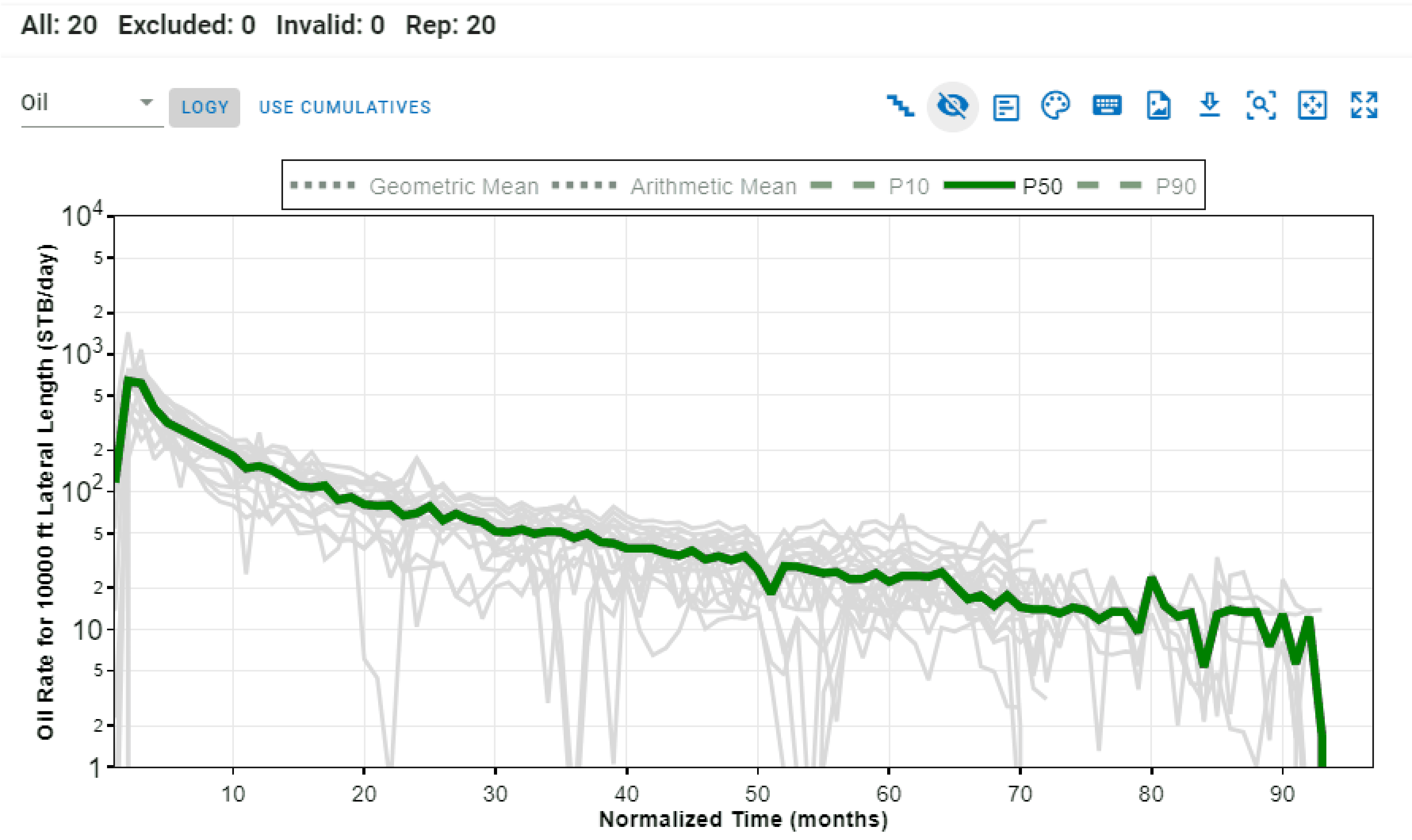
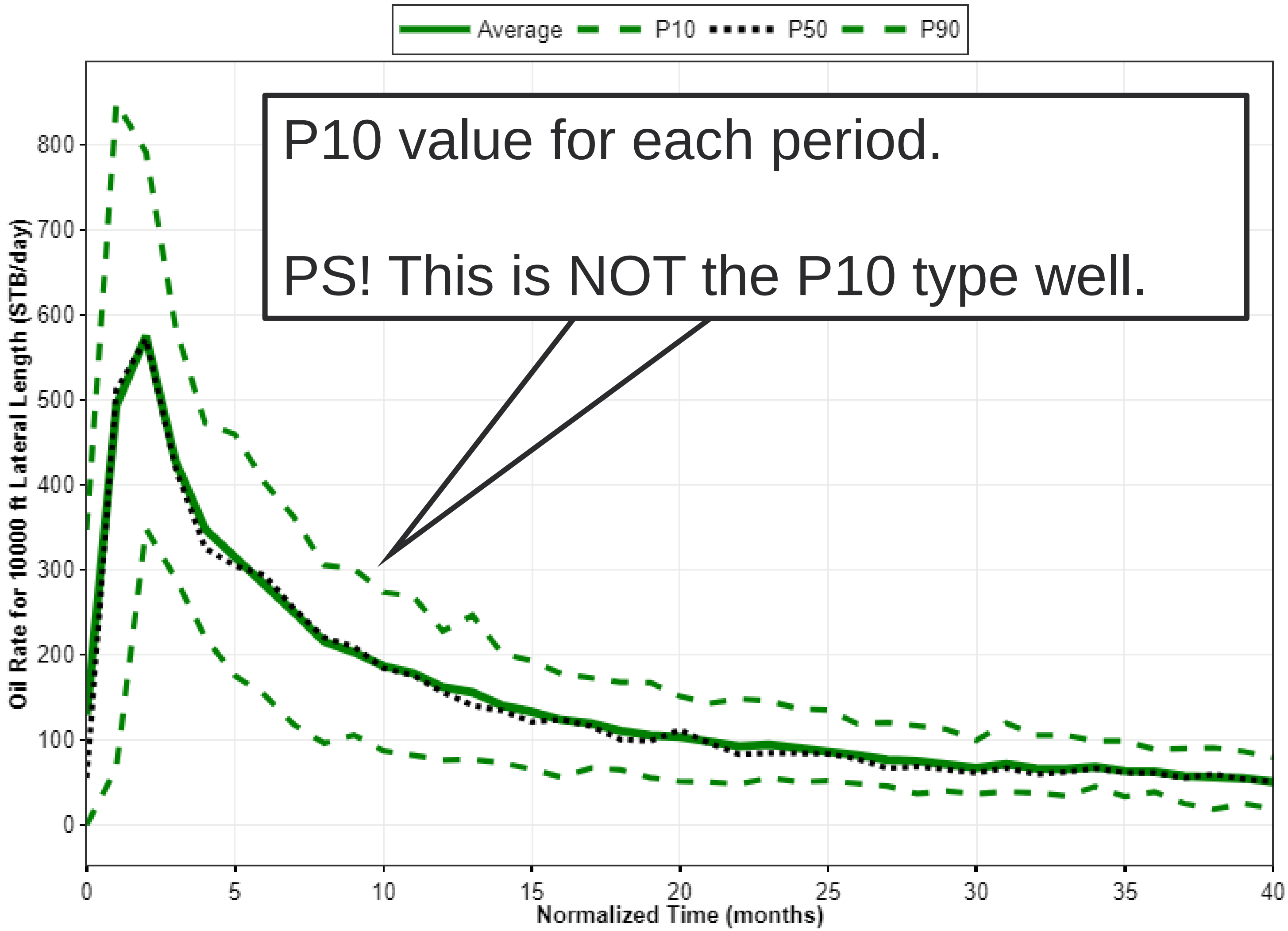
Type Well Averaging Diagnostic



Type Well: Percentile Trendlines



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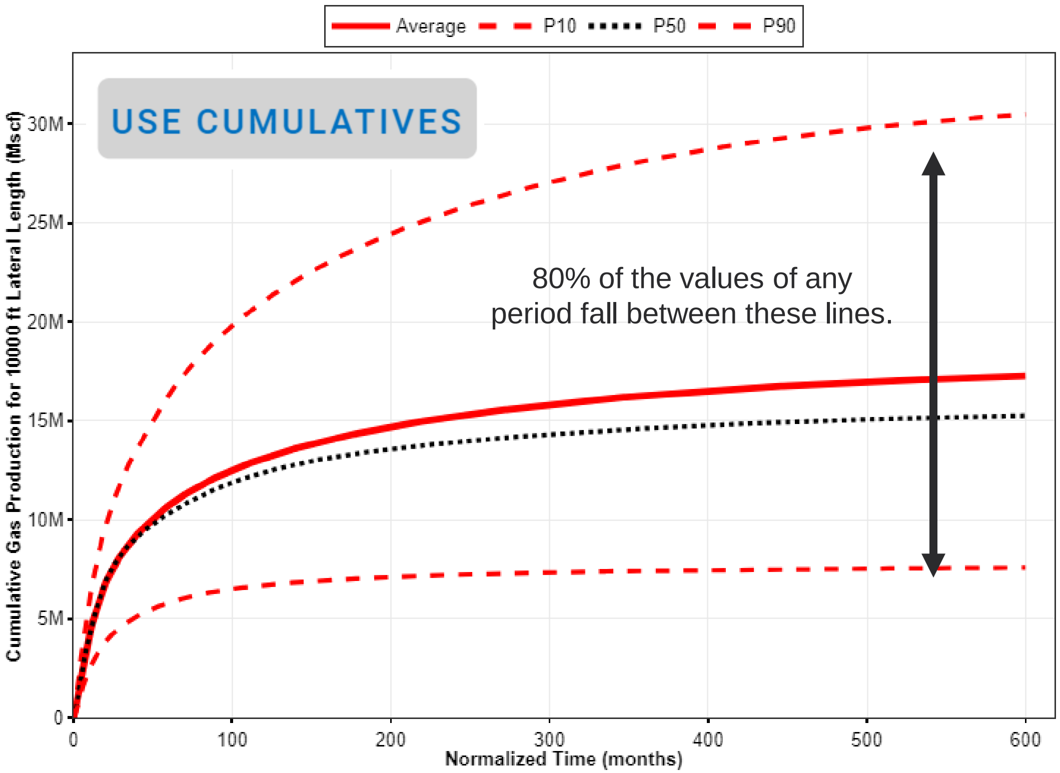
Type Well: Percentile Trendlines



Representing uncertainty with percentile trendlines can also be done in cumulative space.

Combined with auto-forecasts, percentile trendlines can provide a visual projection of the range of EUR outcomes.

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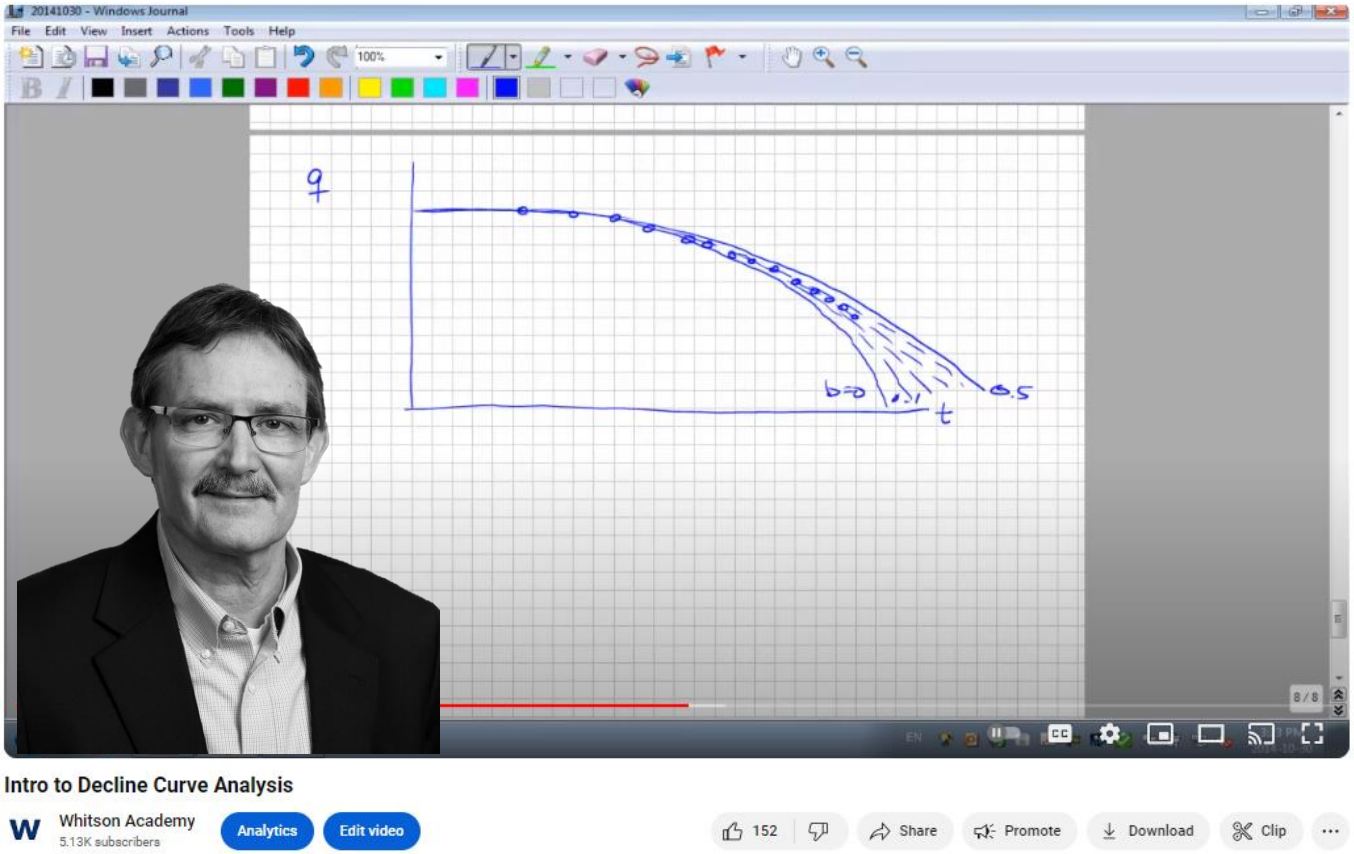
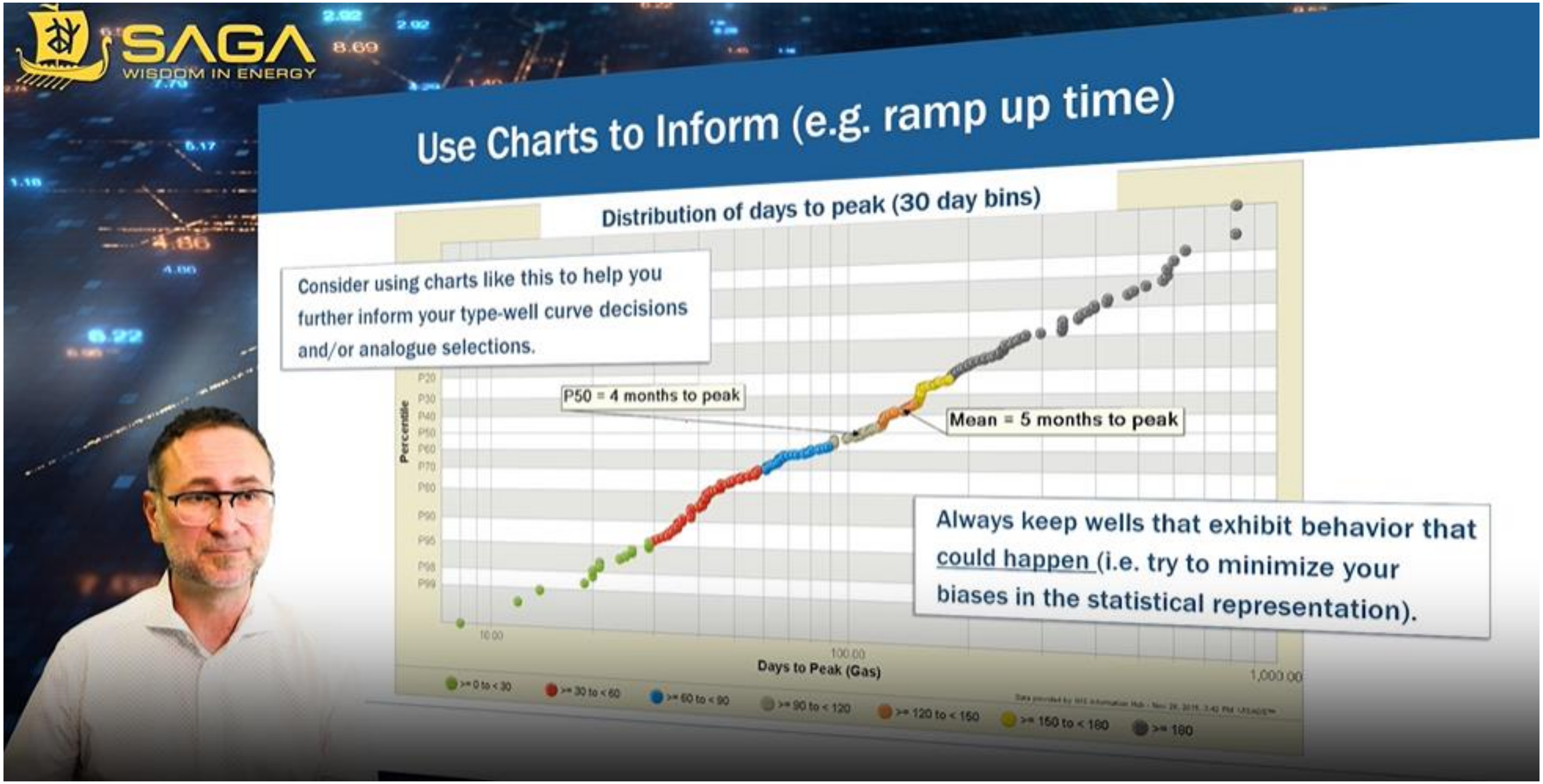
DCA: Want to Learn More?



https://www.youtube.com/watch?v=XF9IZI2DUuQ&list=PLgktb39S1tGcAar8zYnmNC9_aJNgdvCD_

Type Wells: Want to learn more?



https://sagawisdom.com/