

Ford LSPI Prove Out Operational Data Plots

12-10-15

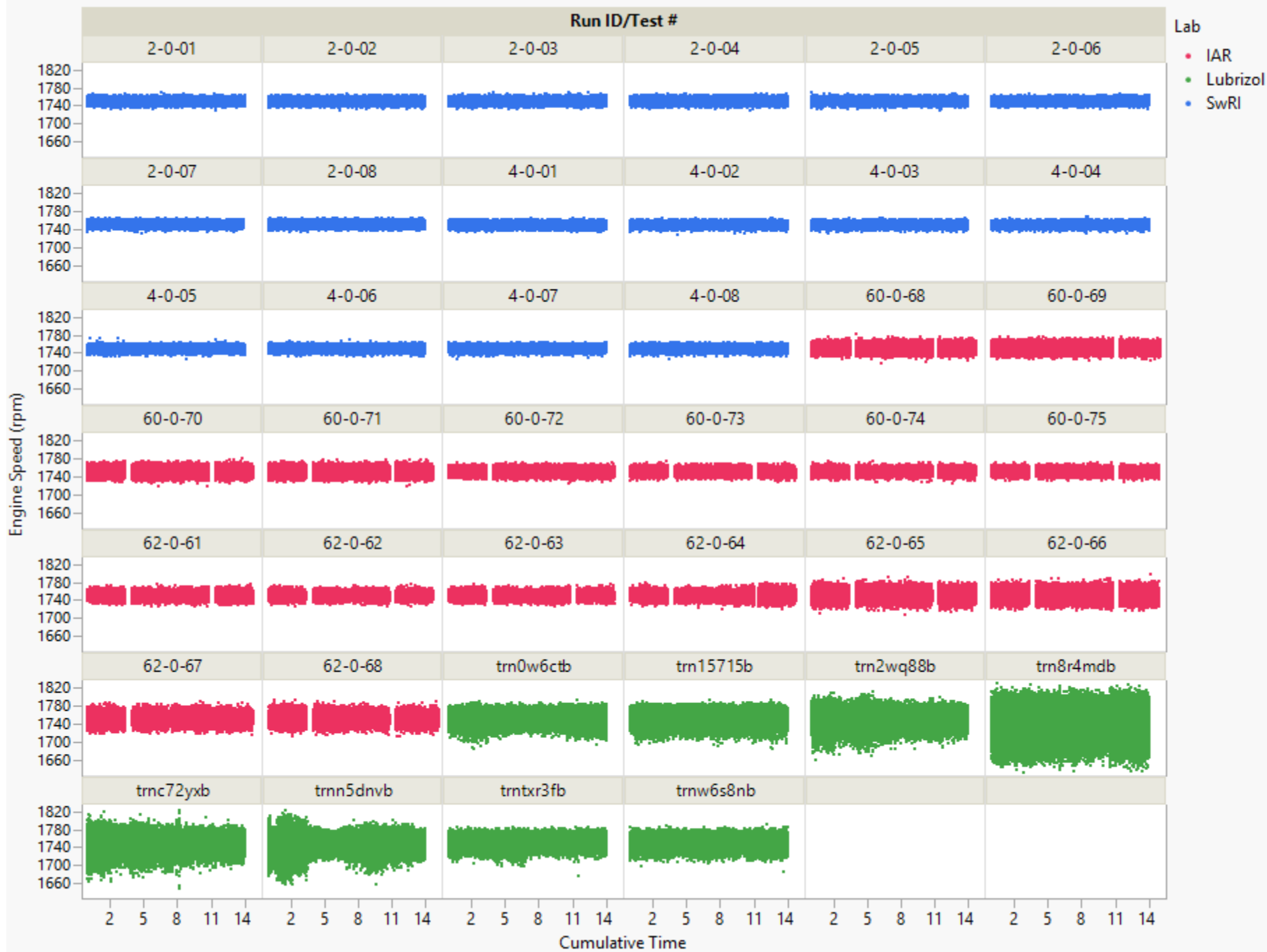
Kevin O'Malley

The Lubrizol Corporation

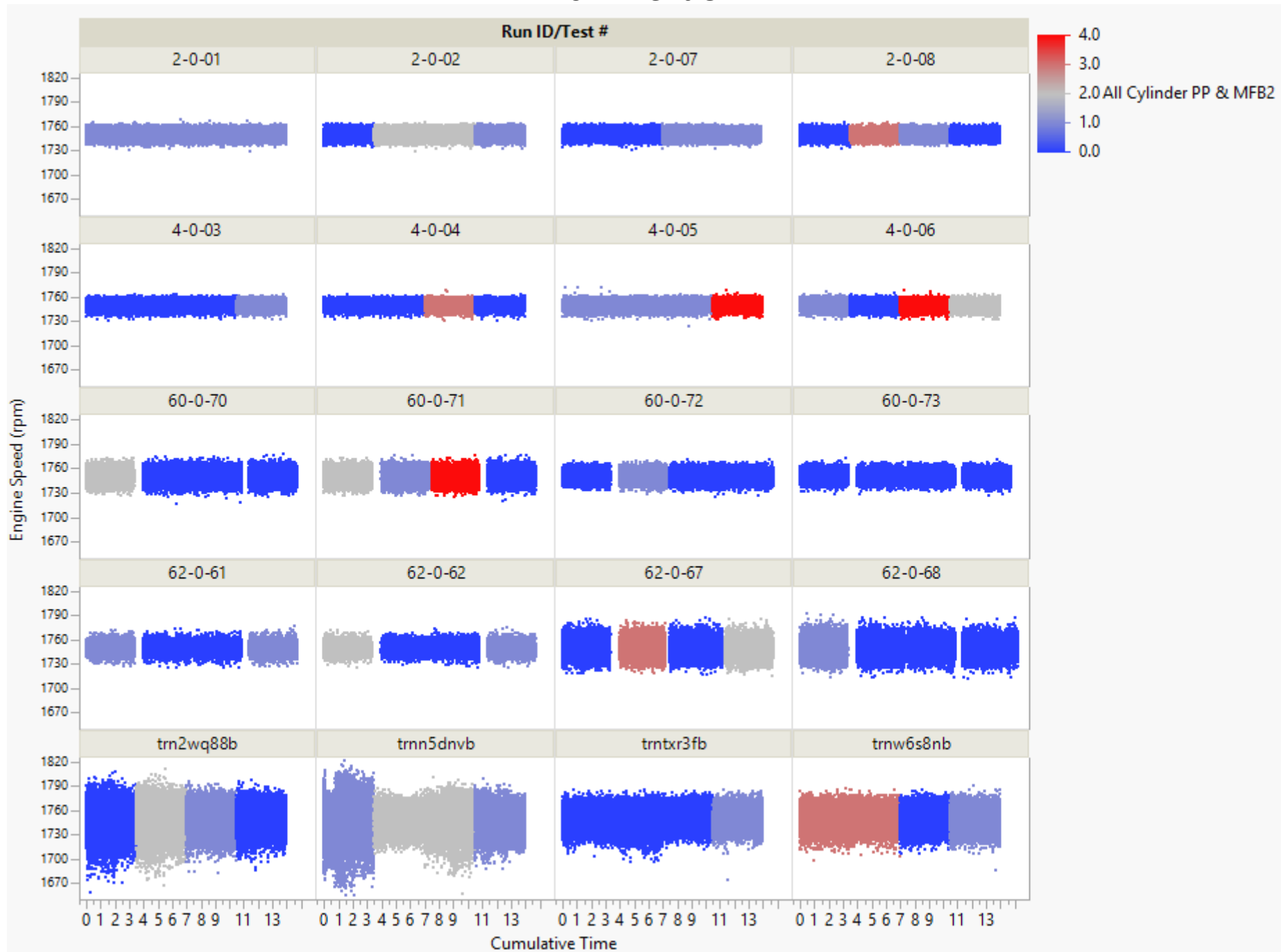
Overview

- 40 tests included
 - 16 IAR (2 stands; 8 tests per stand; 2 engine builds per stand)
 - 16 SwRI (2 stands; 8 tests per stand; 2 engine builds per stand)
 - 8 LZ (1 stand; 2 engine builds)
- 2 oils tested (low event oil and high event oil)
 - Each oil tested in duplicate within each stand-engine build combination
- Operational parameters are plotted versus cumulative time
 - Cumulative time is a combination of time from valid iterations A, B, C, and D; time at start of iteration A = 0hrs
- Each RunID/Test # is plotted in a separate pane
- Each parameter has plots with a legend for both lab and number of LSPI events (a.k.a. All Cylinder PP & MFB2)
- CAN data are plotted with and without stand 62

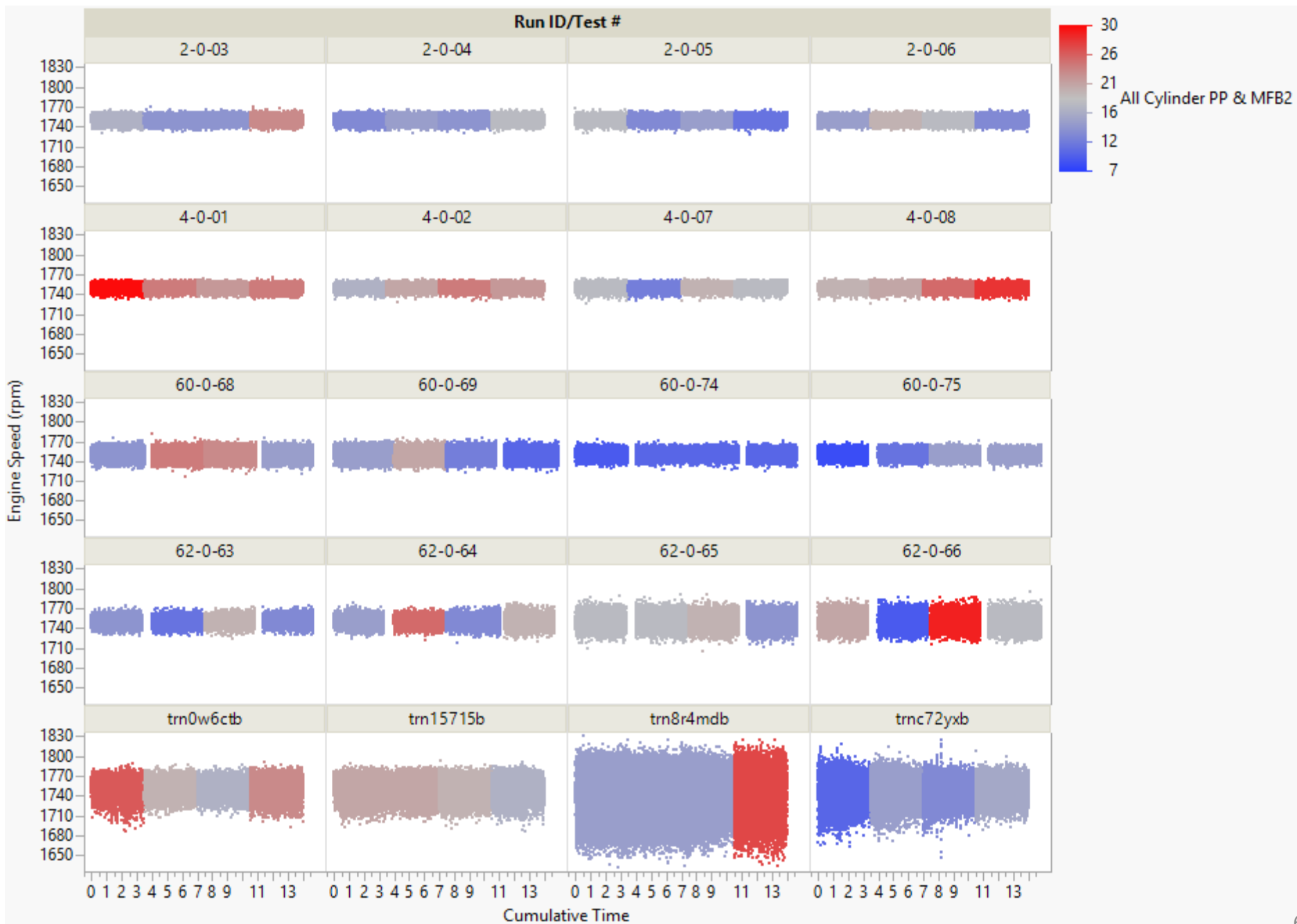
Engine Speed



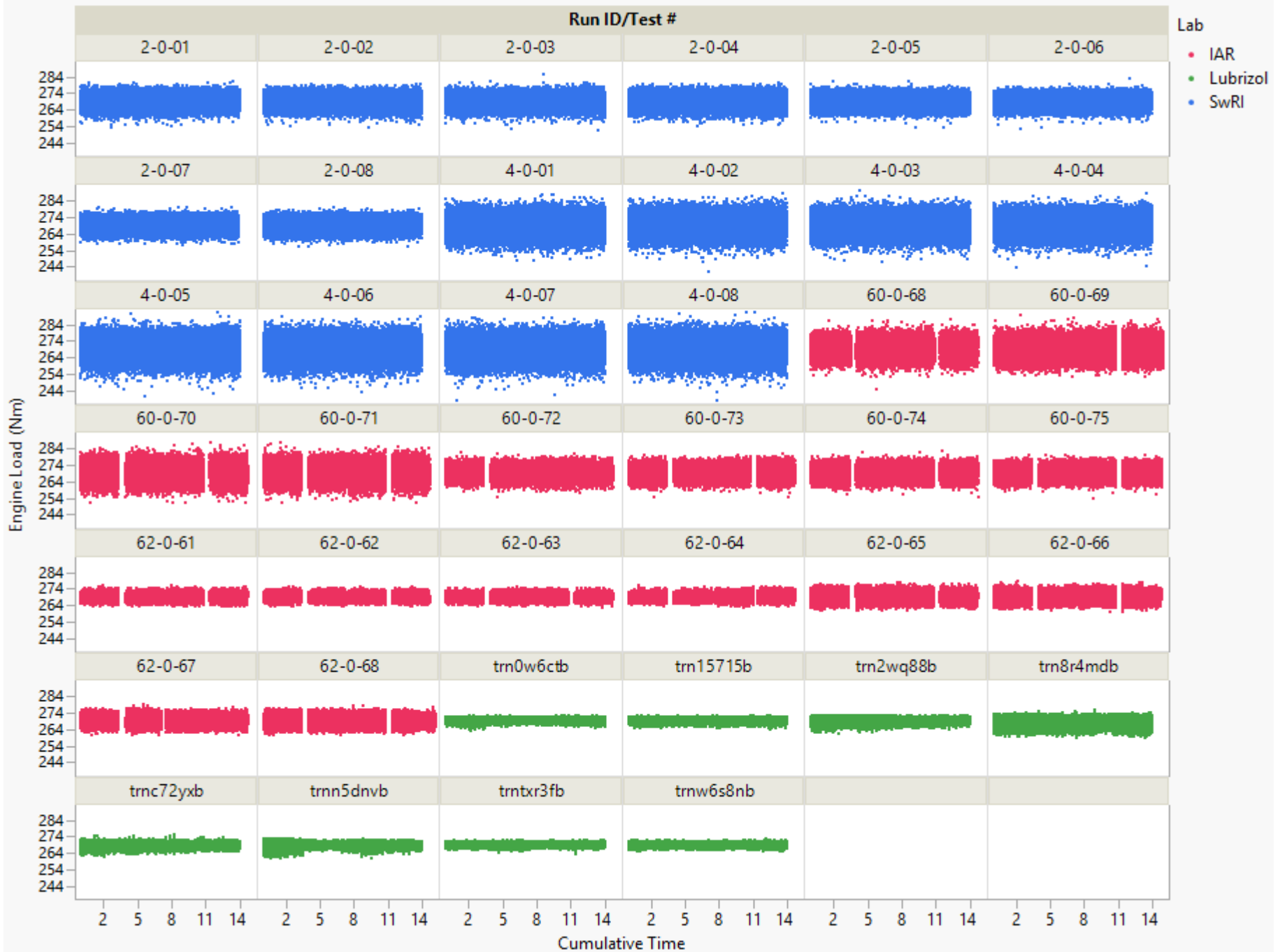
Low Event Oil



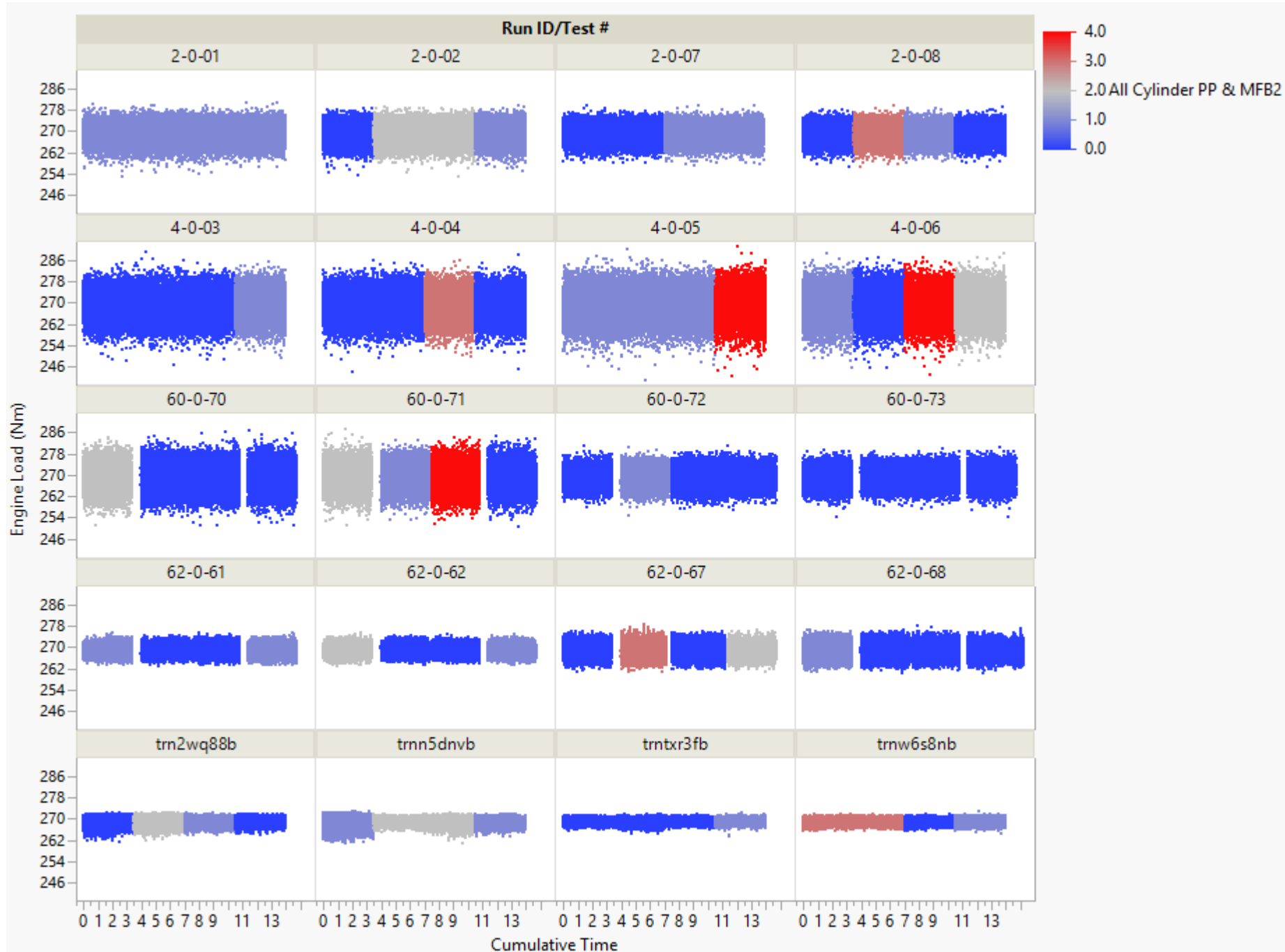
High Event Oil



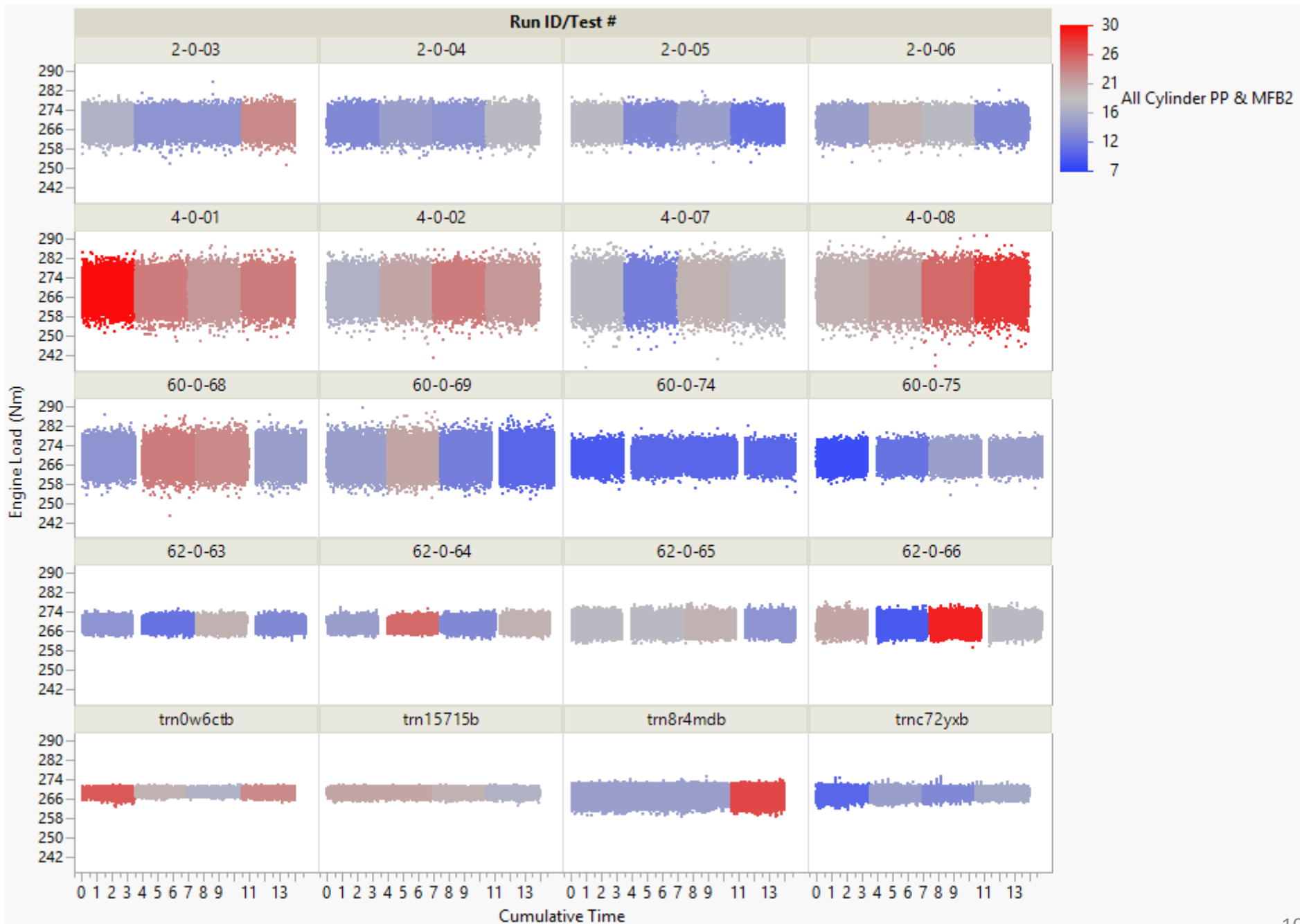
Engine Load



Low Event Oil



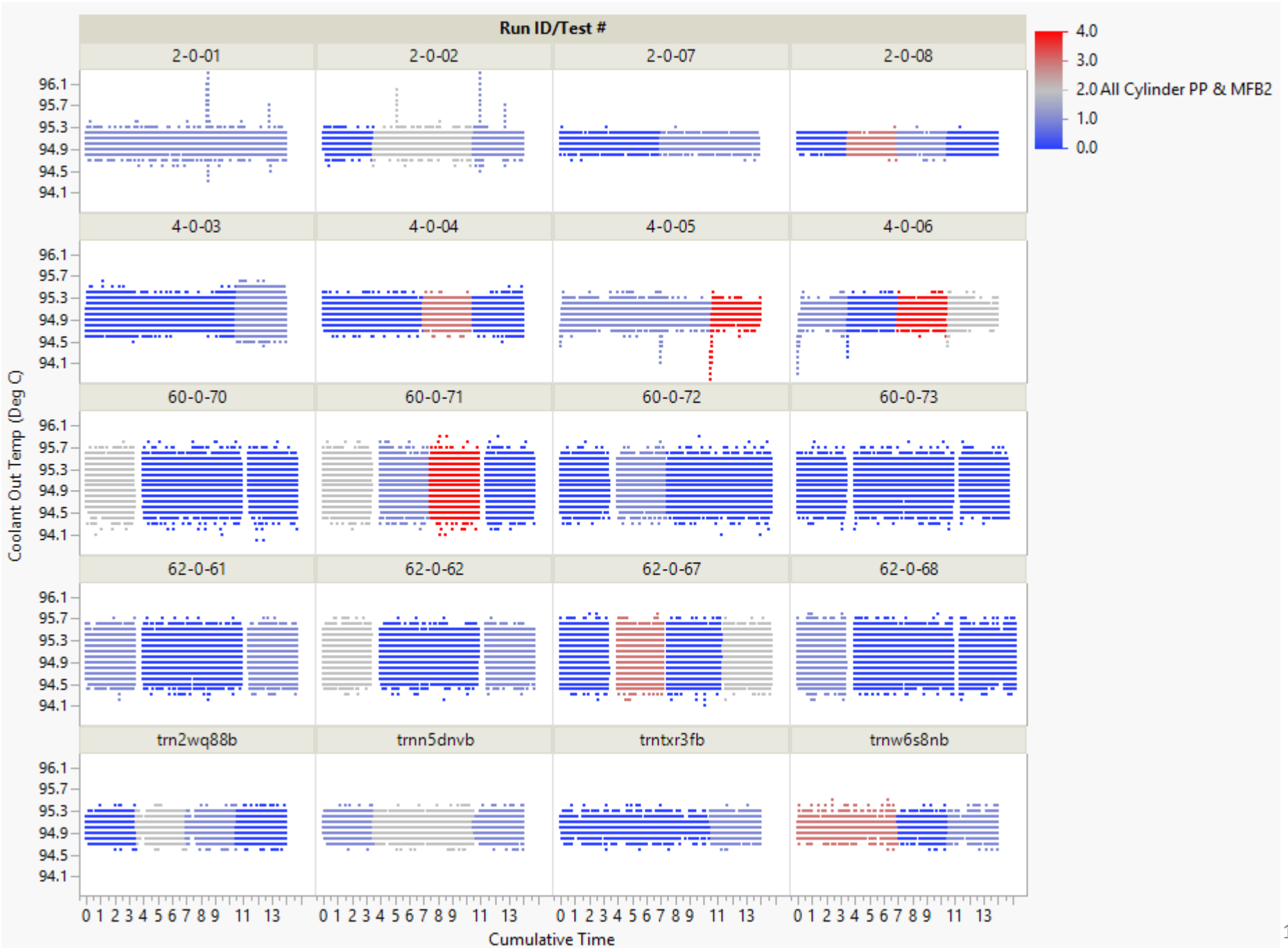
High Event Oil



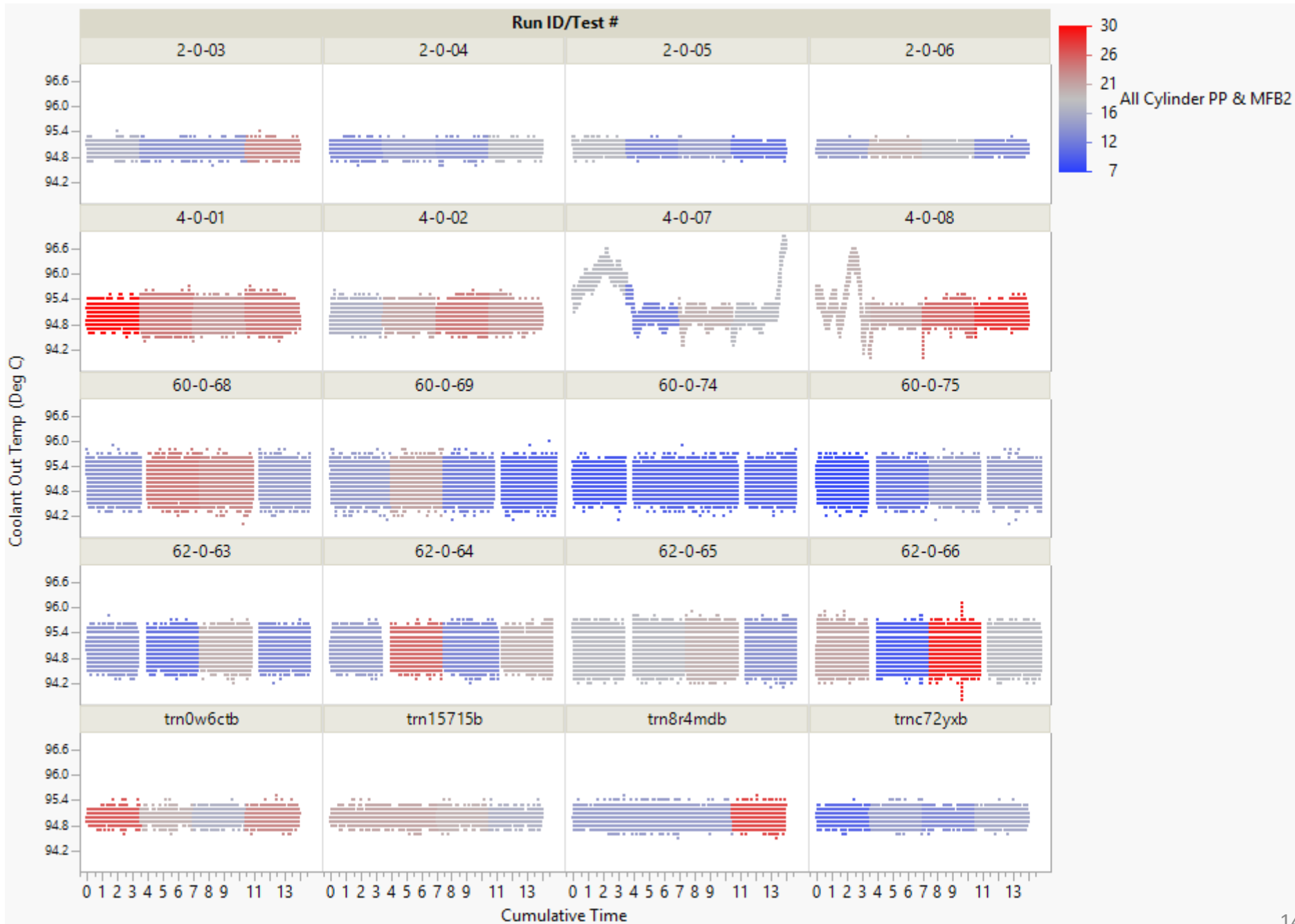
Coolant Out Temperature



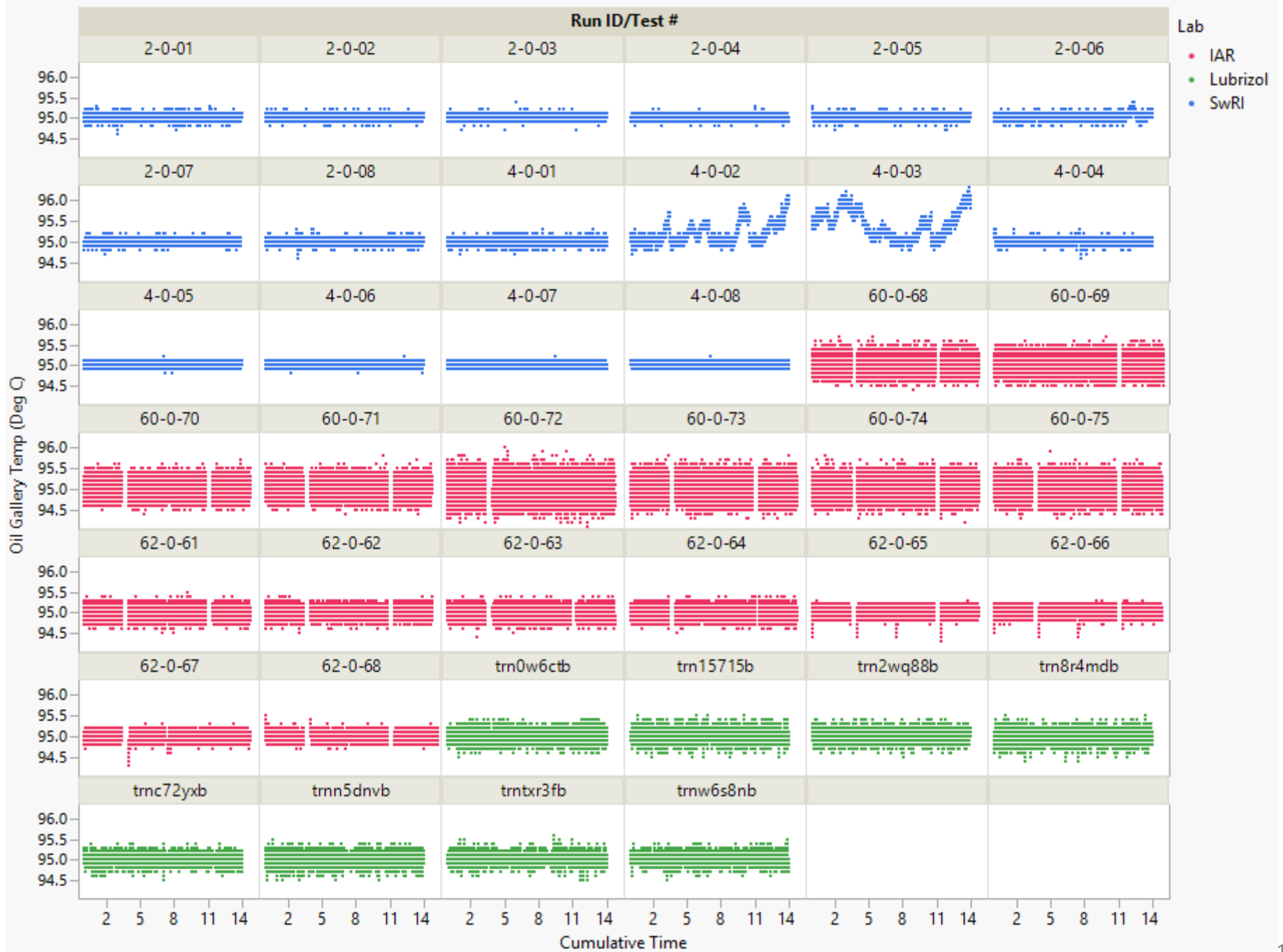
Low Event Oil



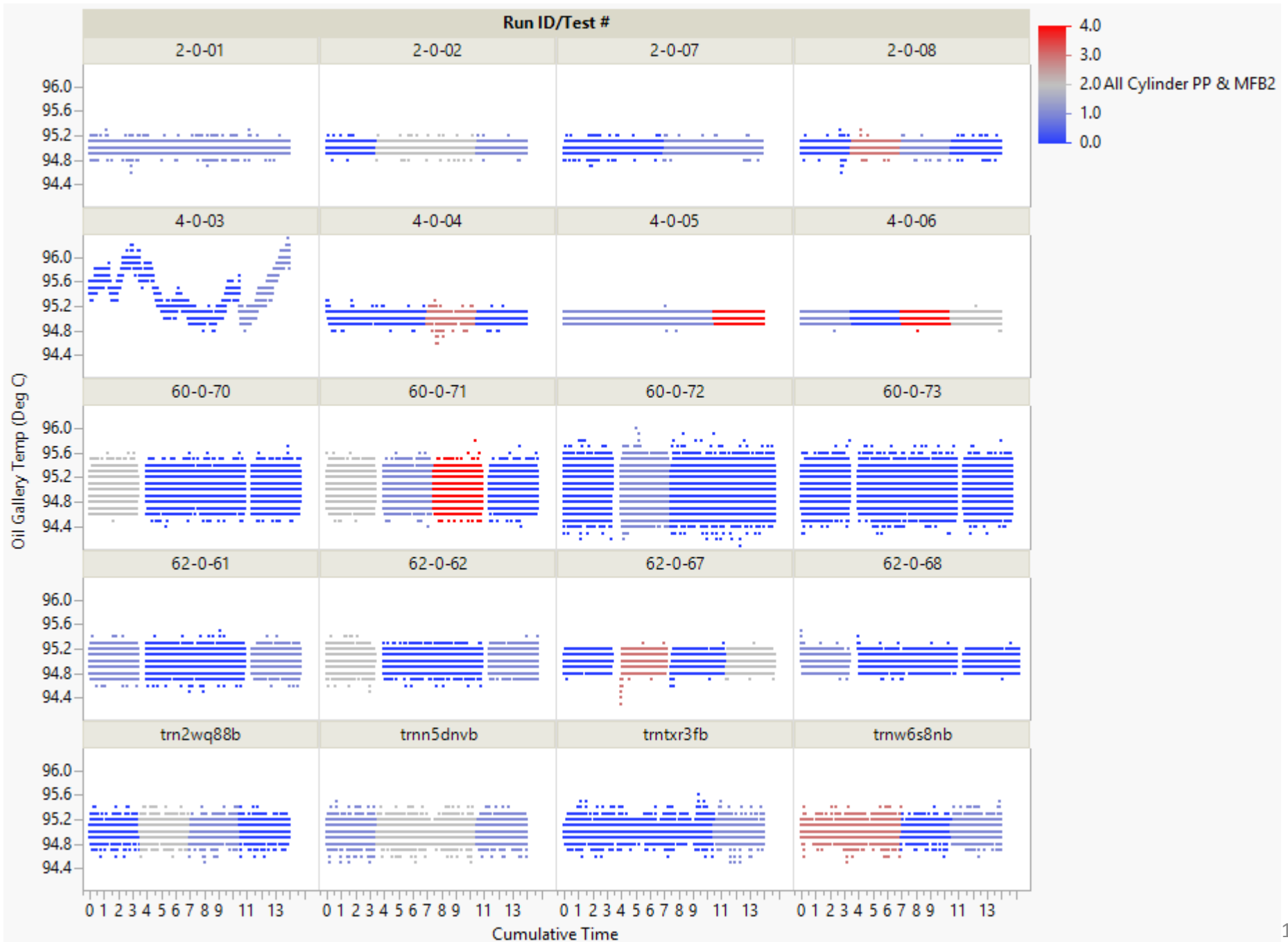
High Event Oil



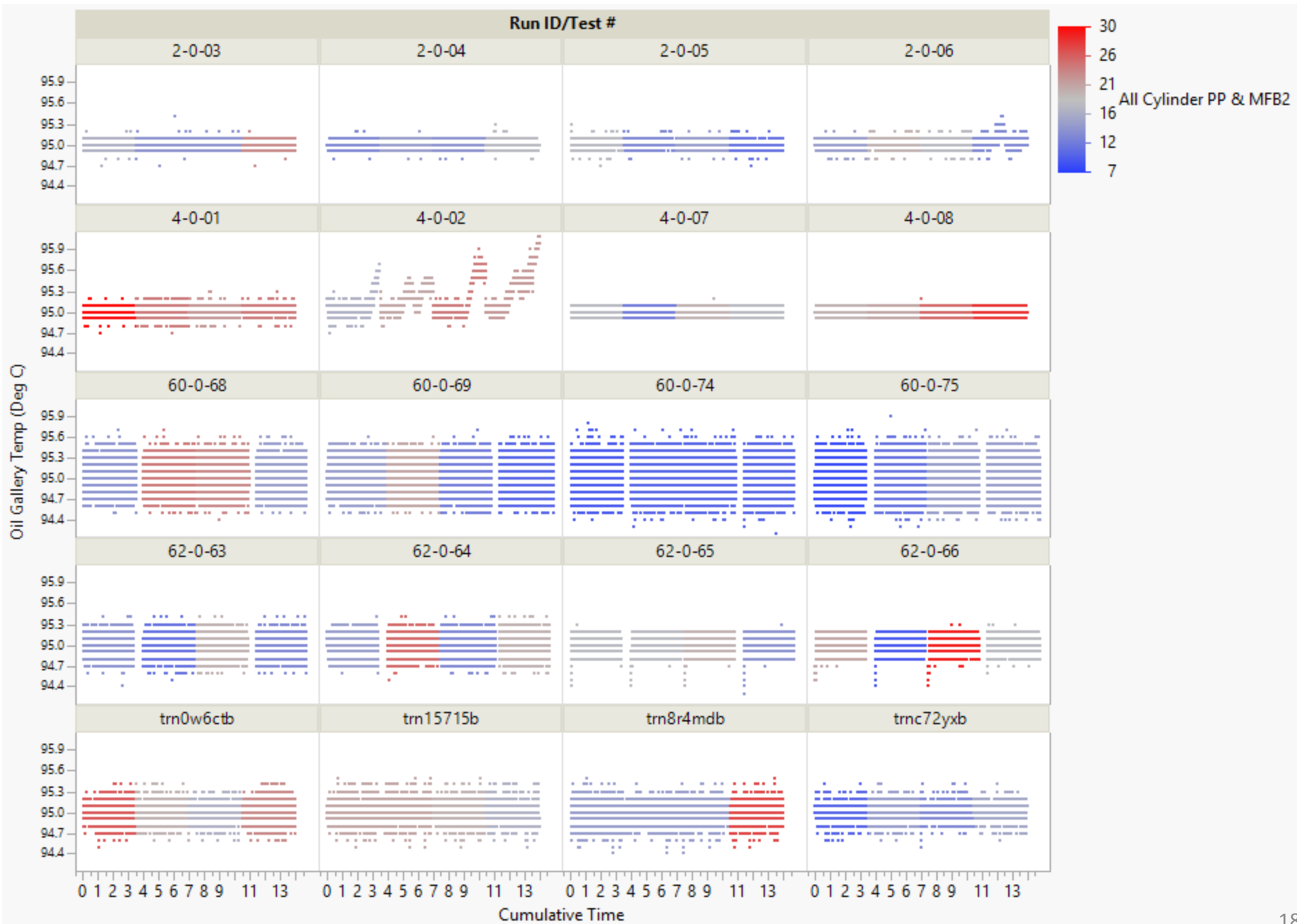
Oil Gallery Temperature



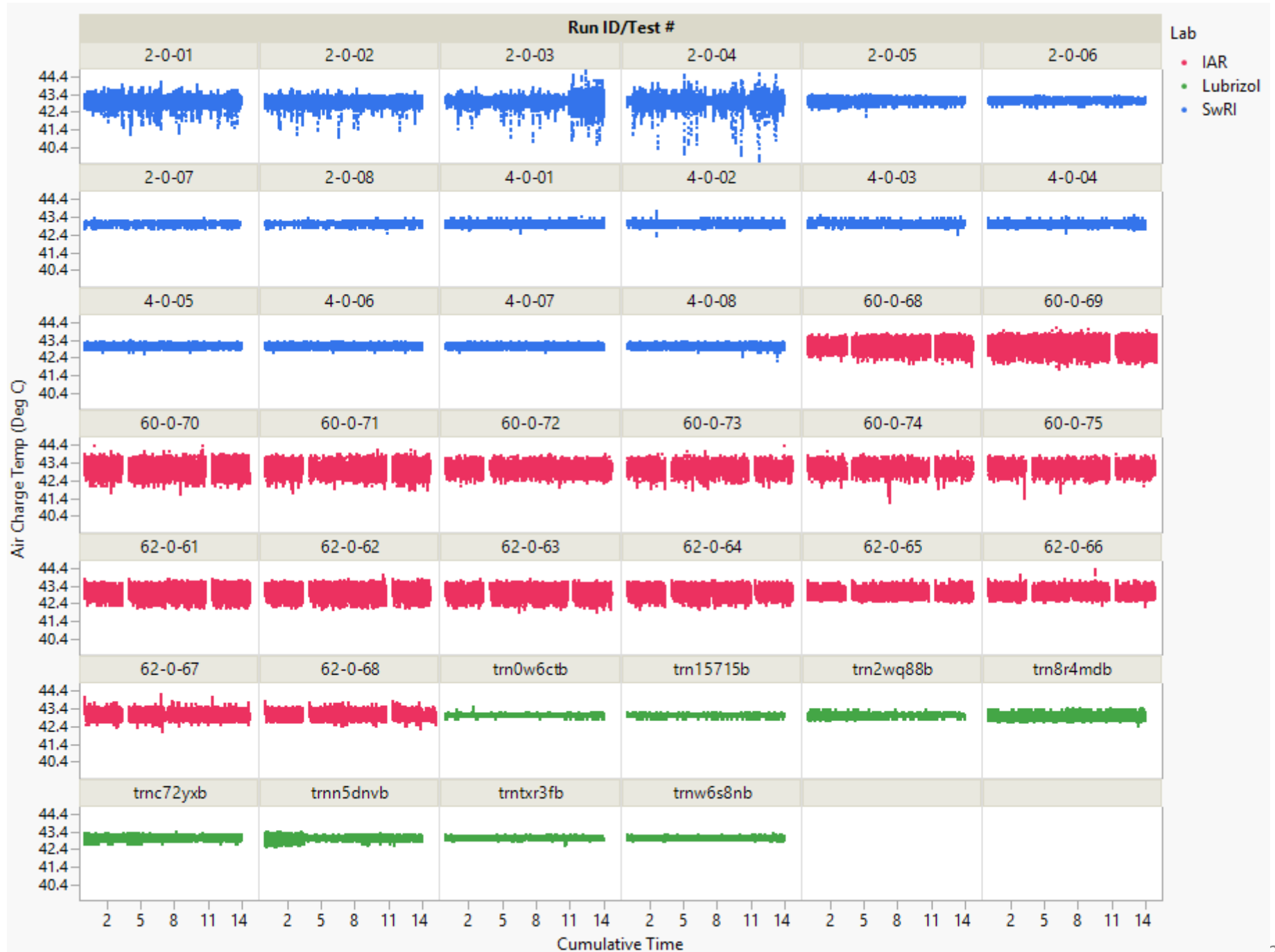
Low Event Oil



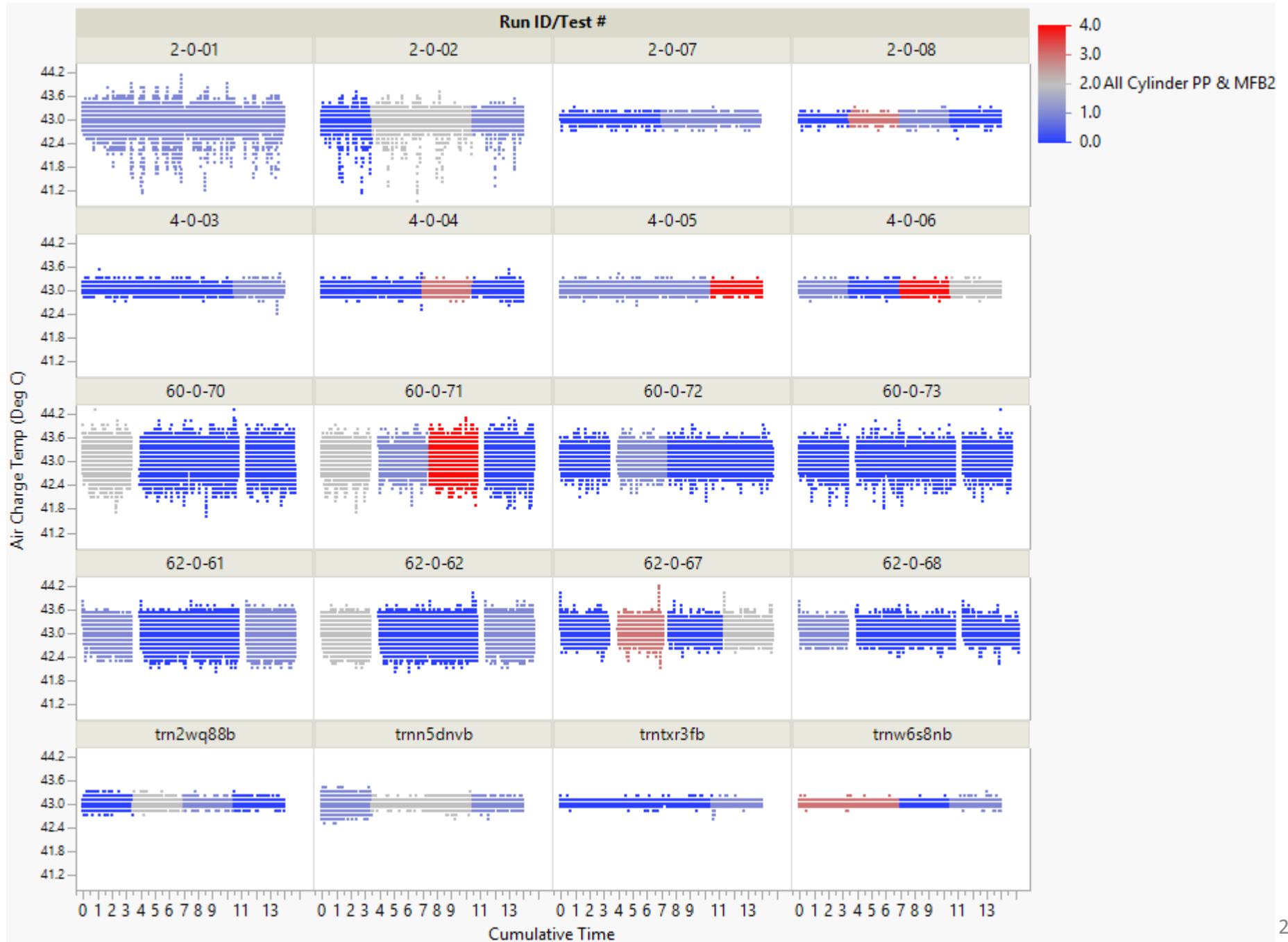
High Event Oil



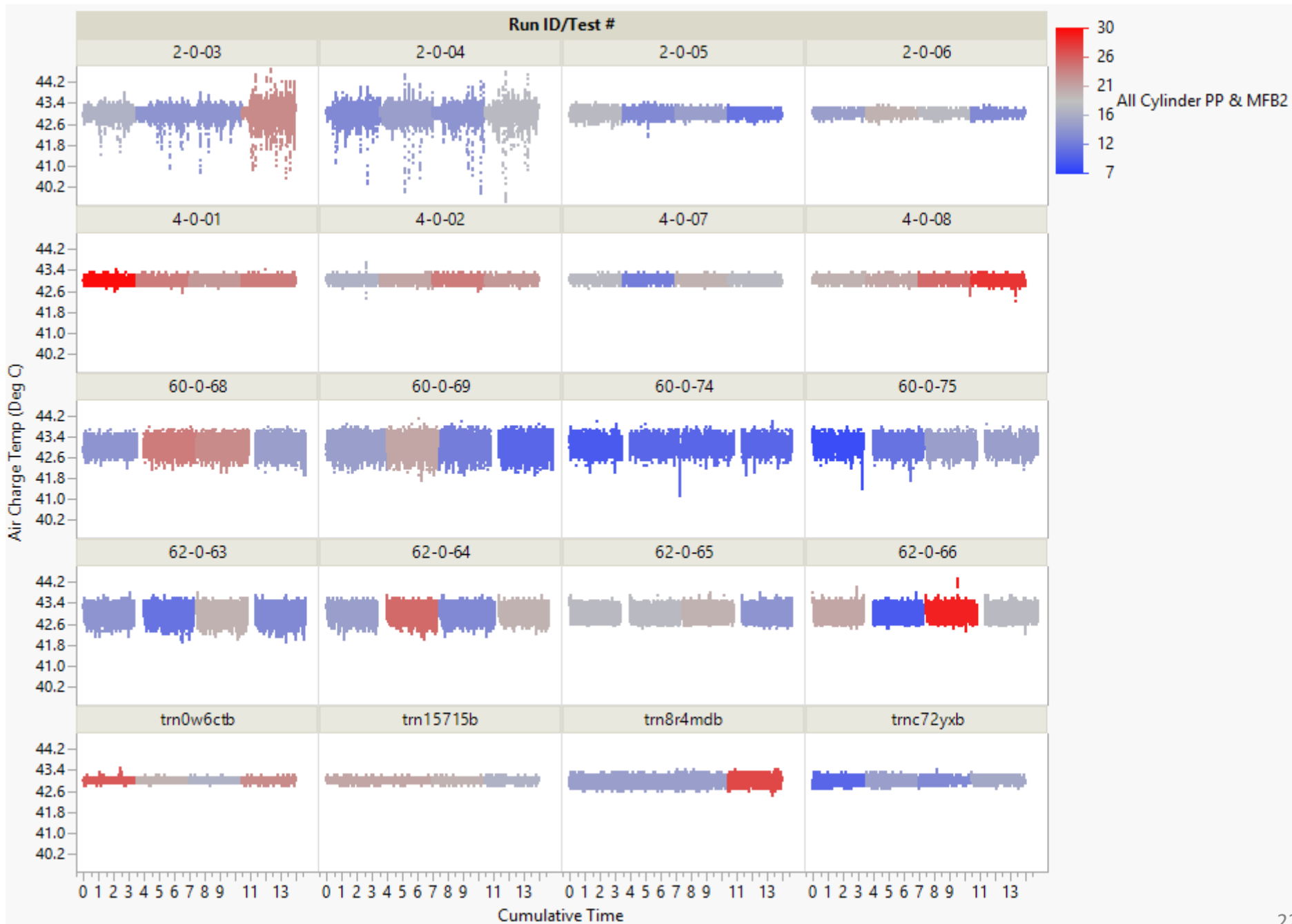
Air Charge Temperature



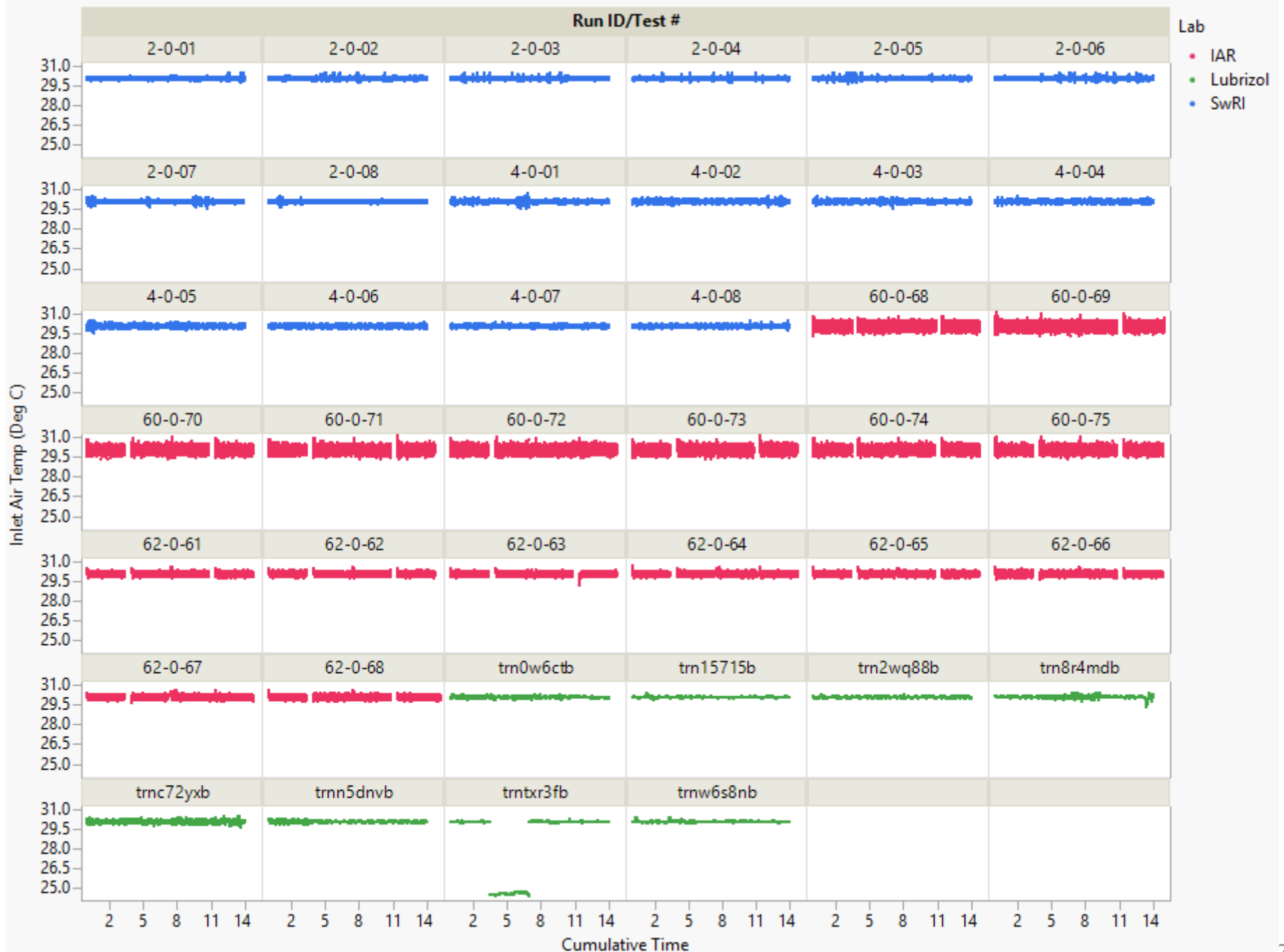
Low Event Oil



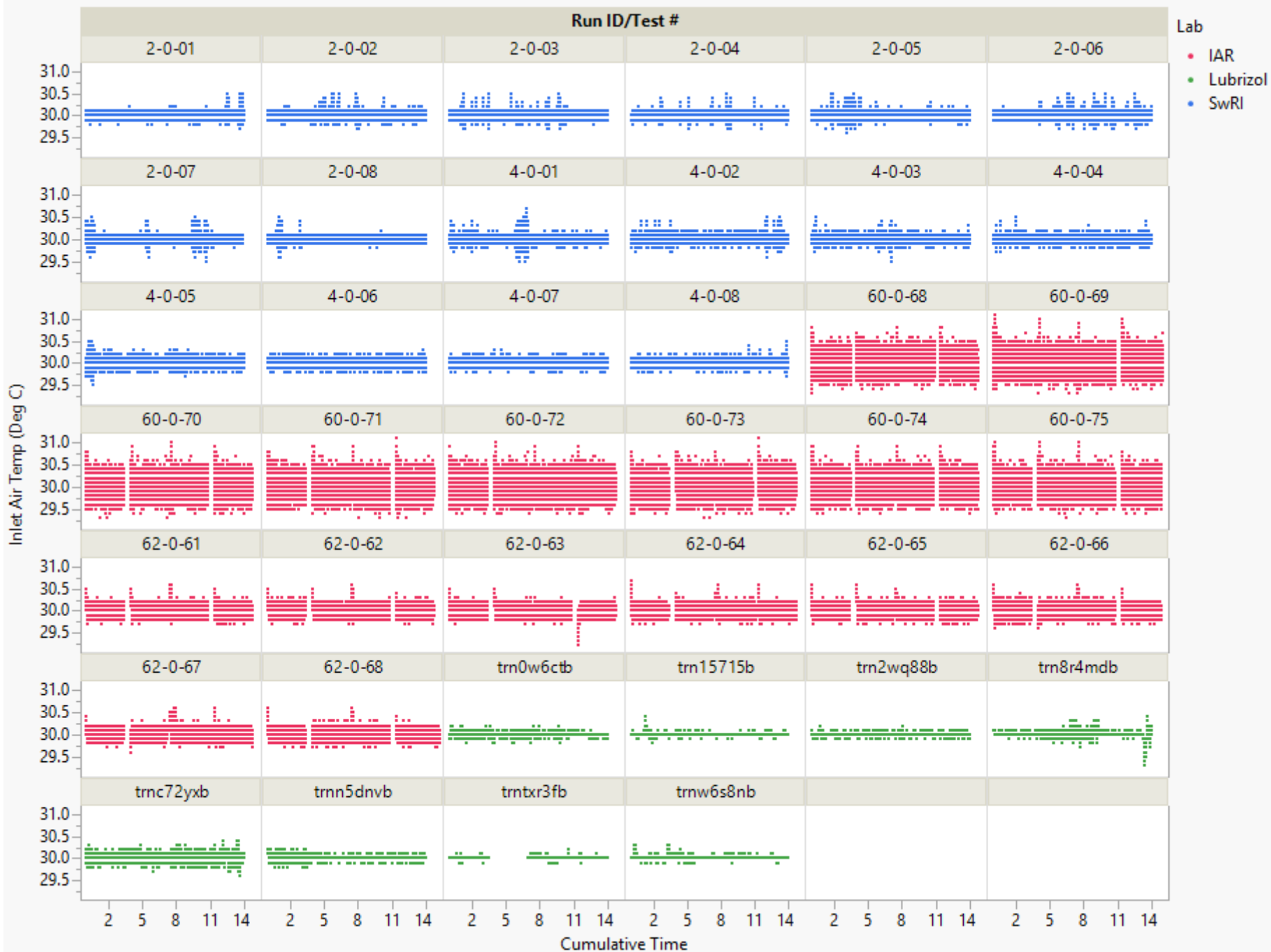
High Event Oil



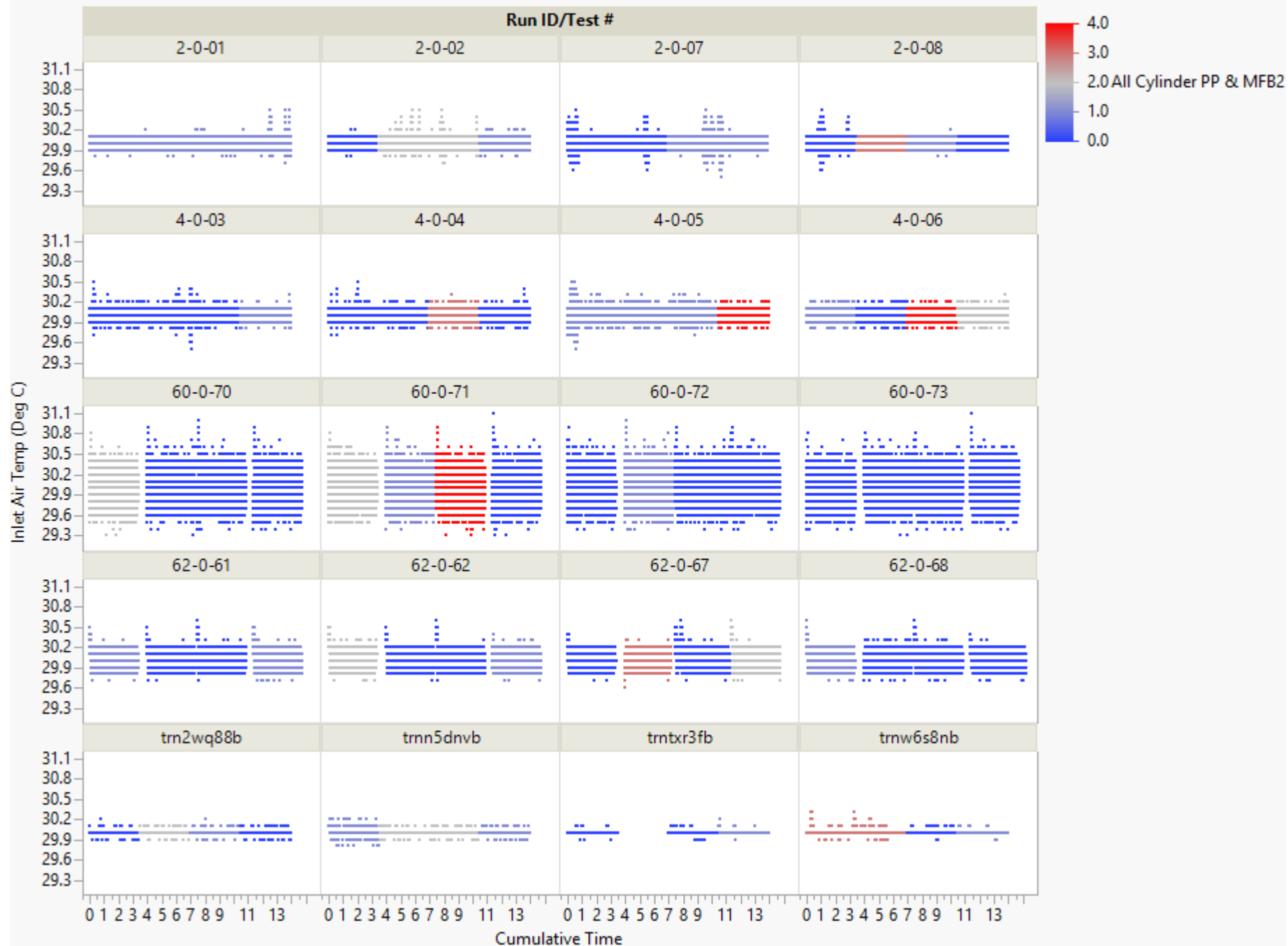
Inlet Air Temperature



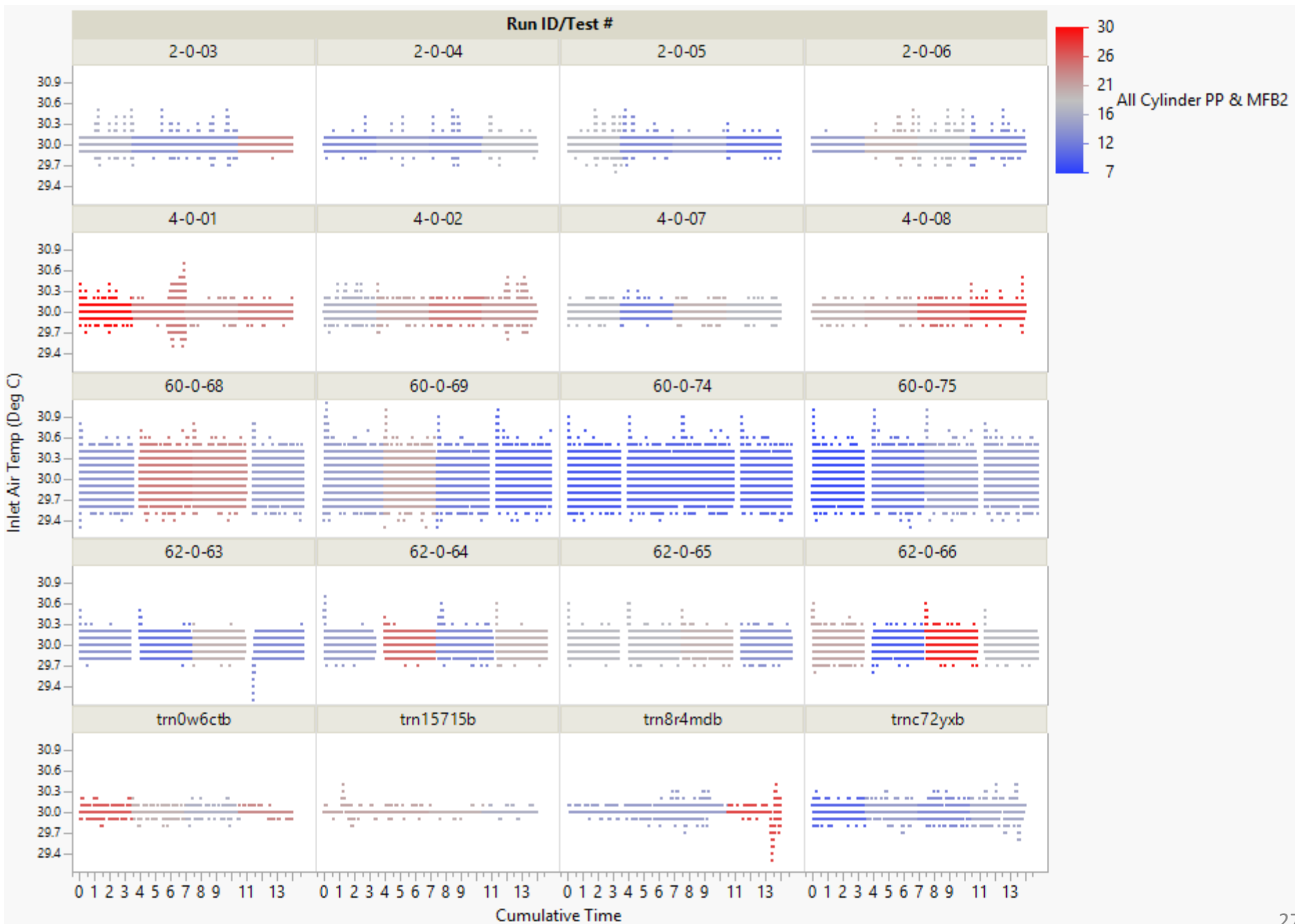
ZOOMED IN



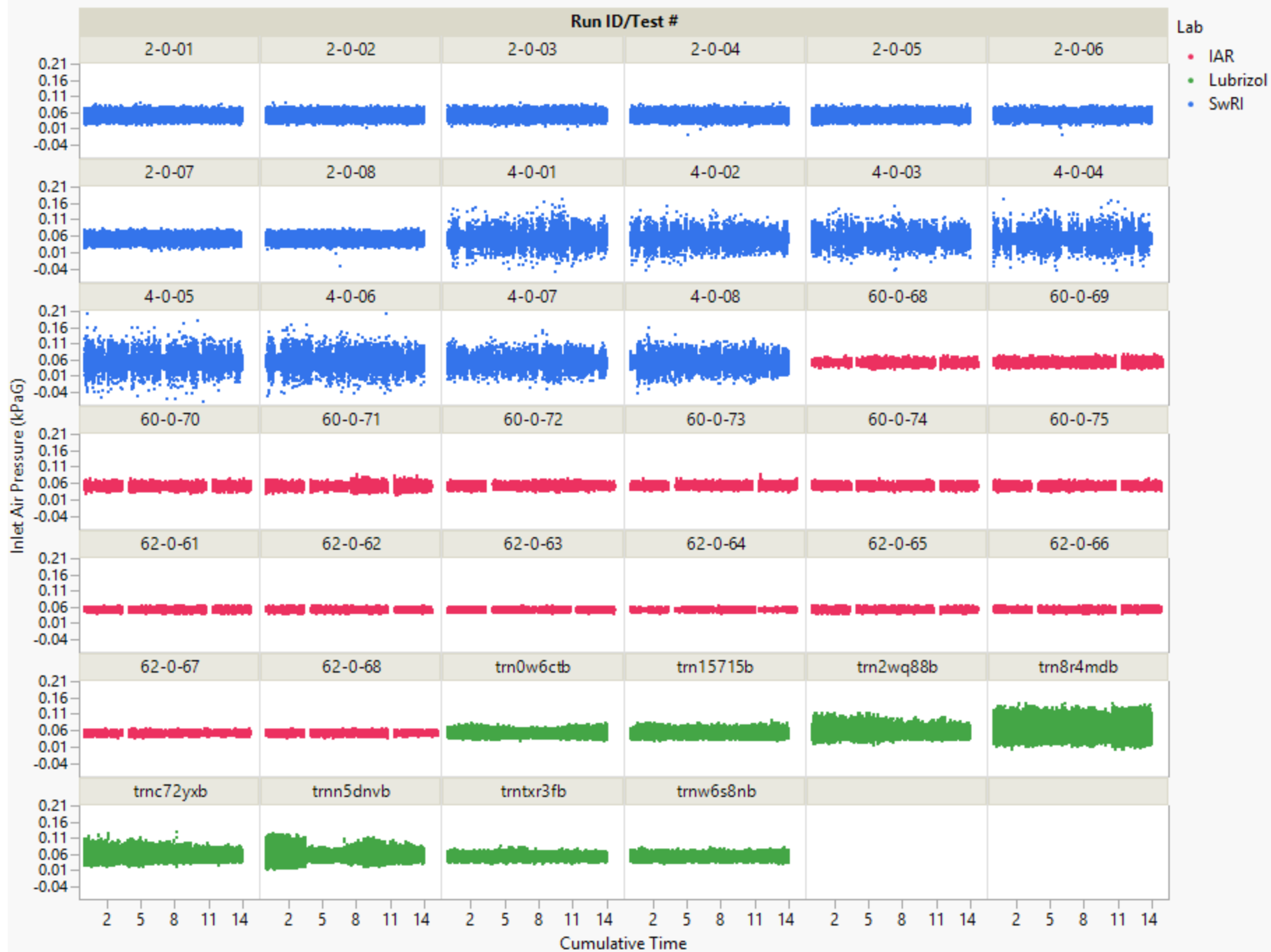
Low Event Oil



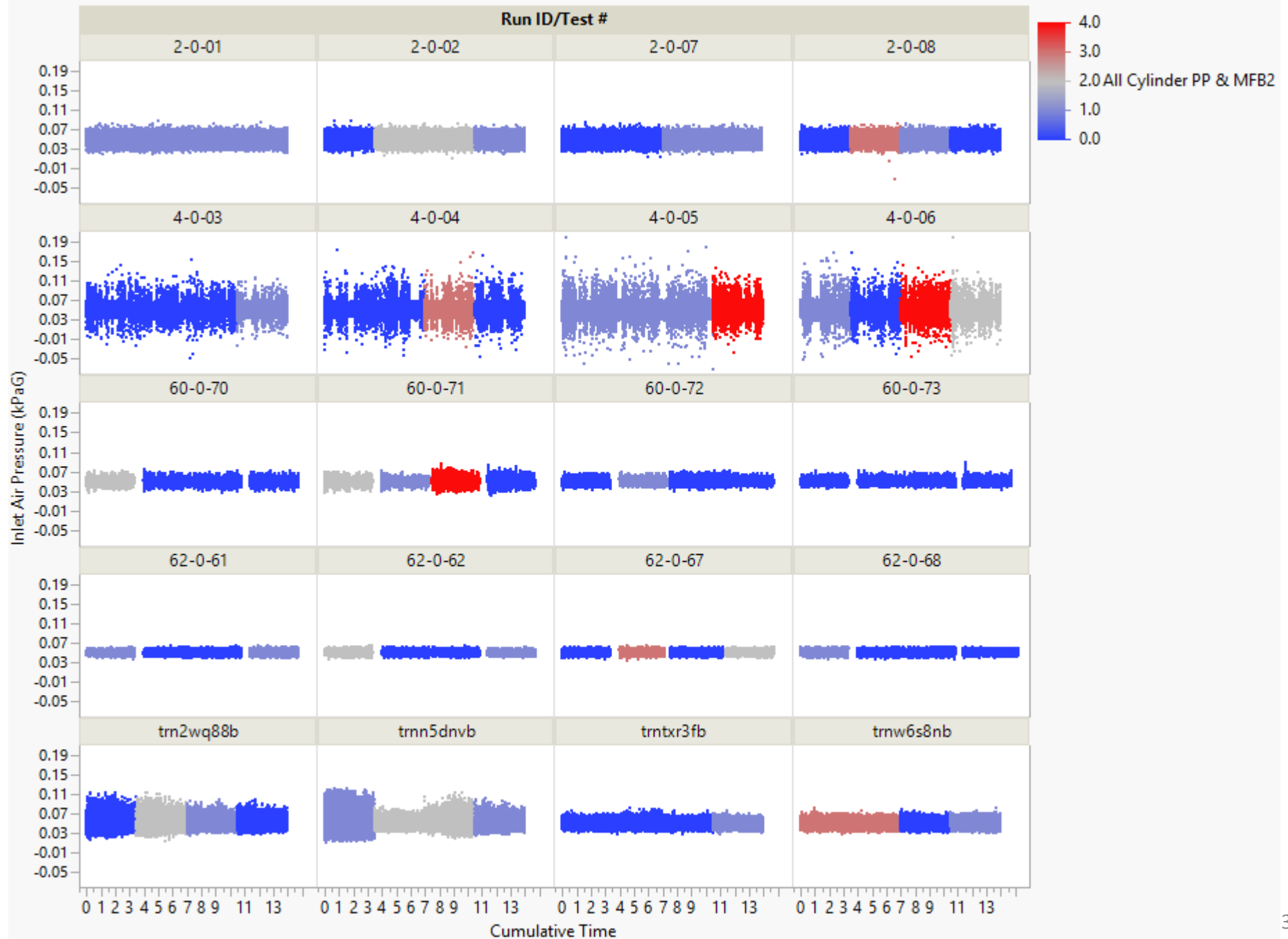
High Event Oil



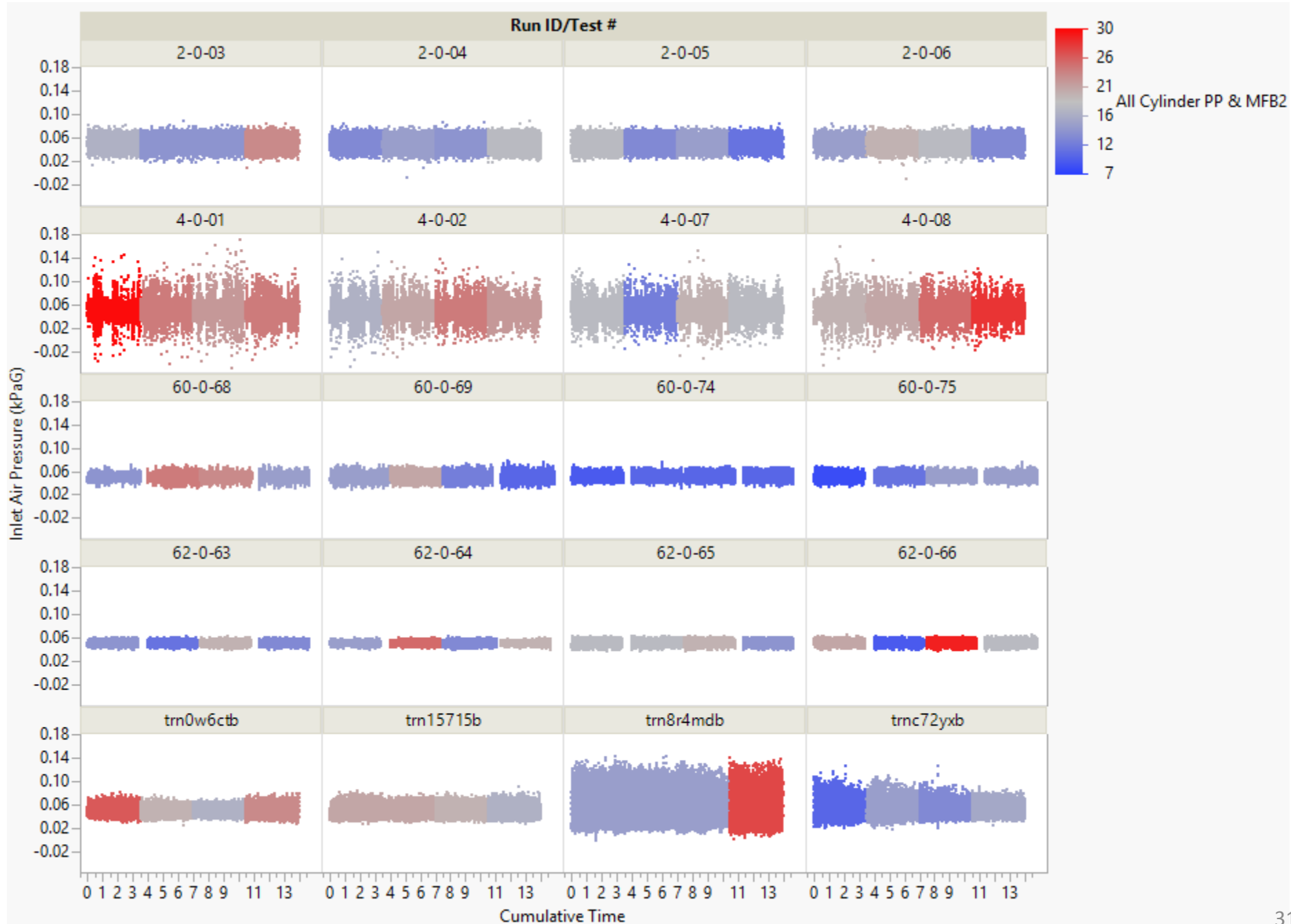
Inlet Air Pressure



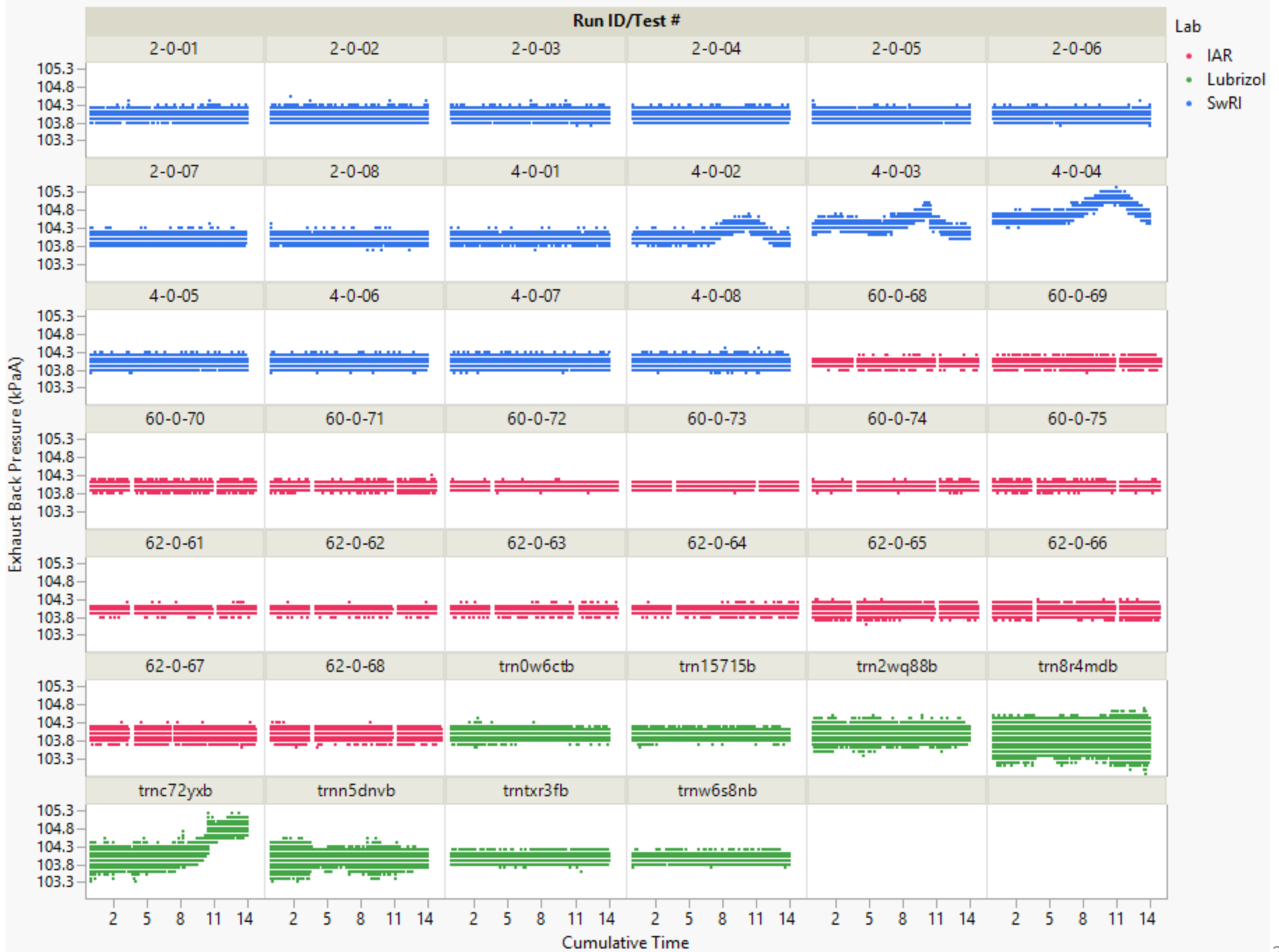
Low Event Oil



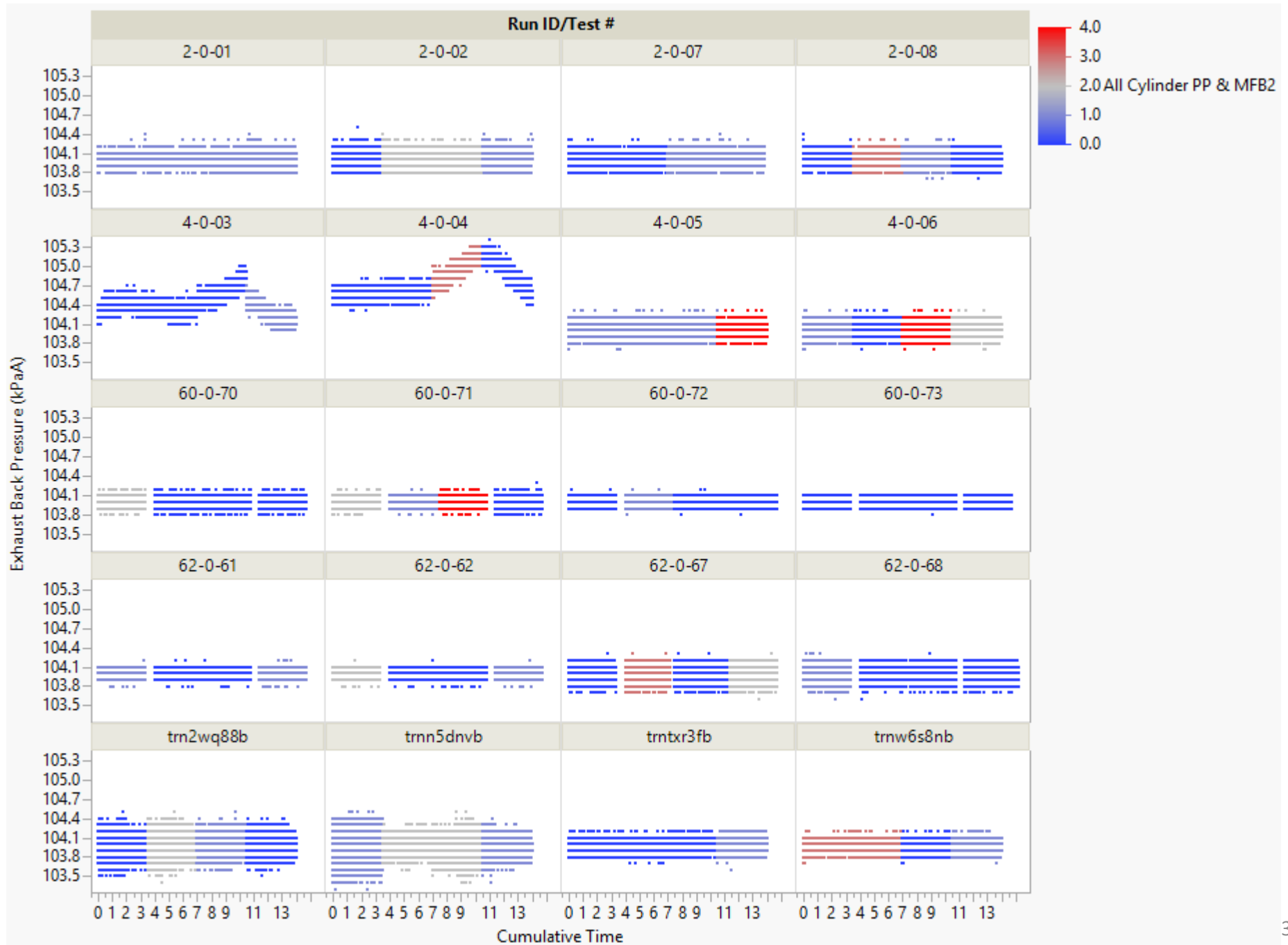
High Event Oil



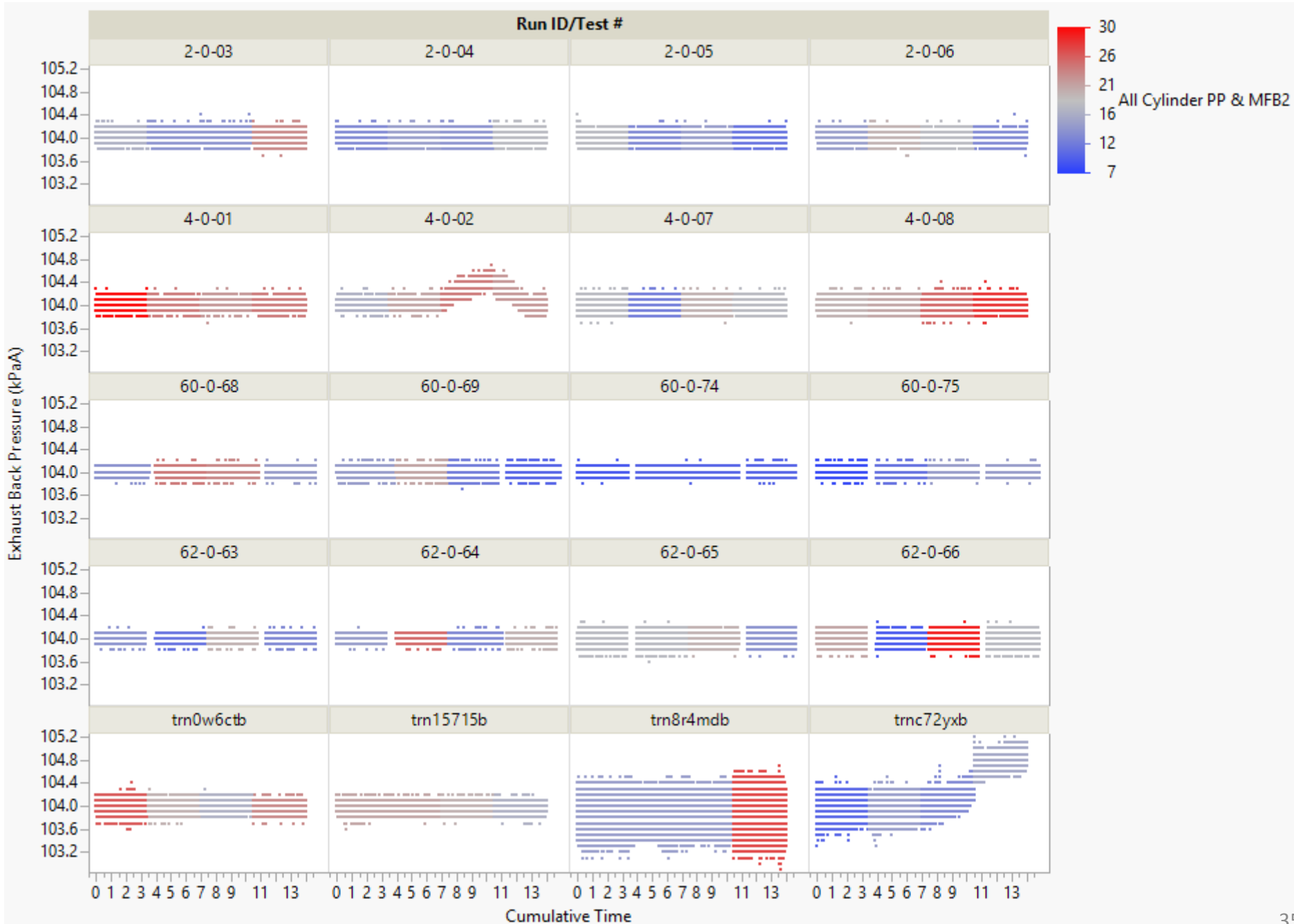
Exhaust Back Pressure



Low Event Oil

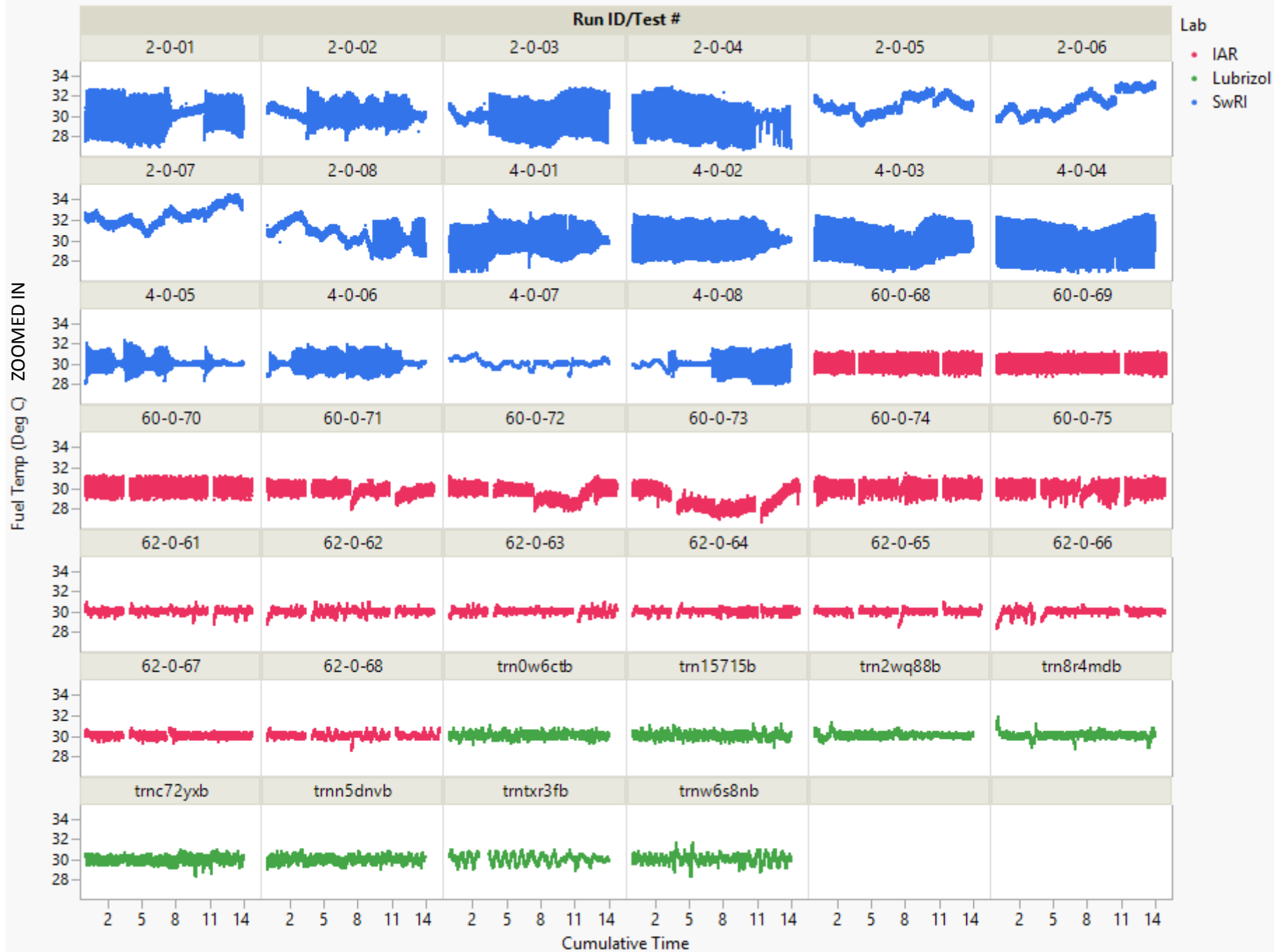


High Event Oil

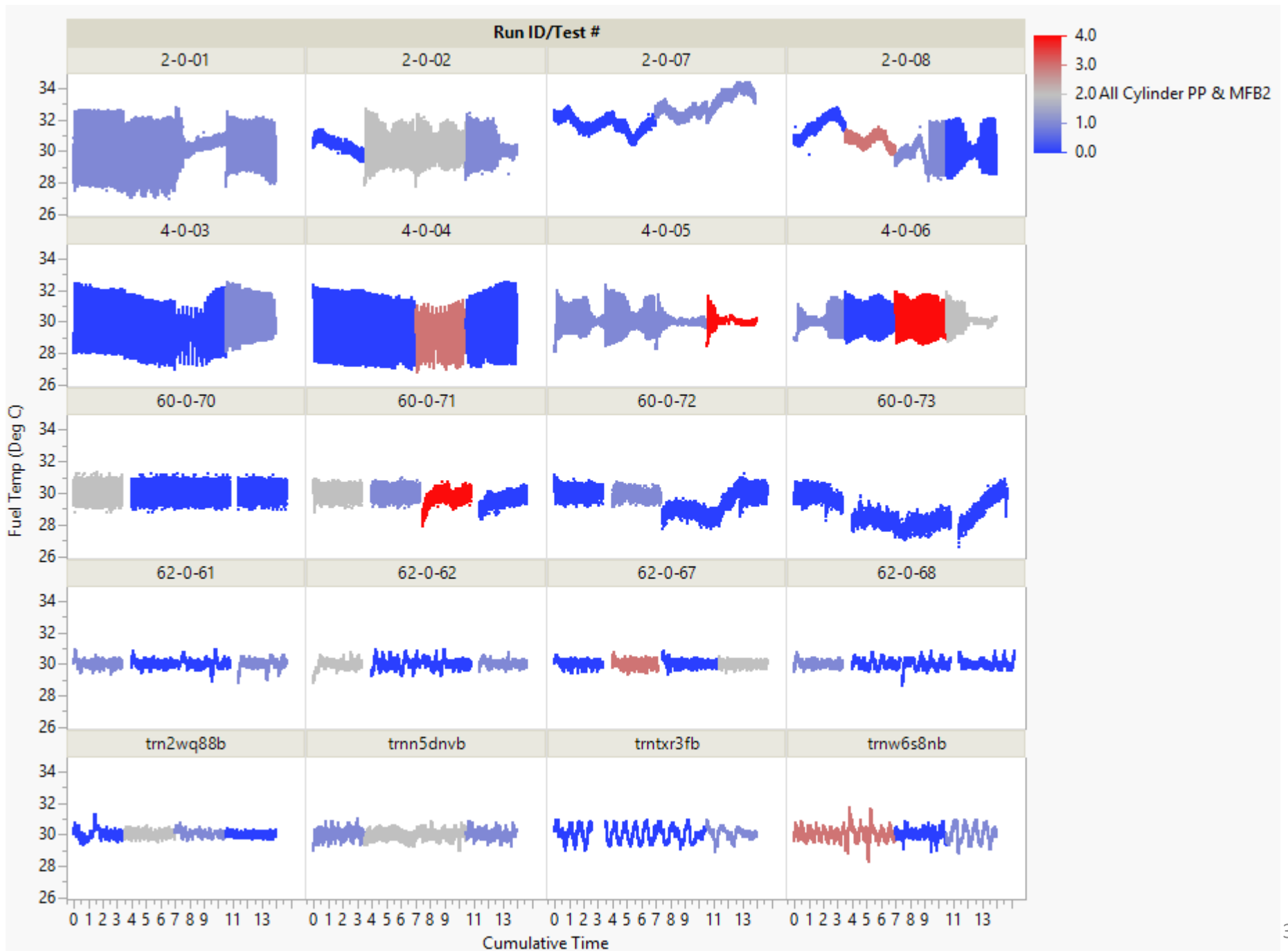


Fuel Temperature

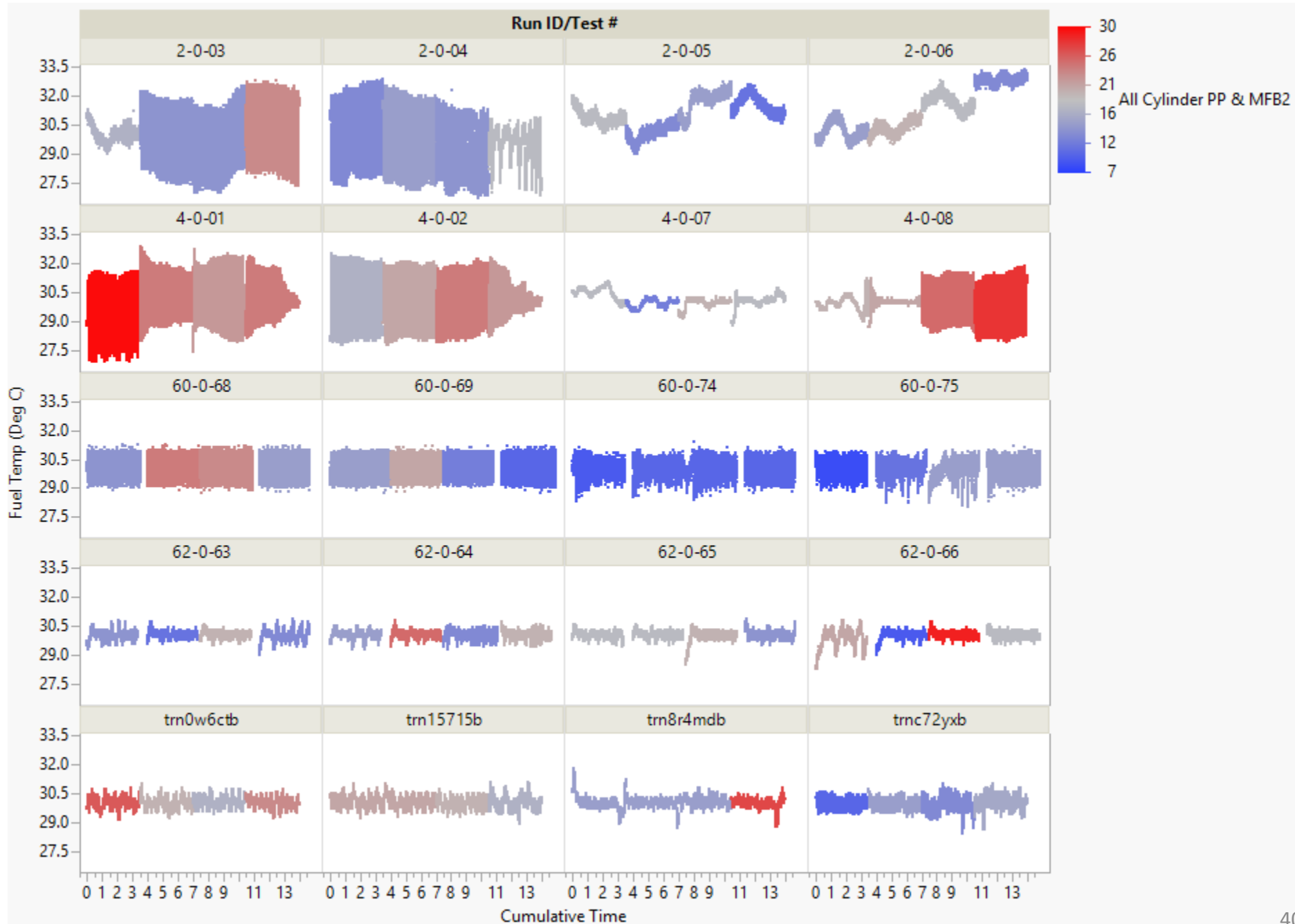




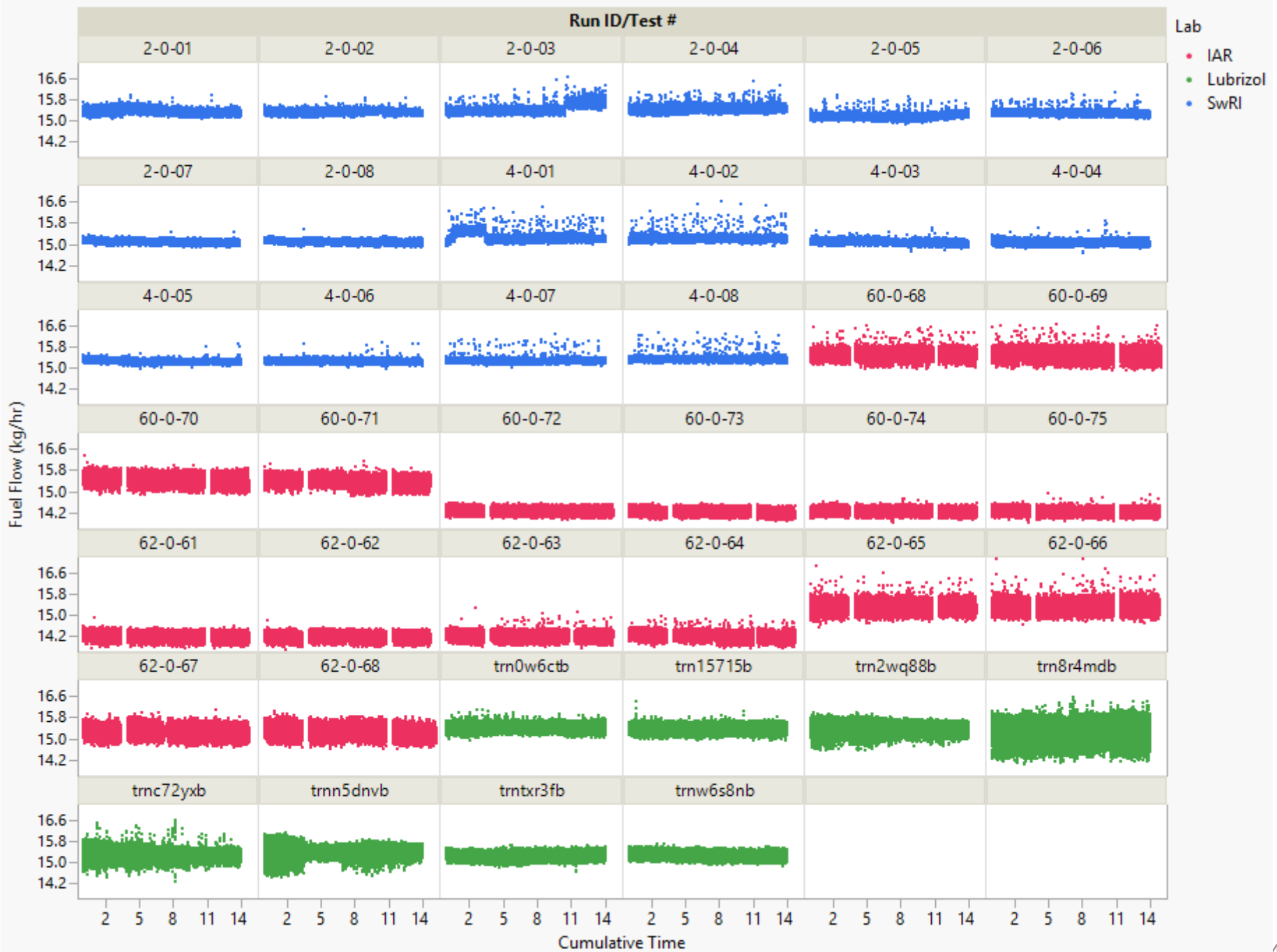
Low Event Oil



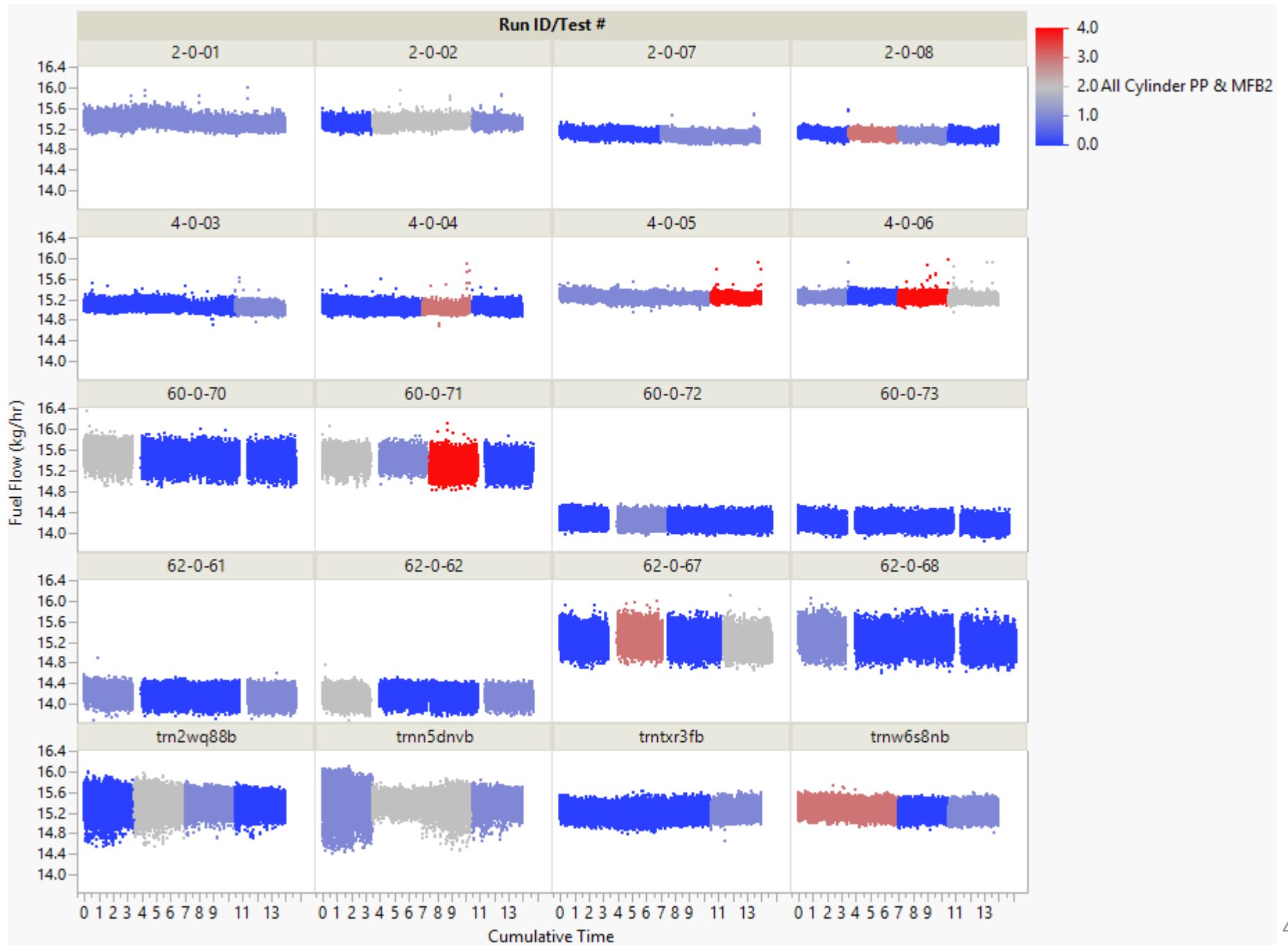
High Event Oil



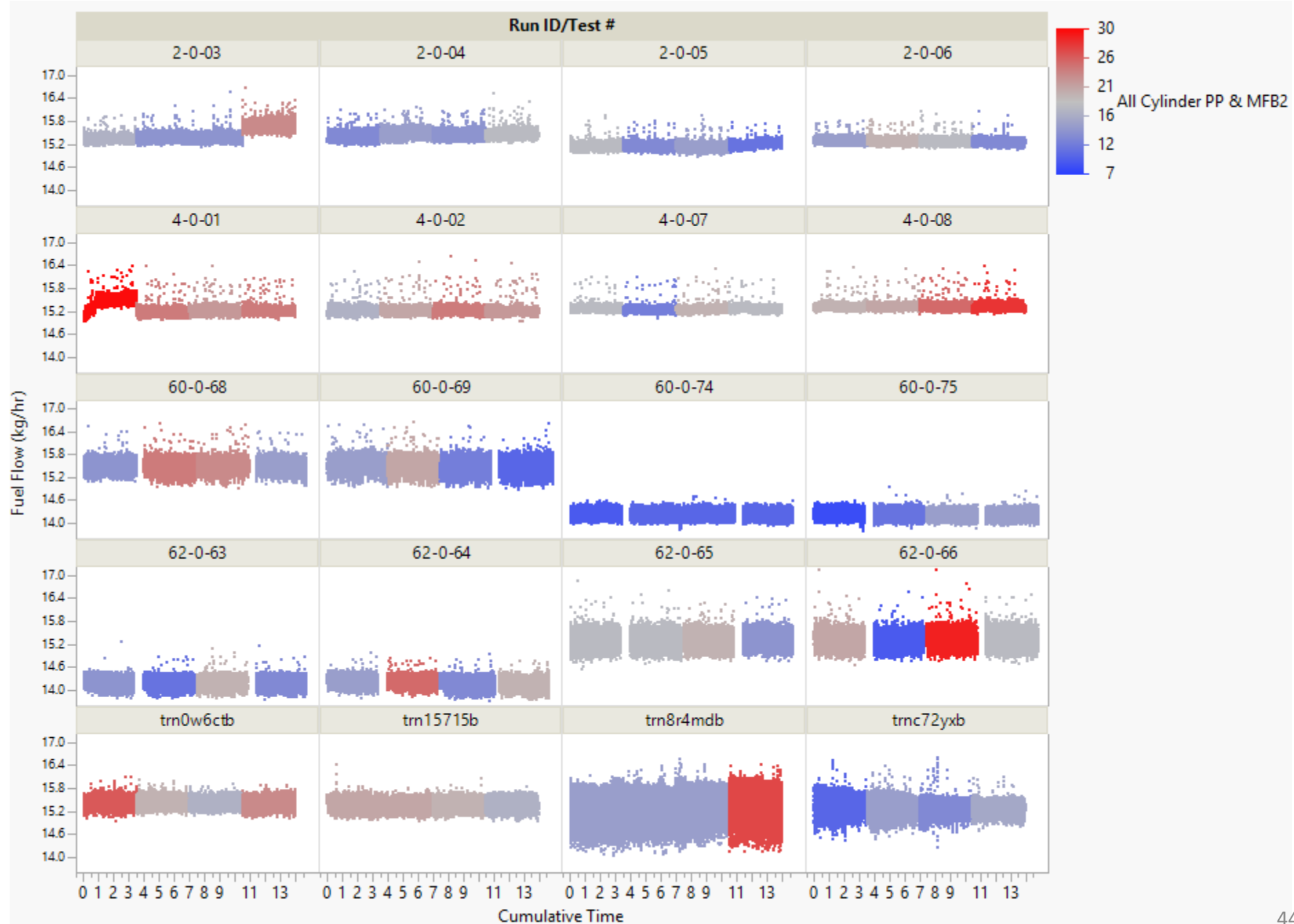
Fuel Flow



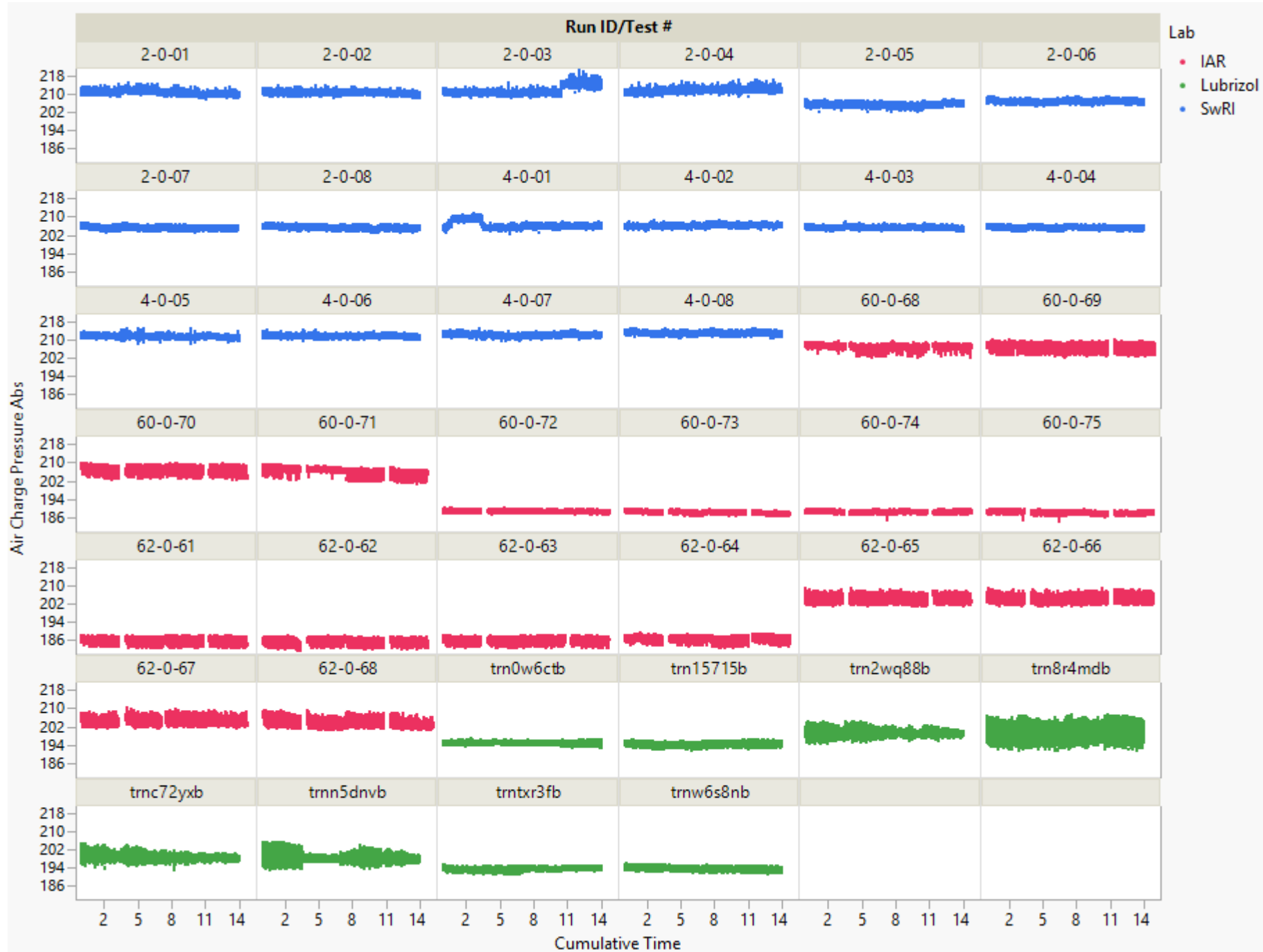
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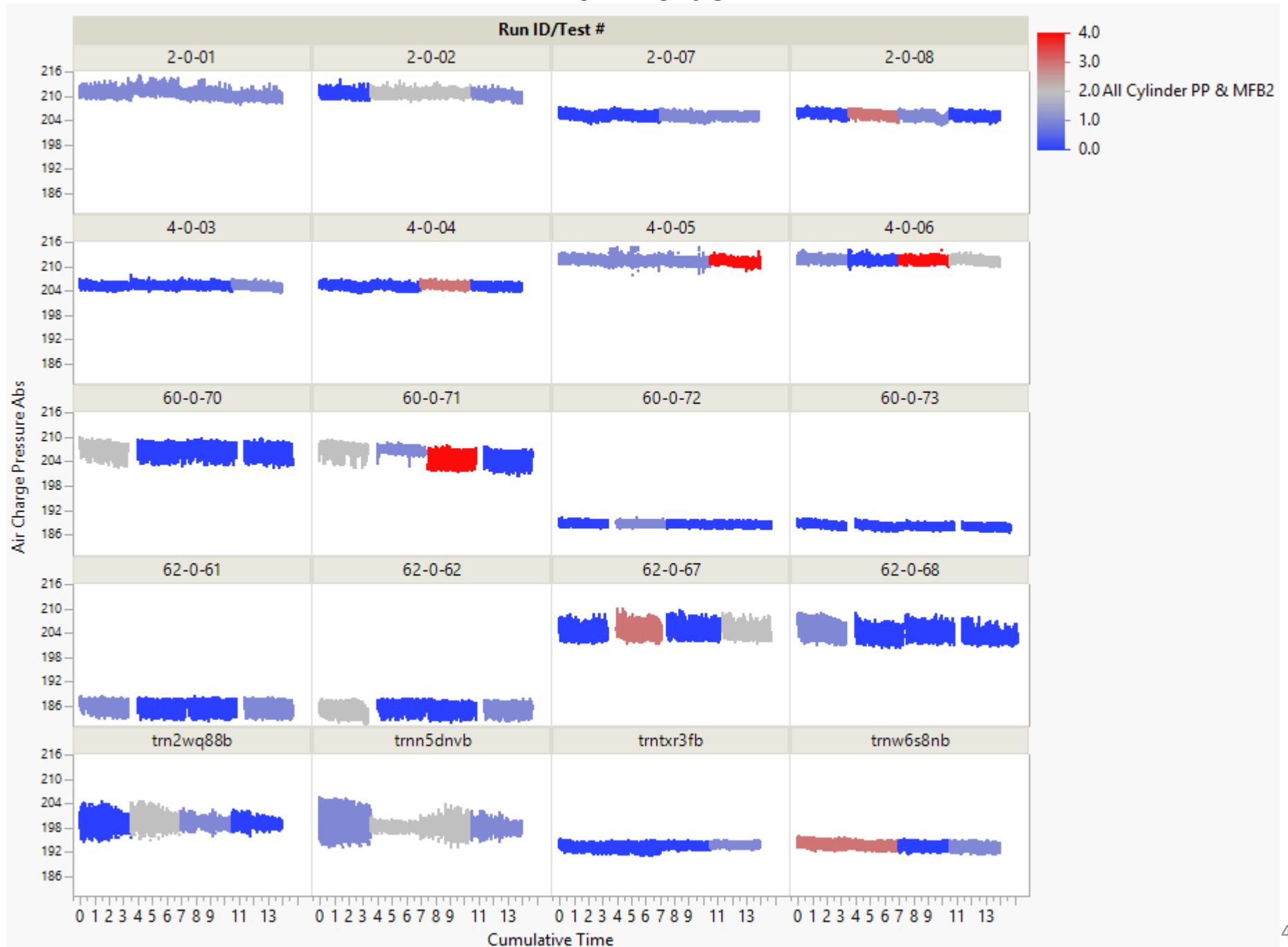
High Event Oil



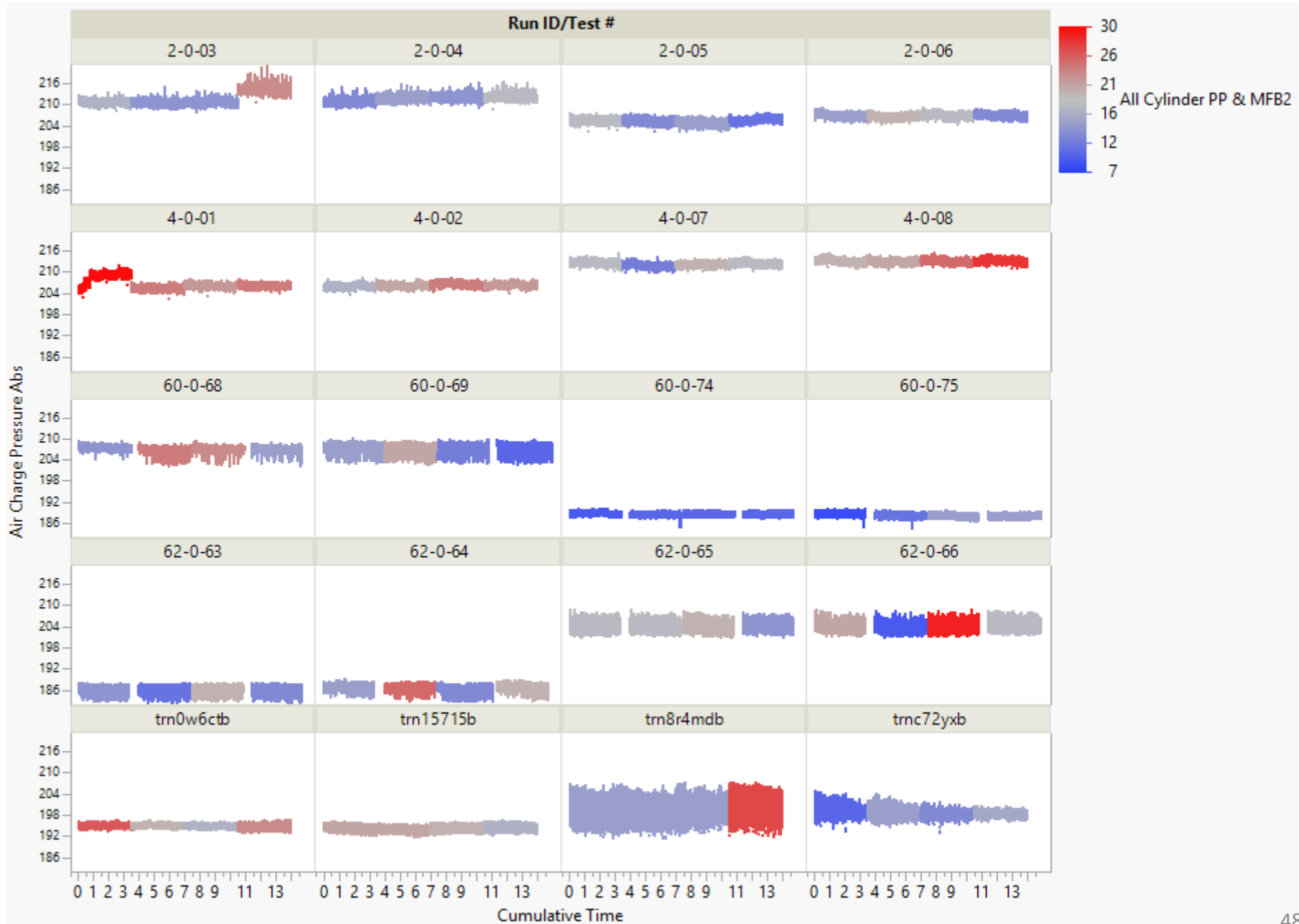
Air Charge Pressure



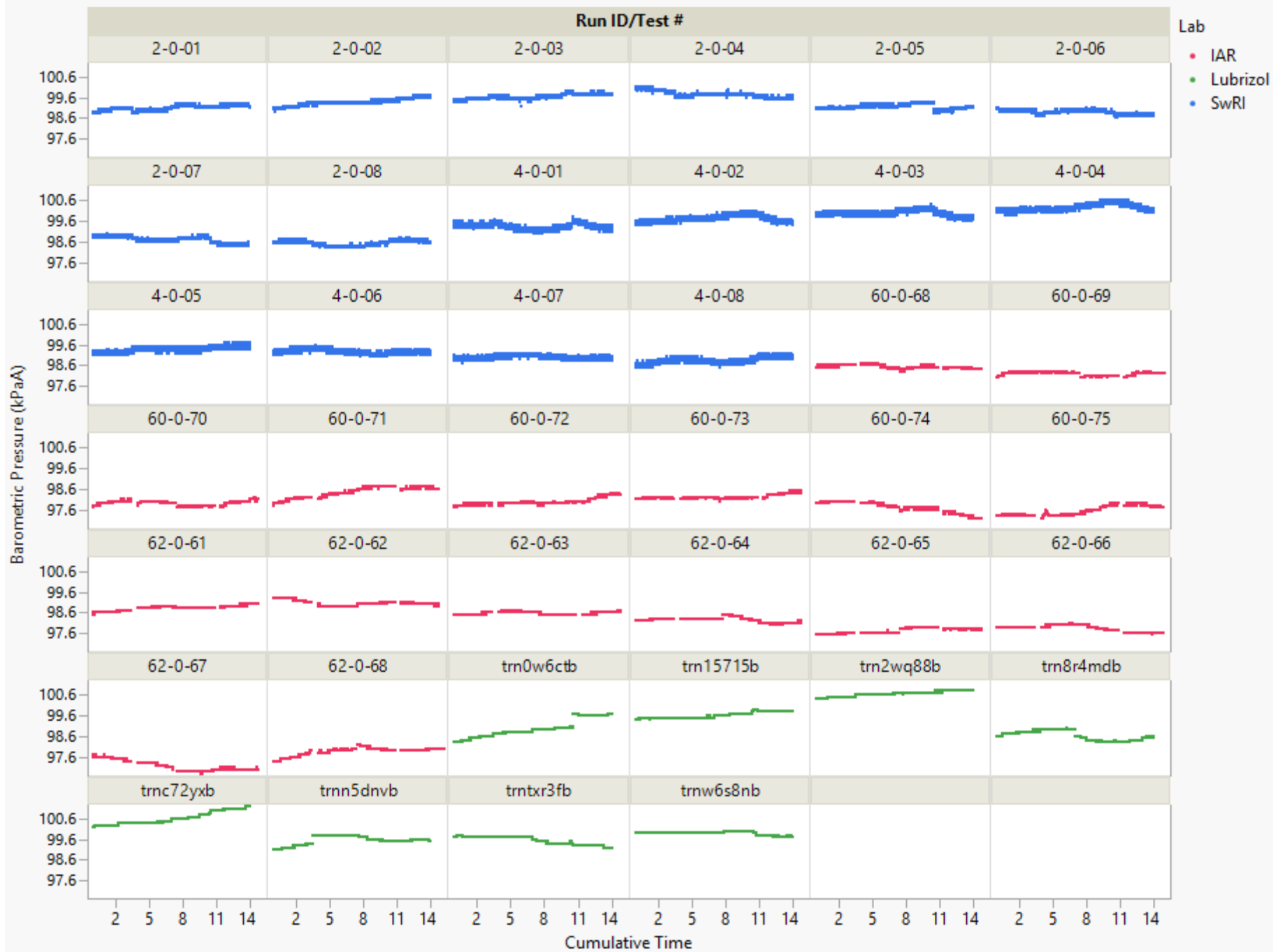
Low Event Oil



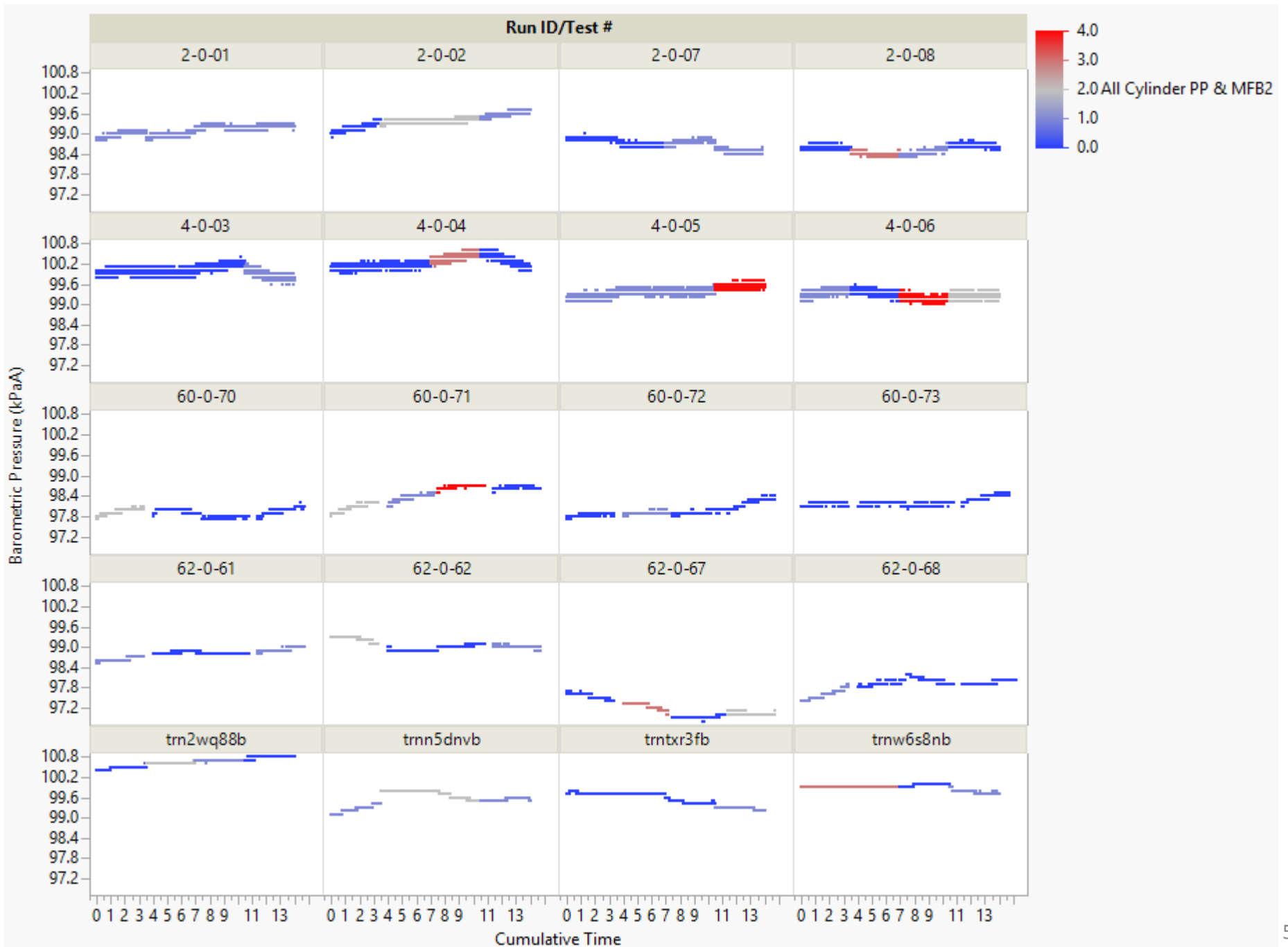
High Event Oil



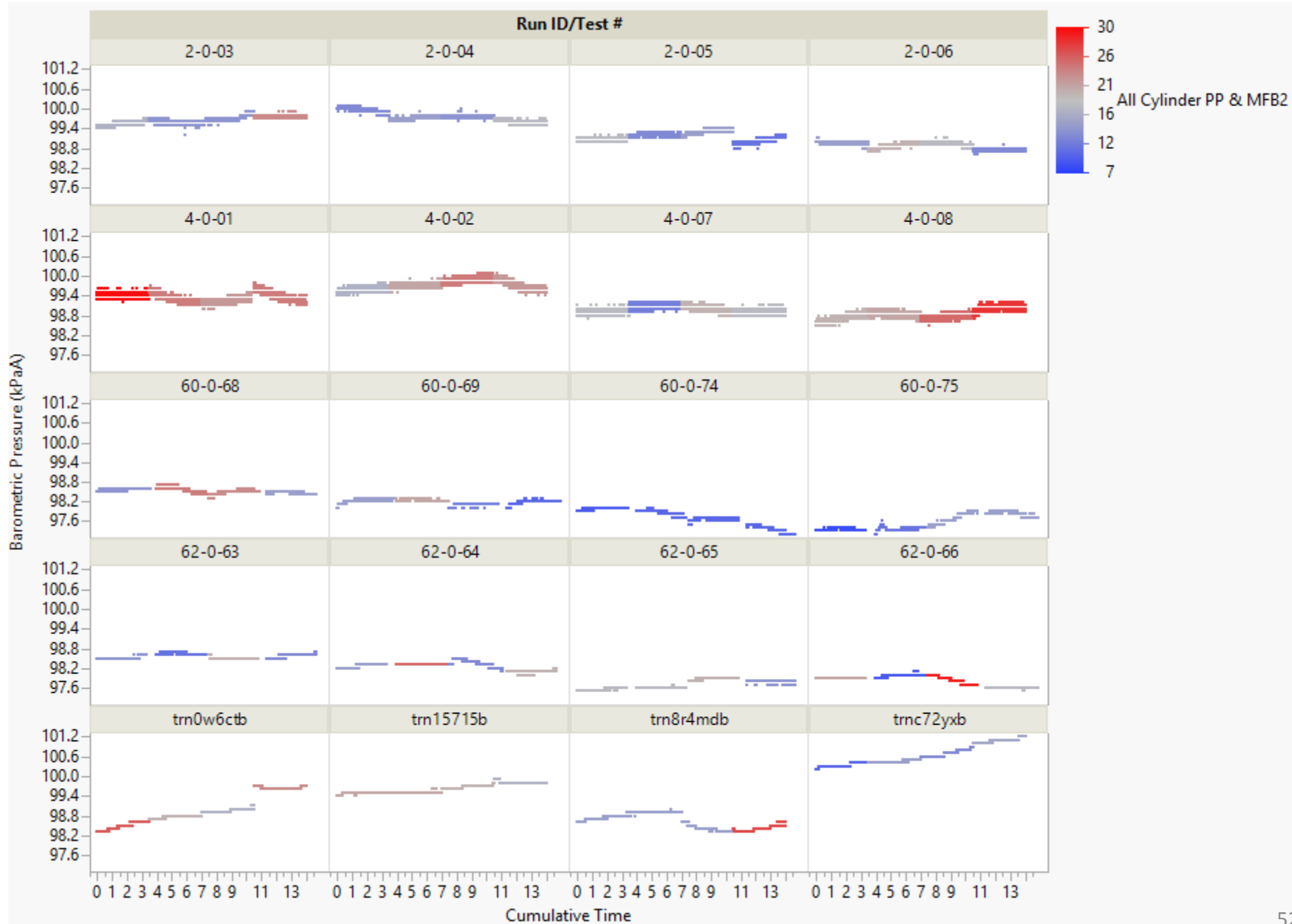
Barometric Pressure



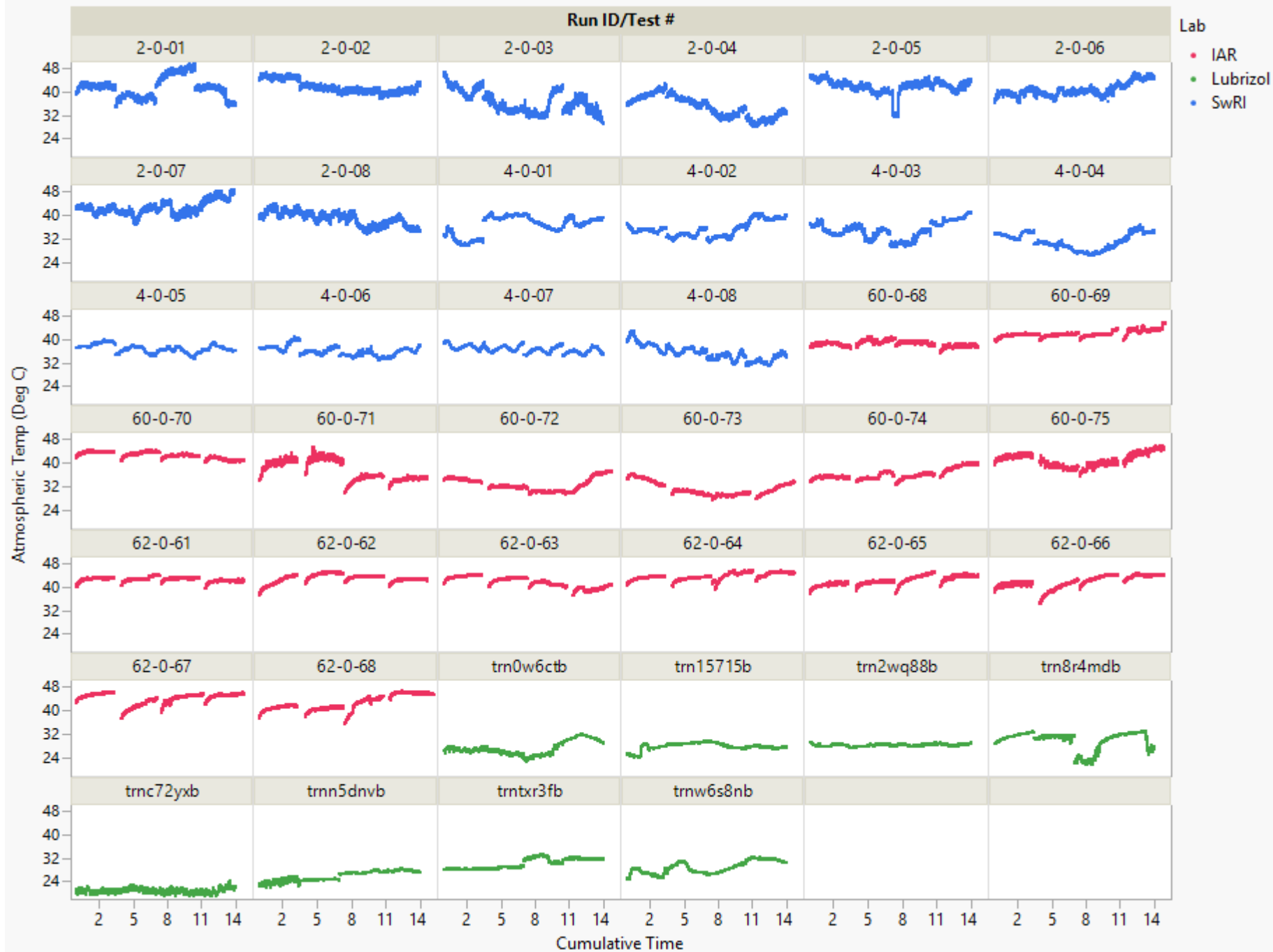
Low Event Oil



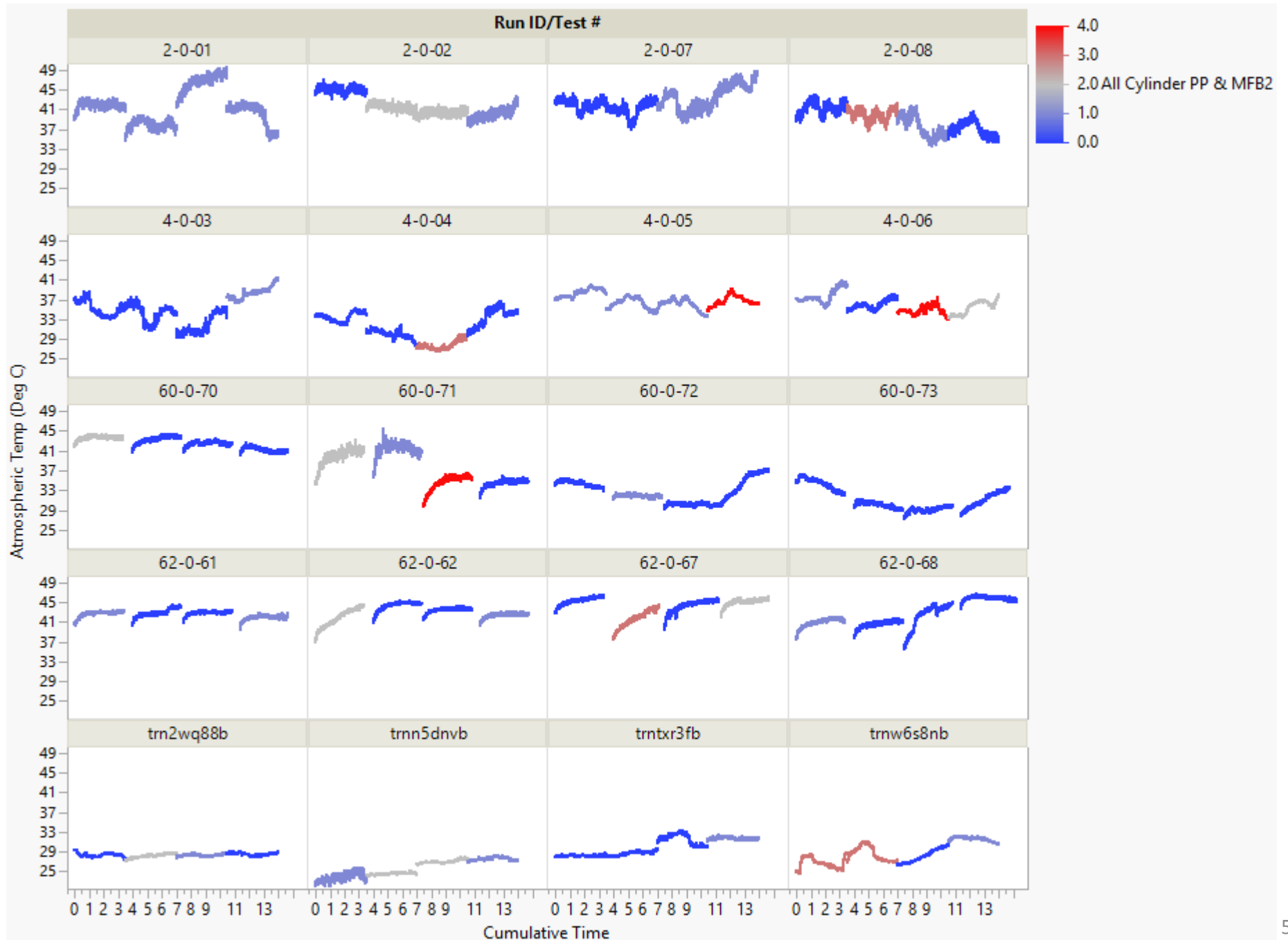
High Event Oil



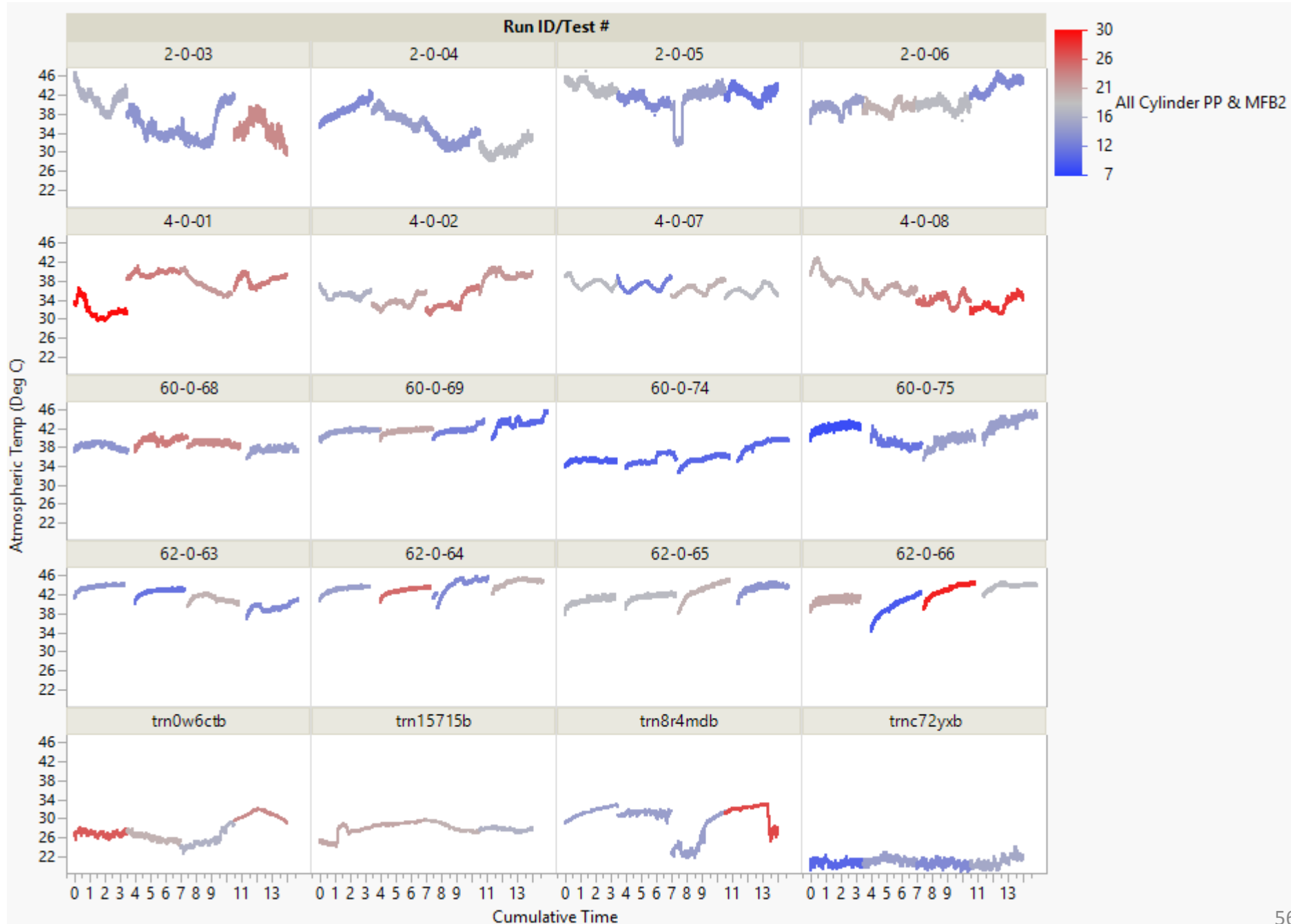
Atmospheric Temp



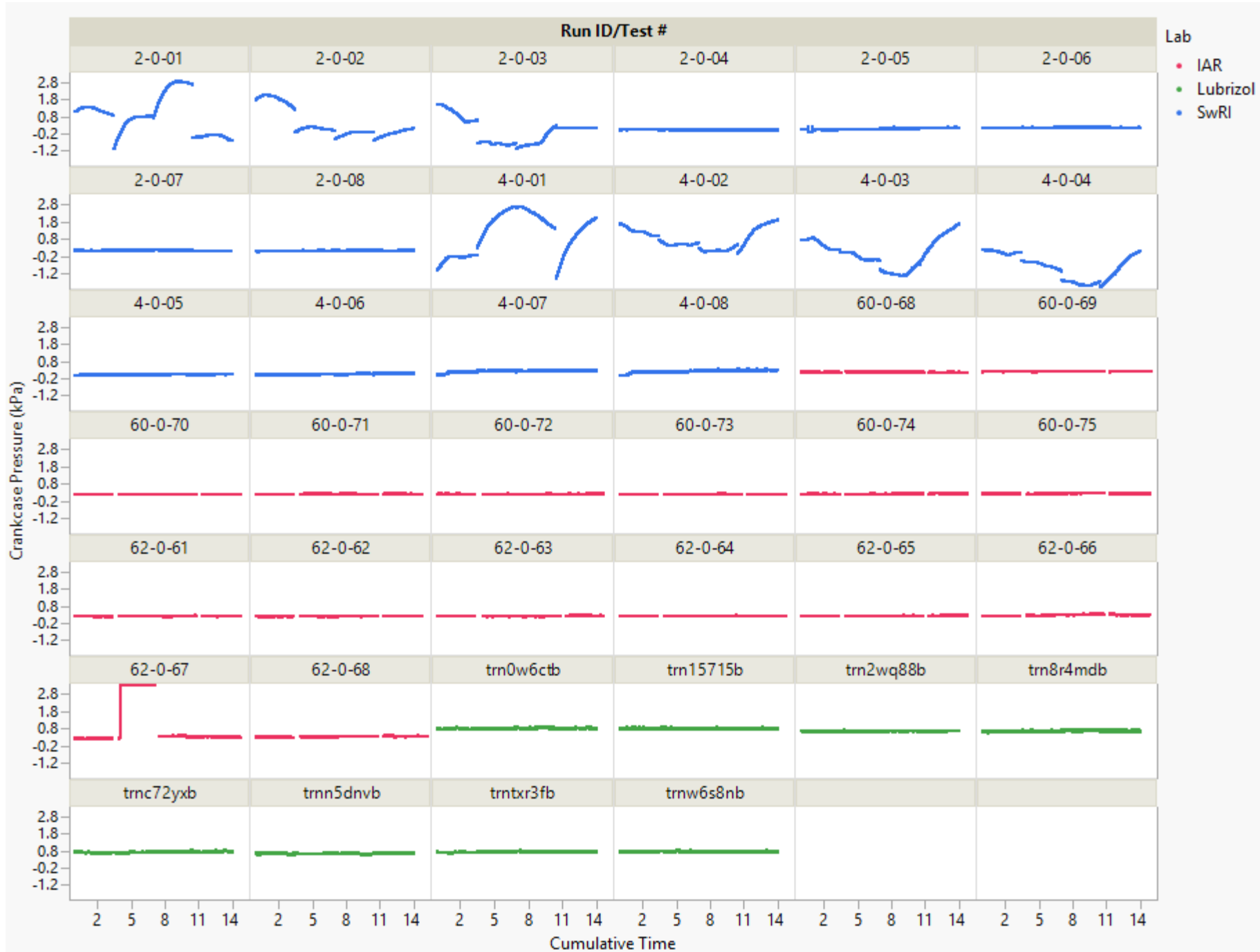
Low Event Oil

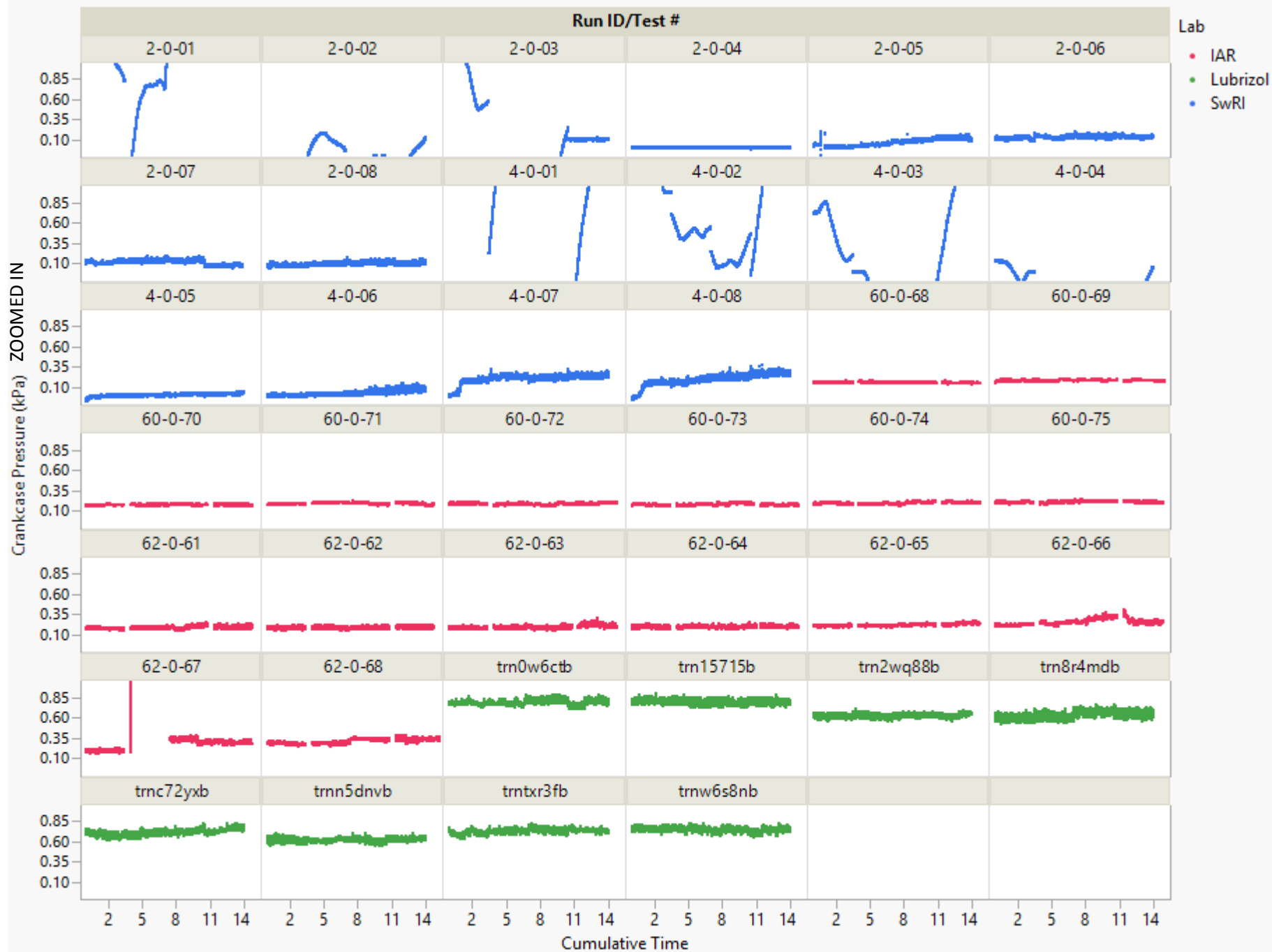


High Event Oil

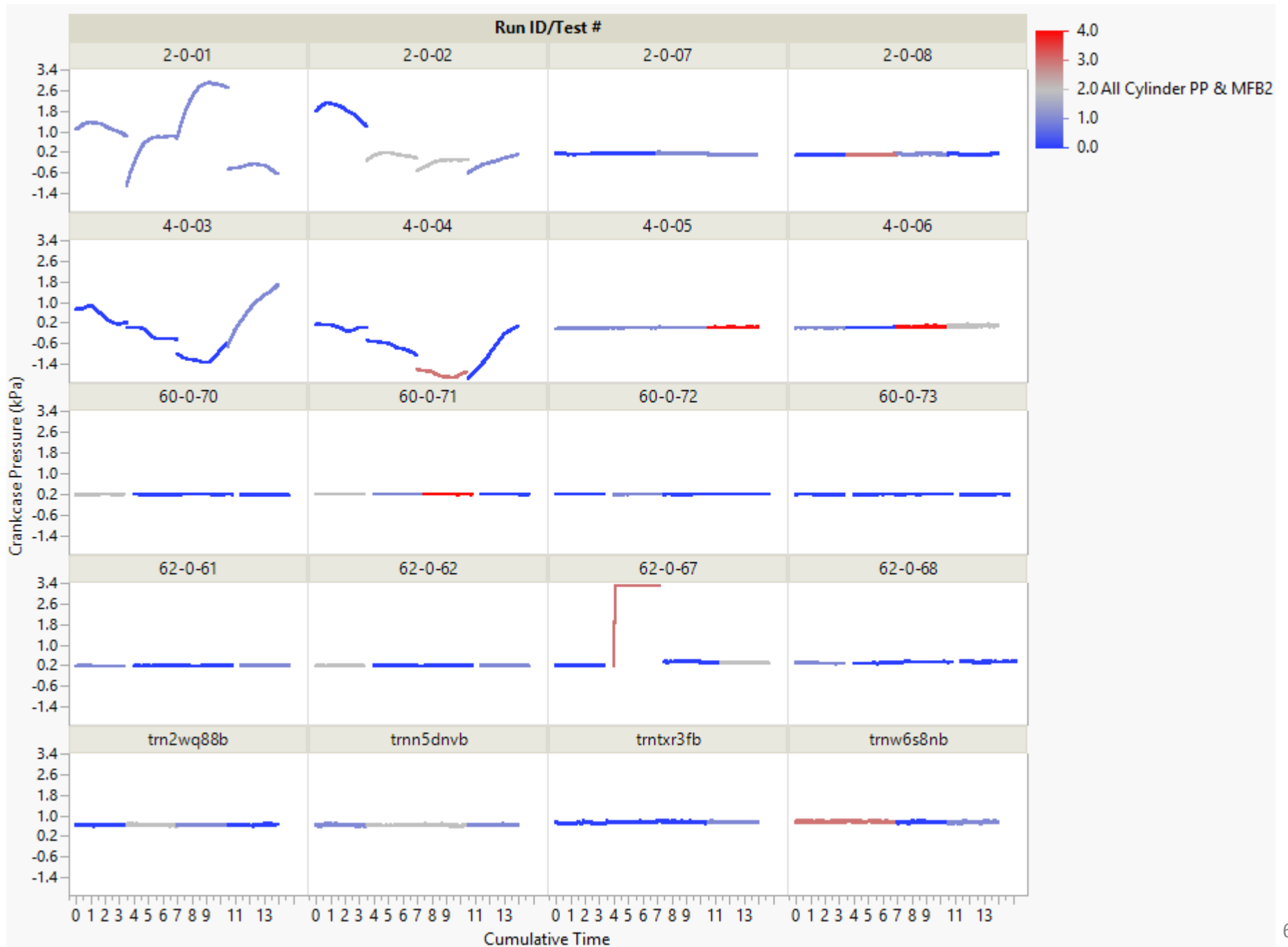


Crankcase Pressure

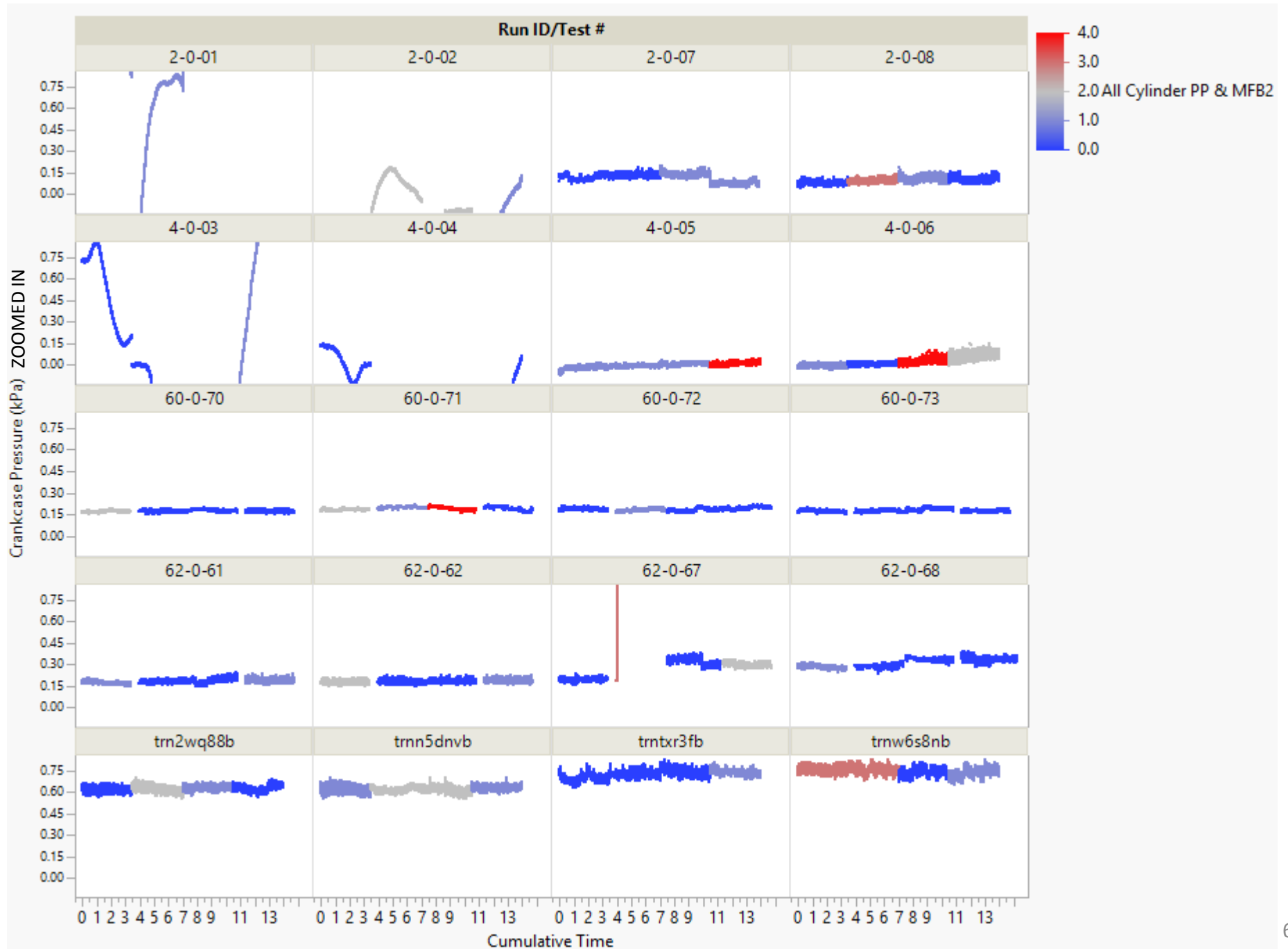




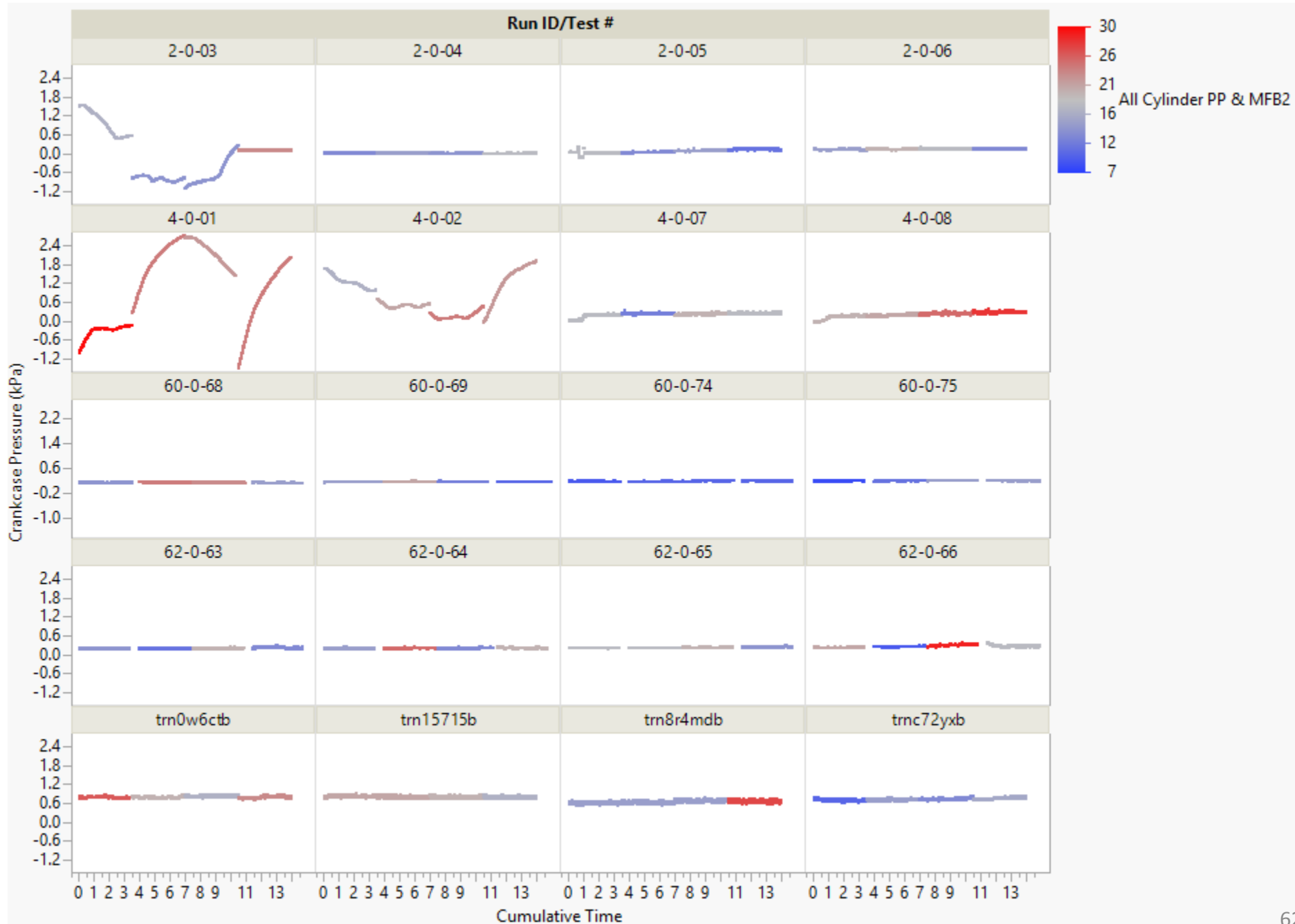
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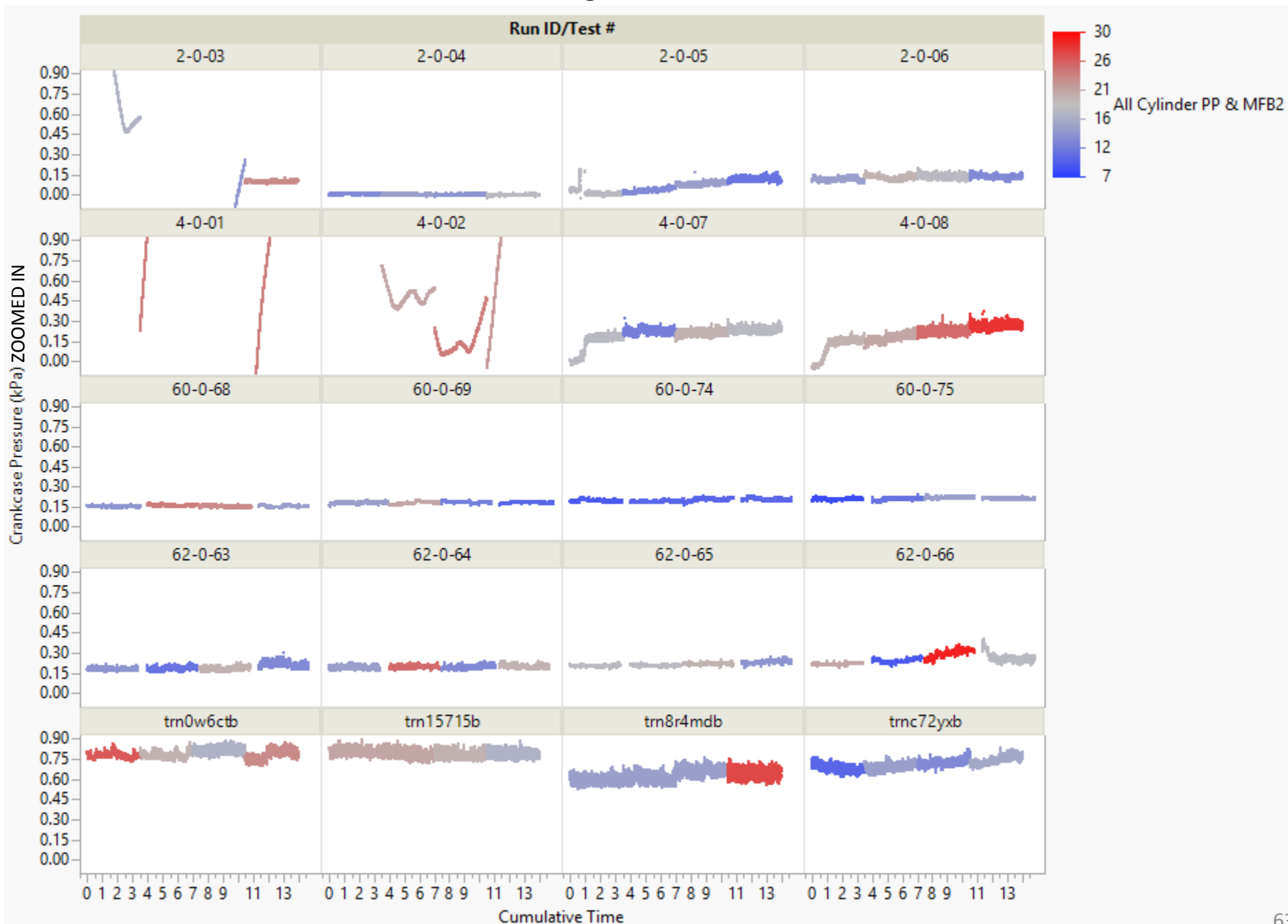
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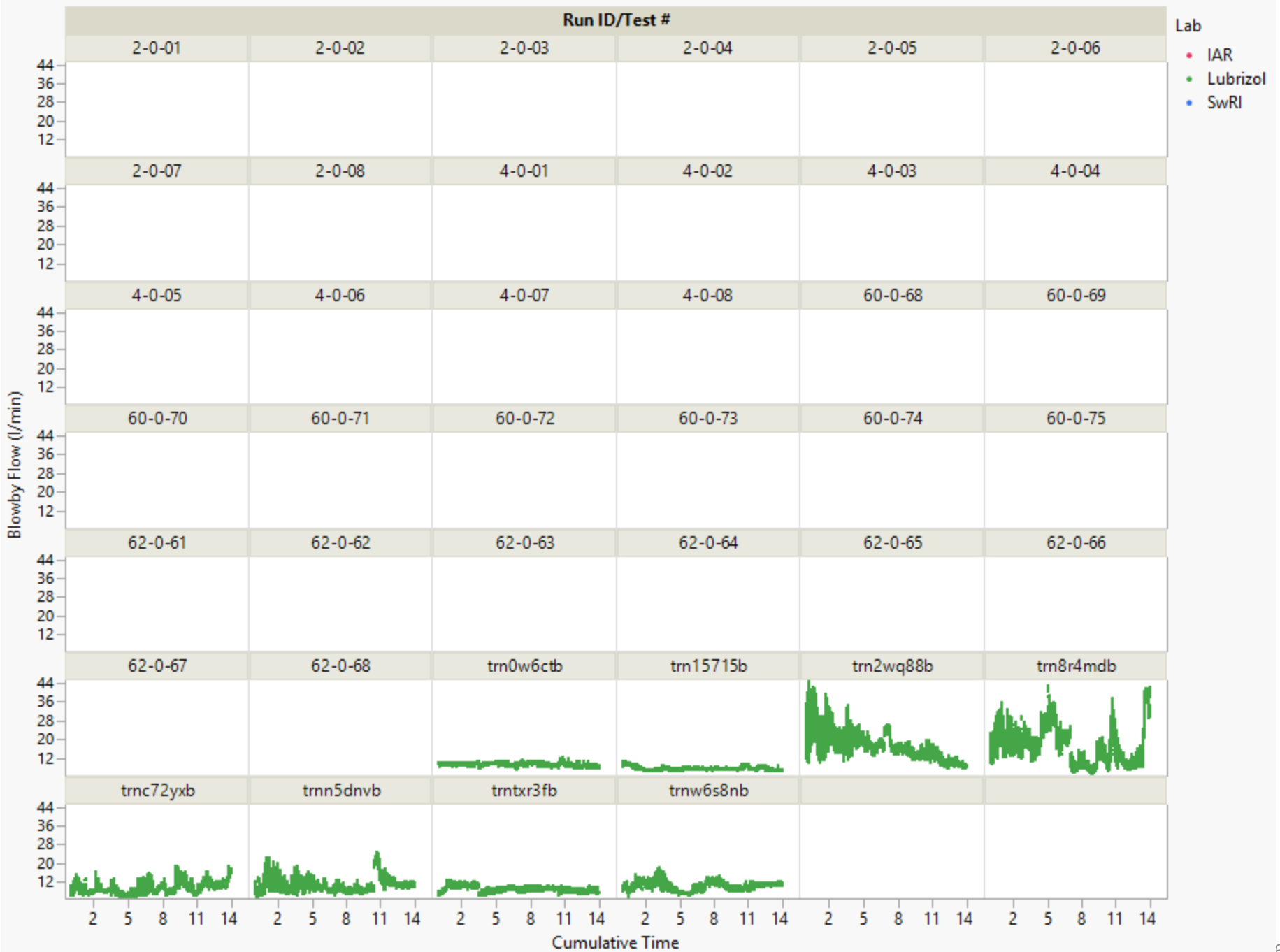
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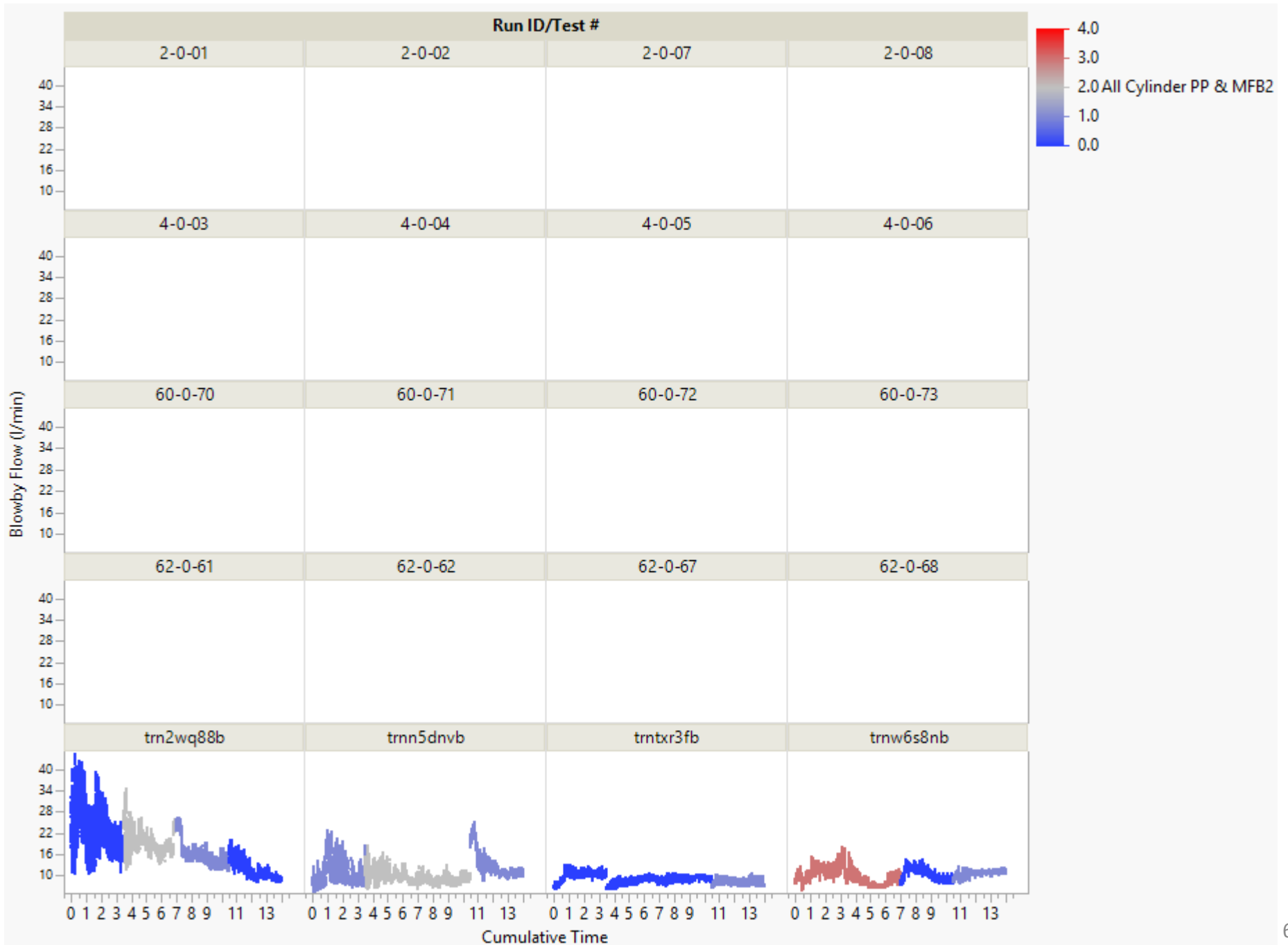
High Event Oil



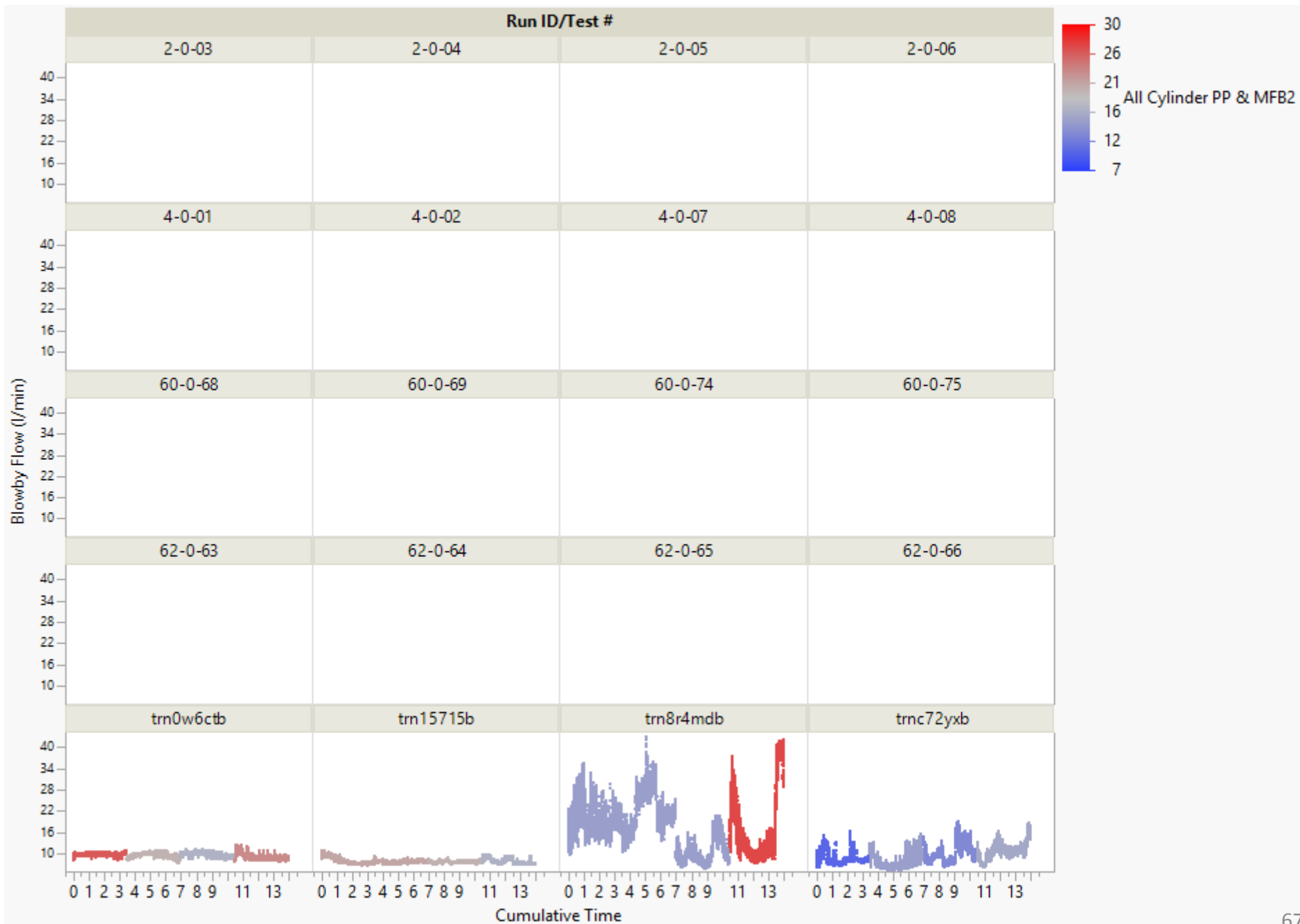
Blowby Flow



Low Event Oil



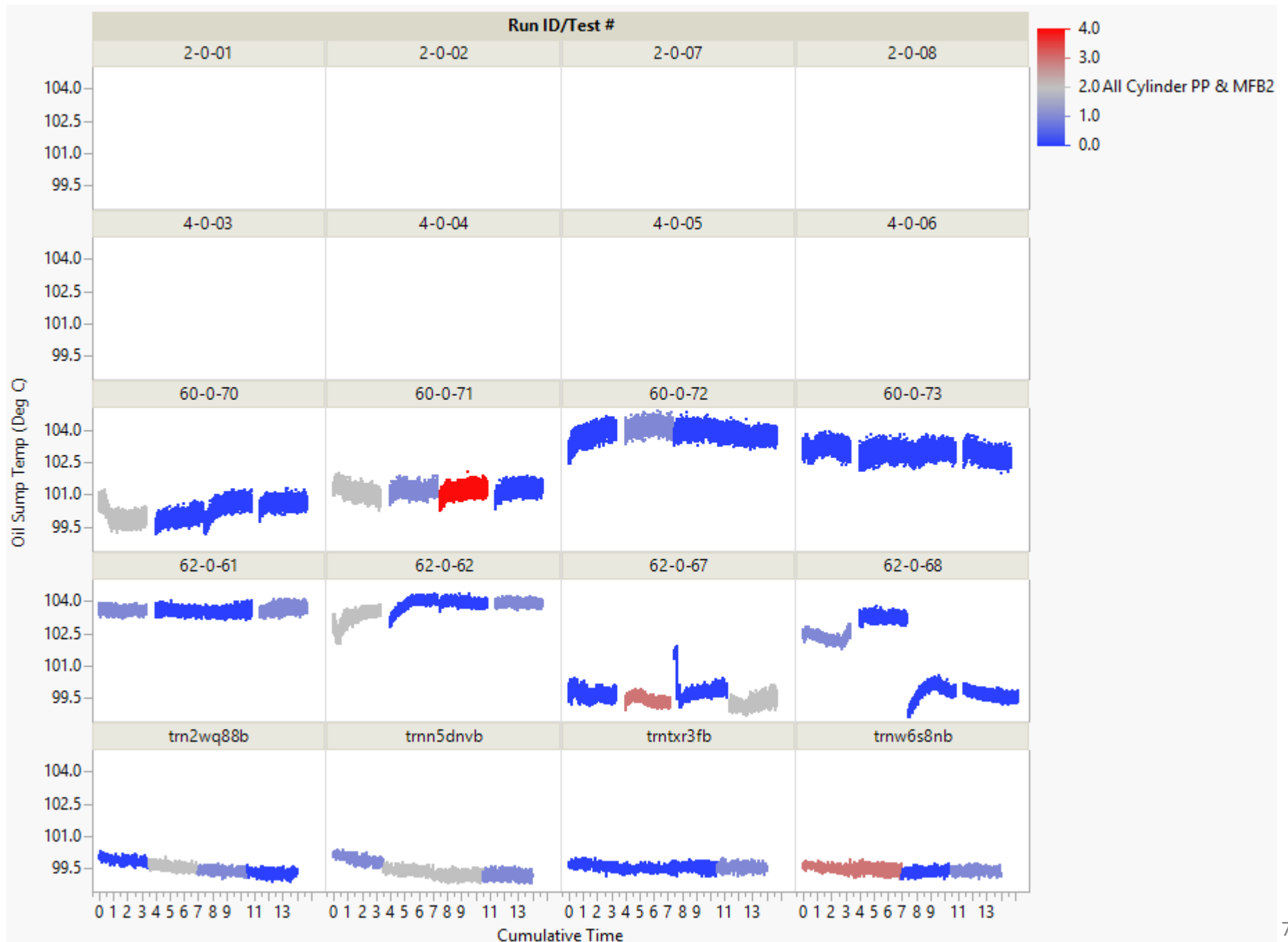
High Event Oil



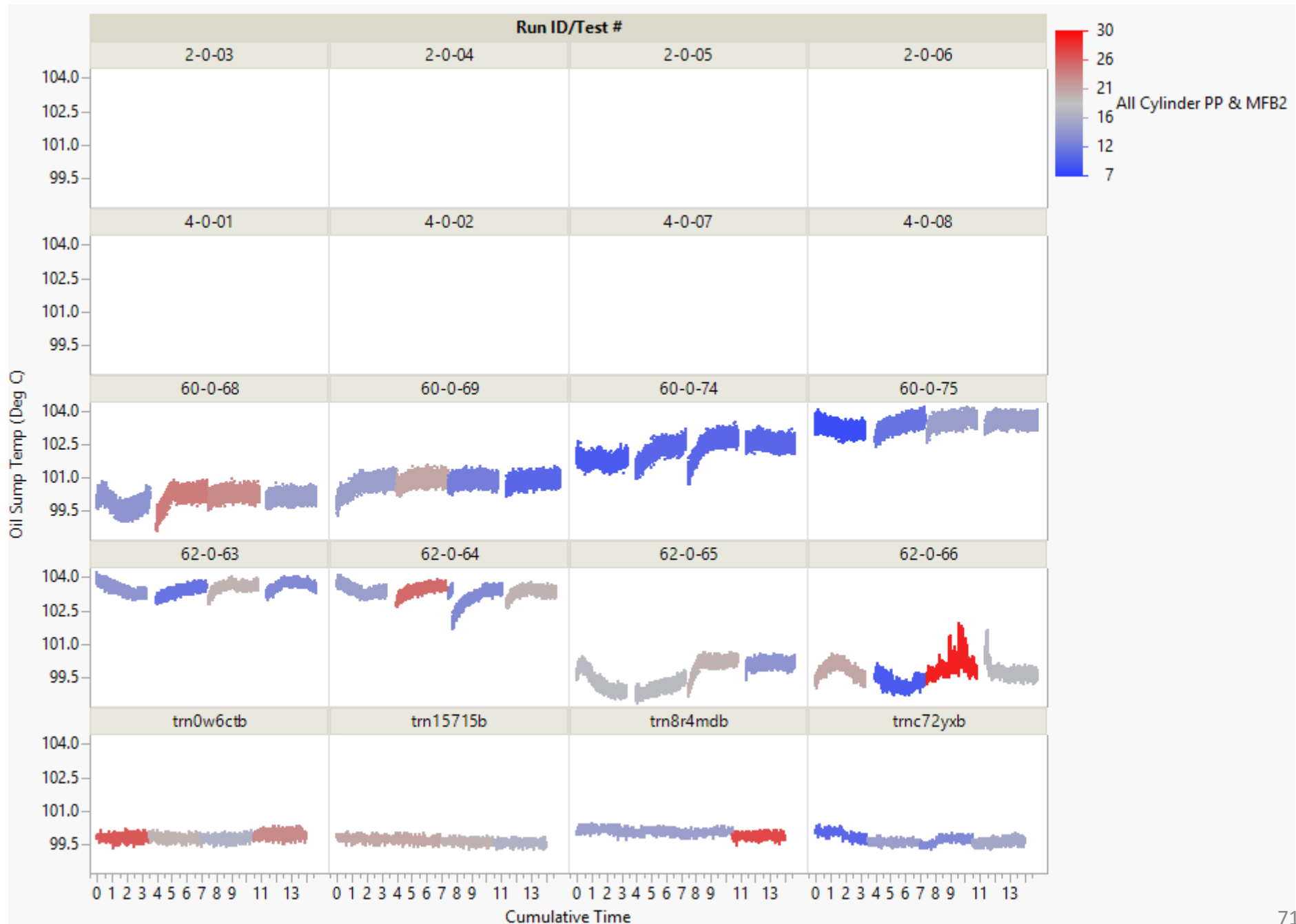
Oil Sump Temp



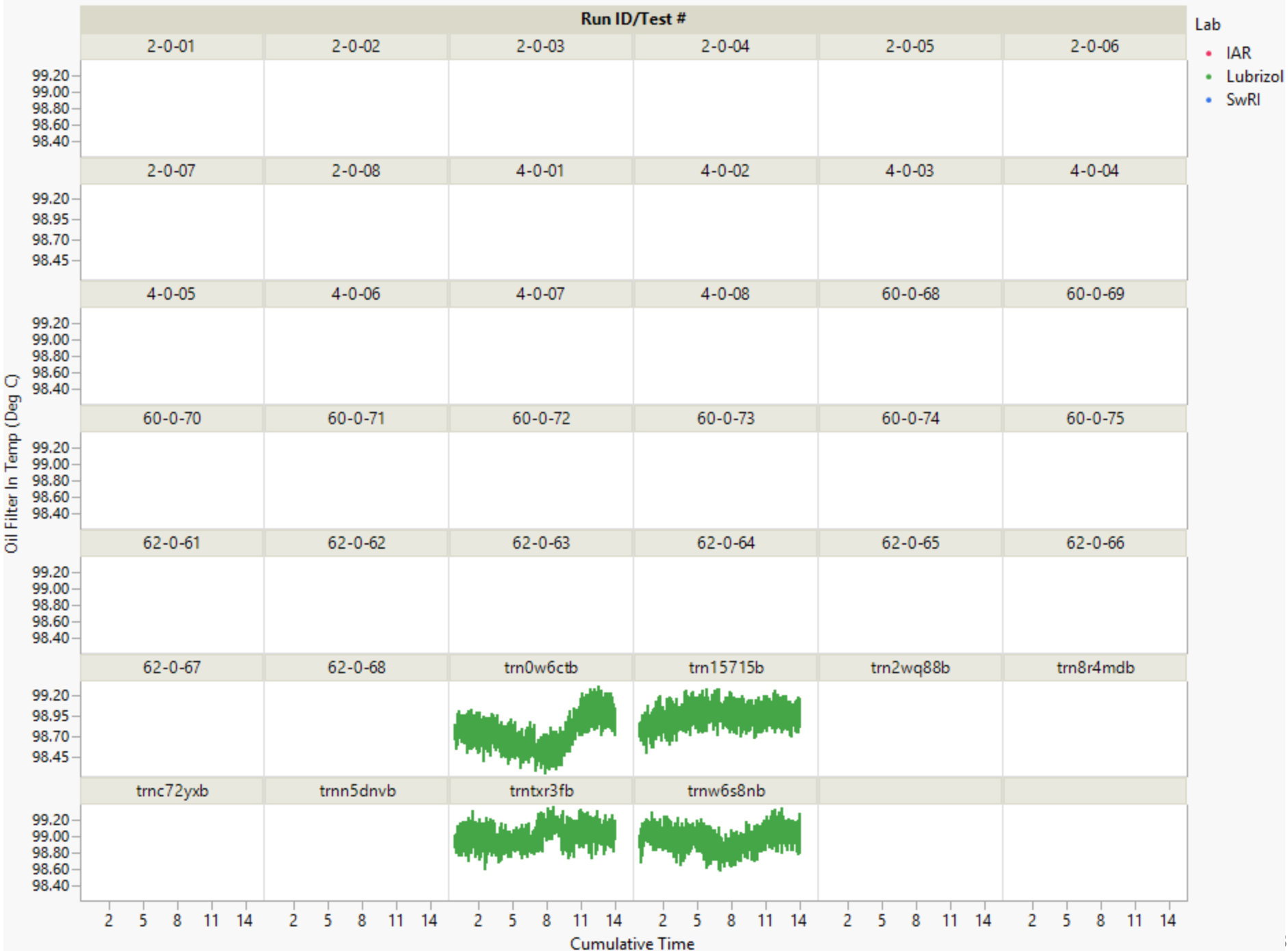
Low Event Oil



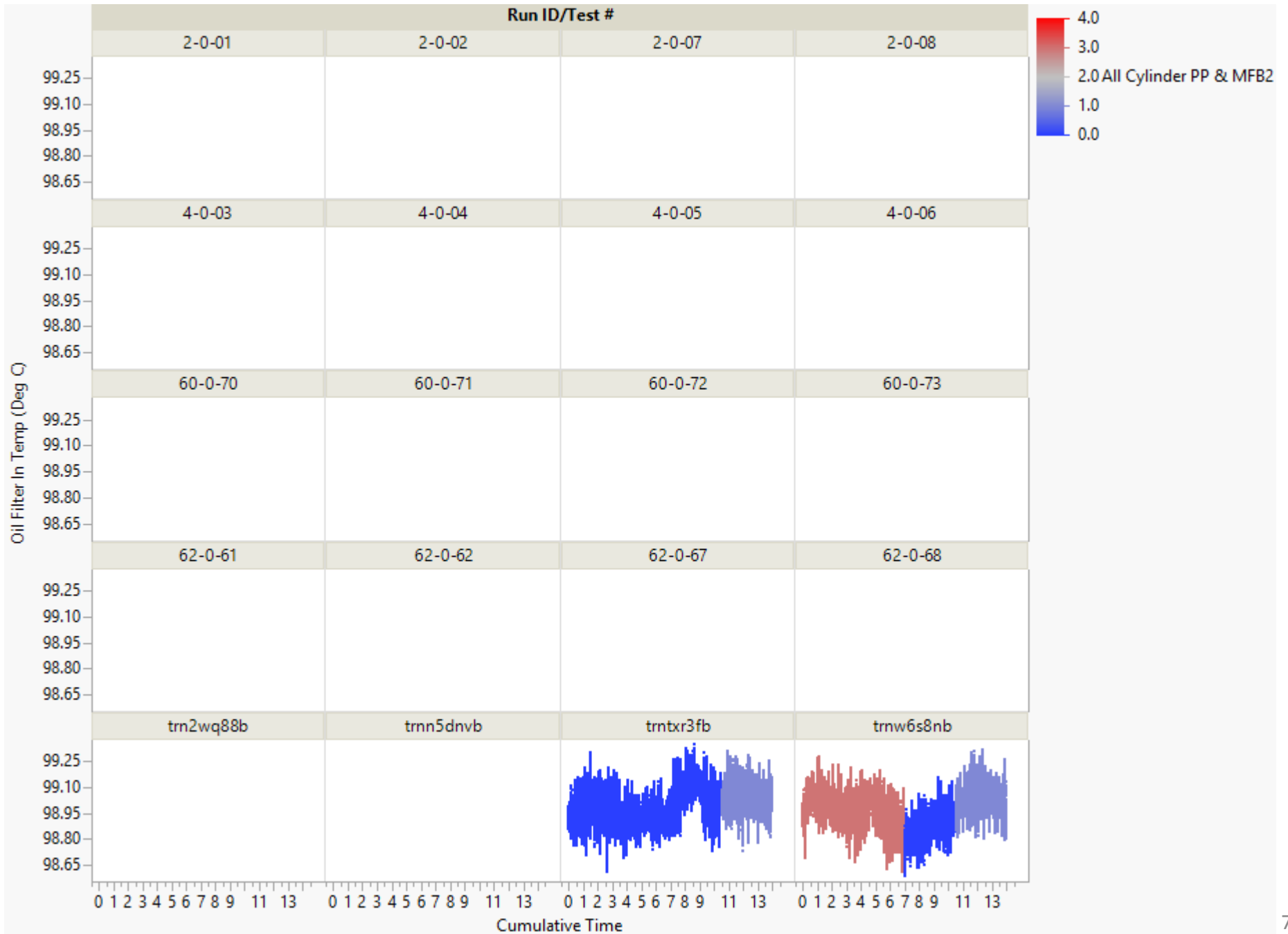
High Event Oil



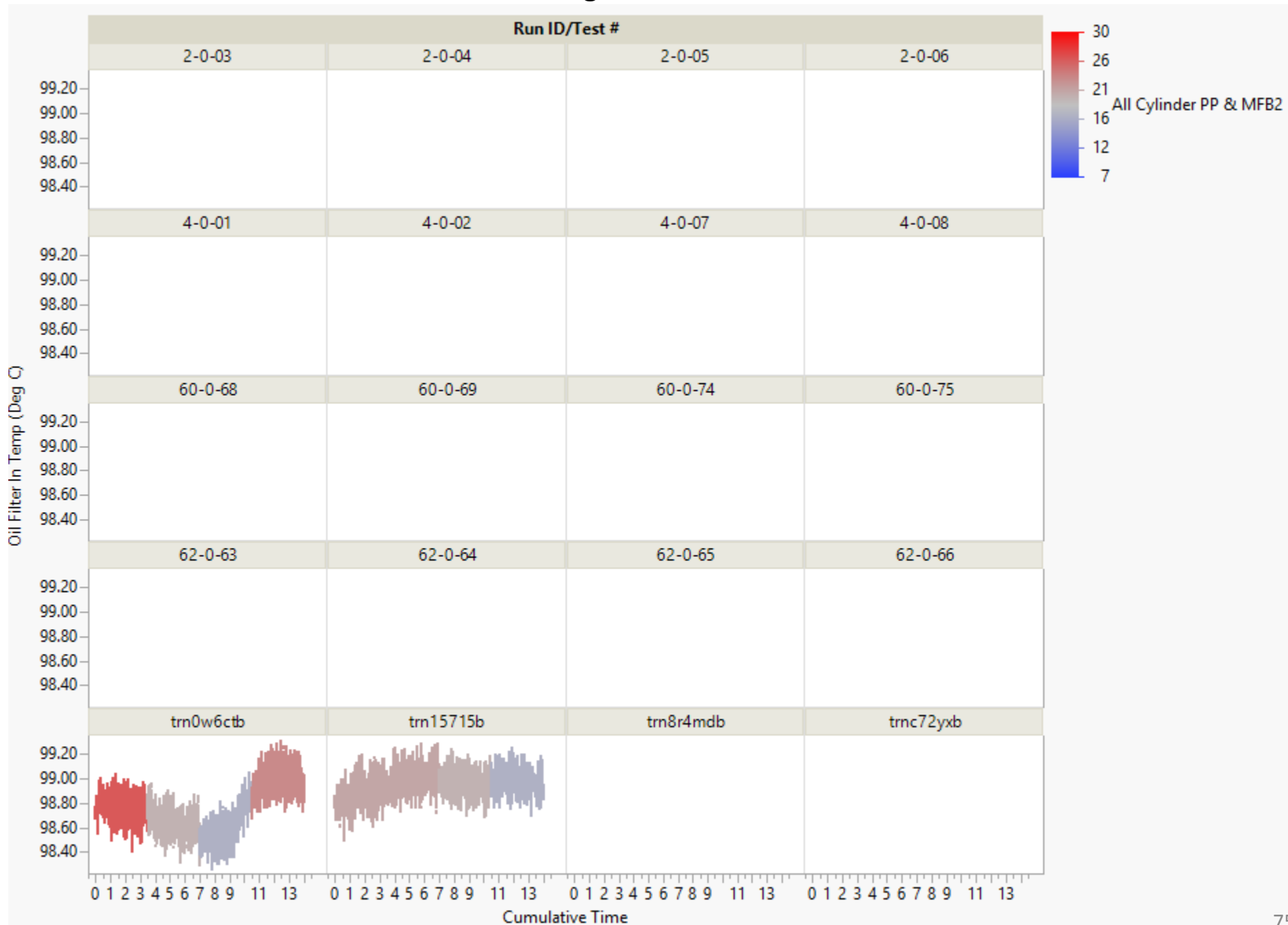
Oil Fiter In Temp



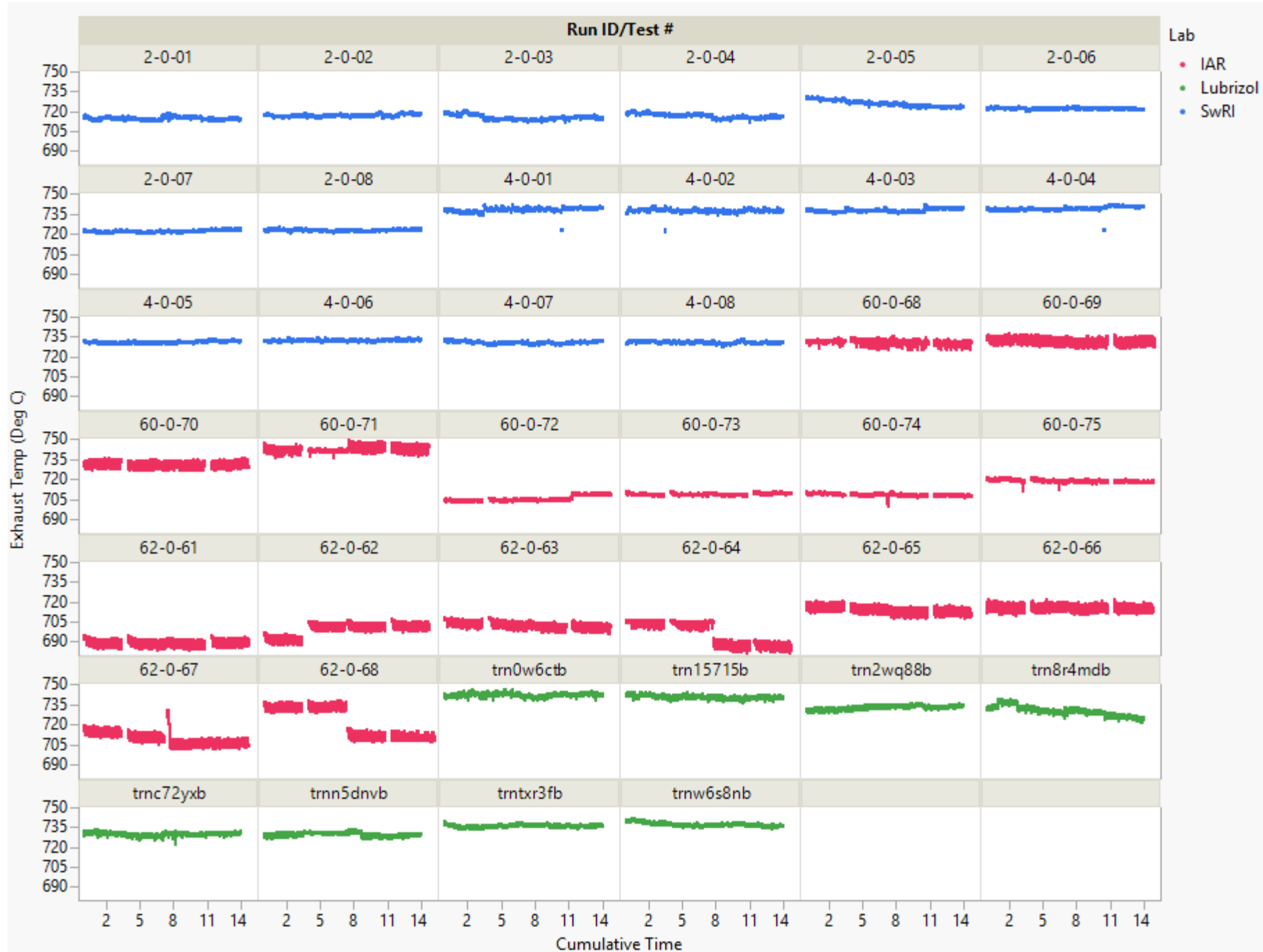
Low Event Oil



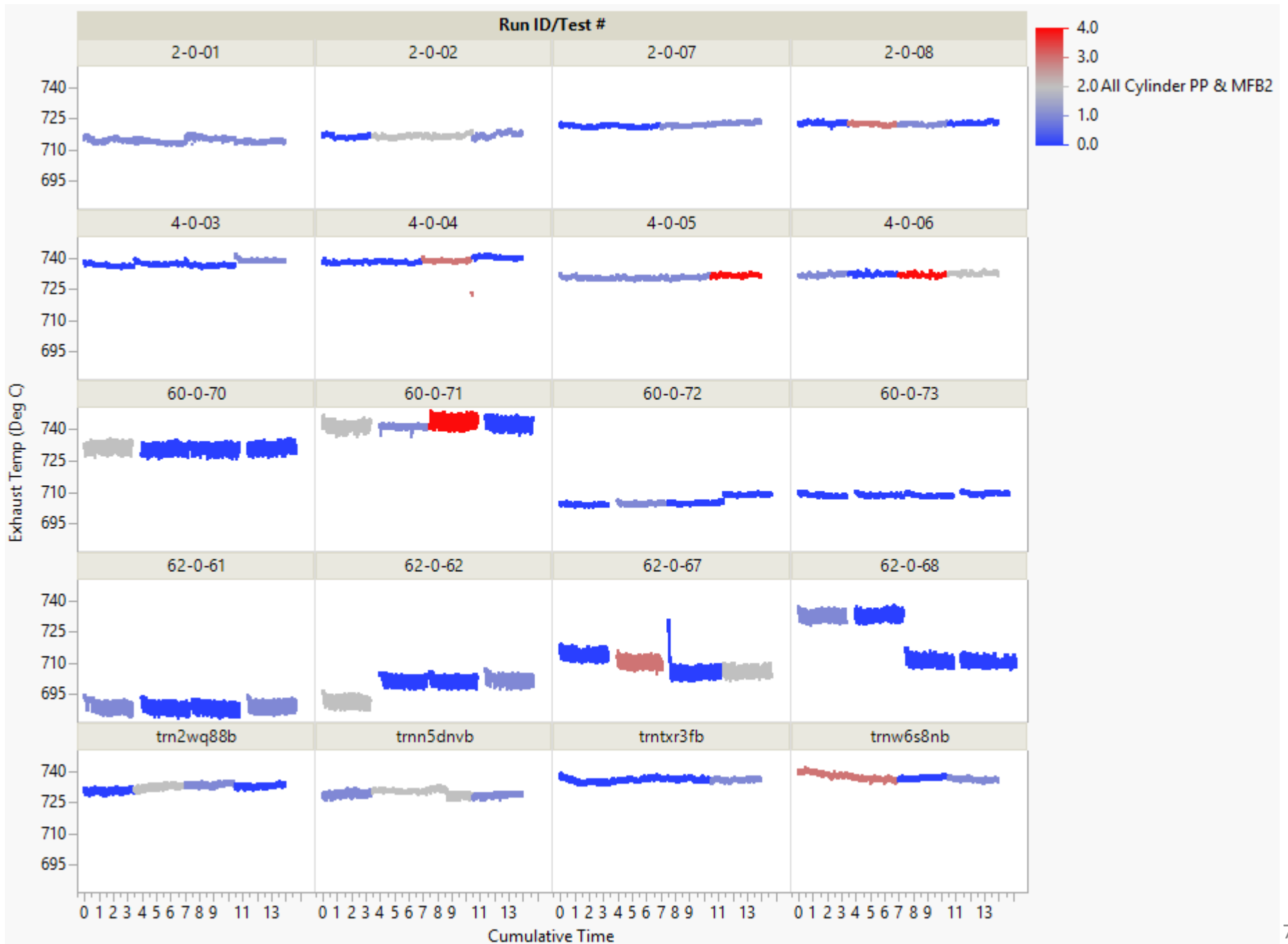
High Event Oil



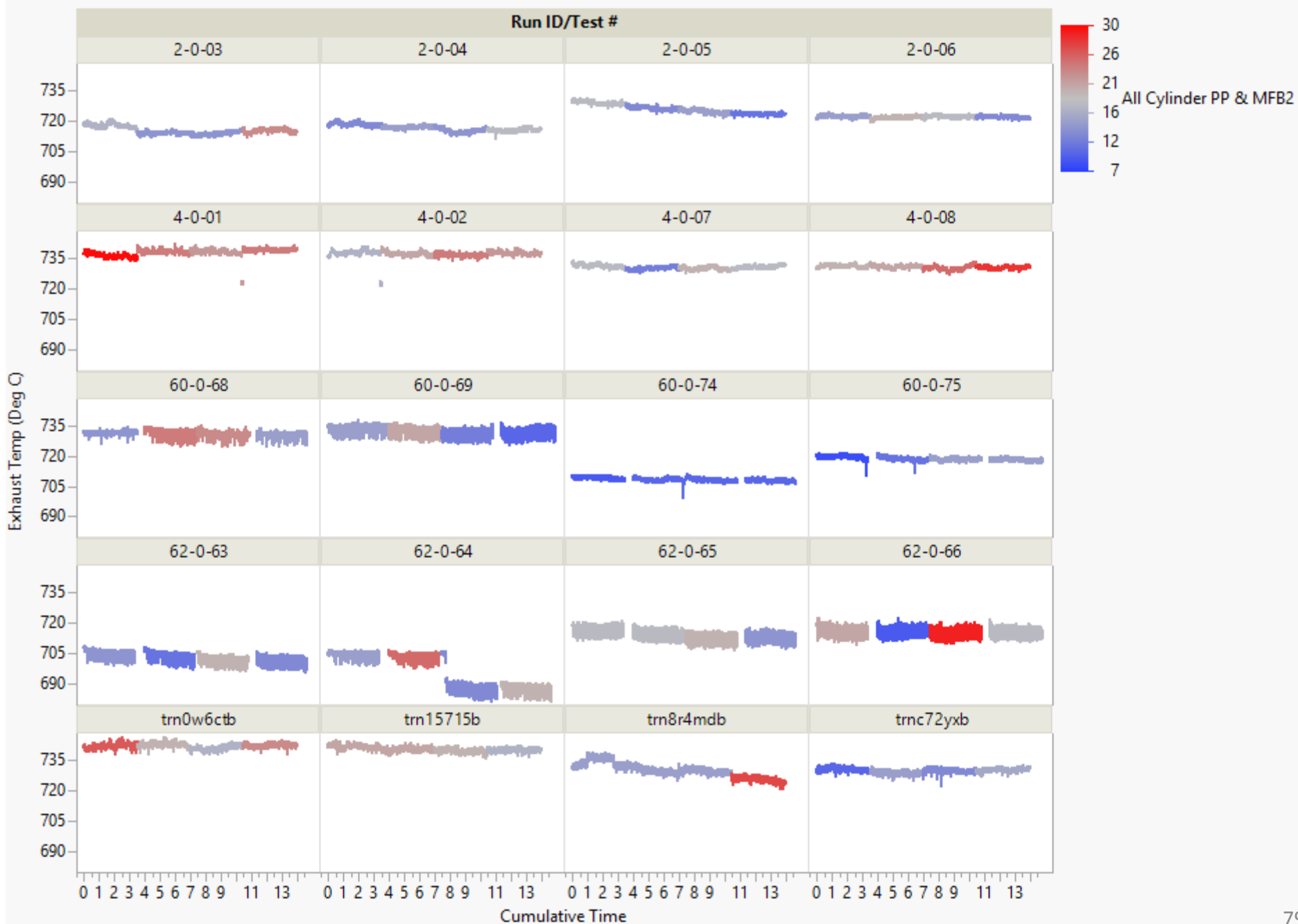
Exhaust Temp



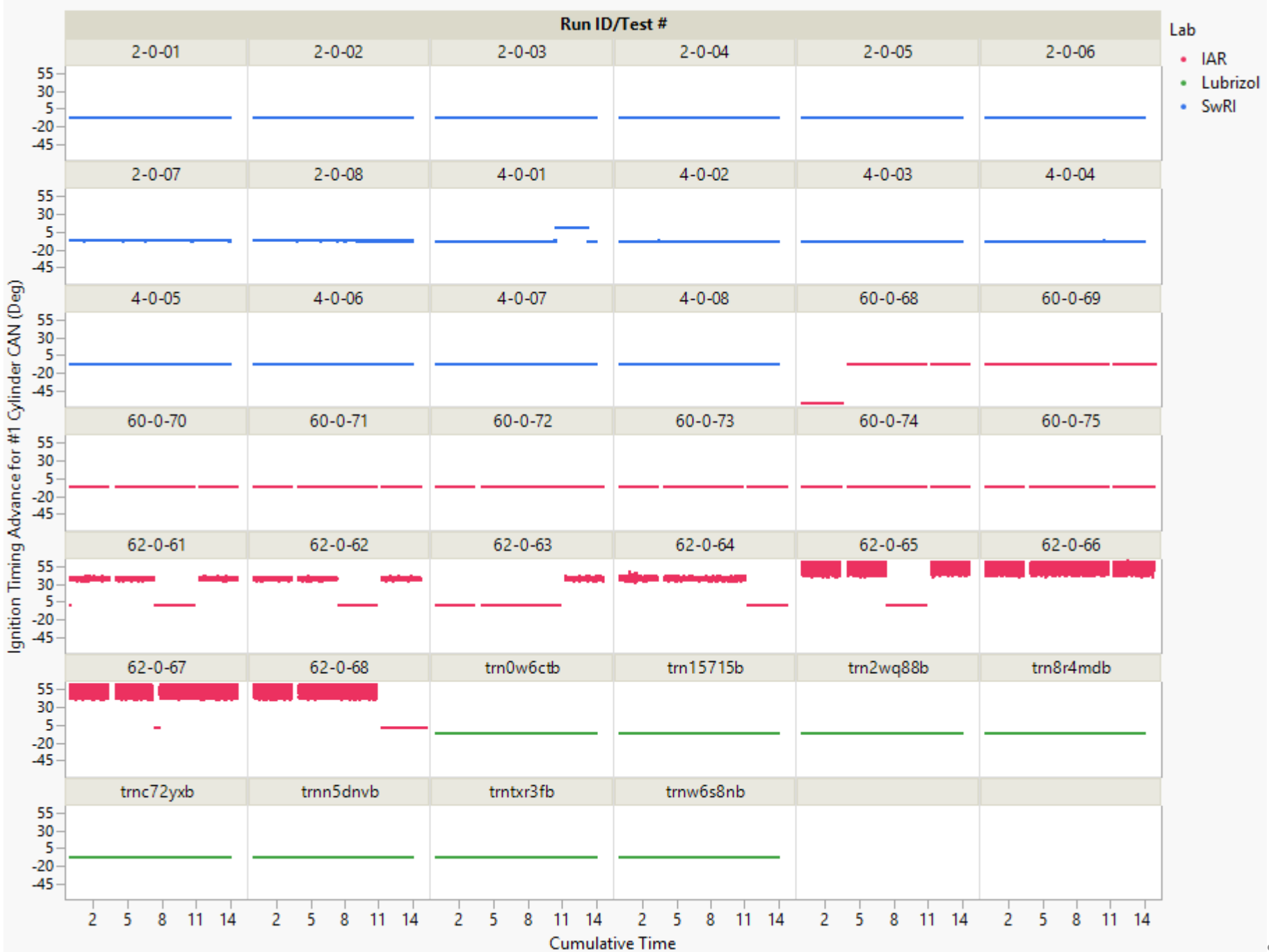
Low Event Oil

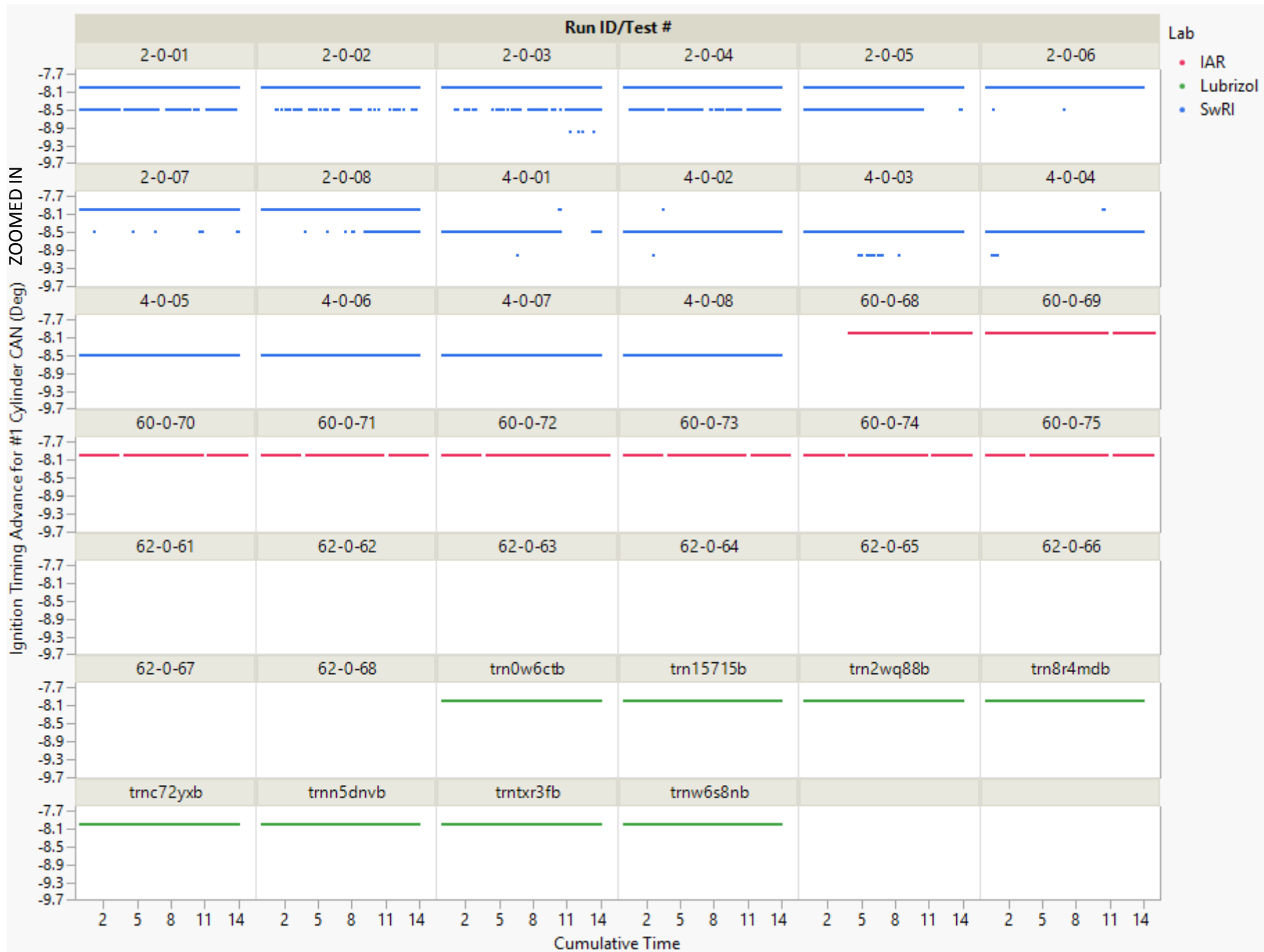


High Event Oil

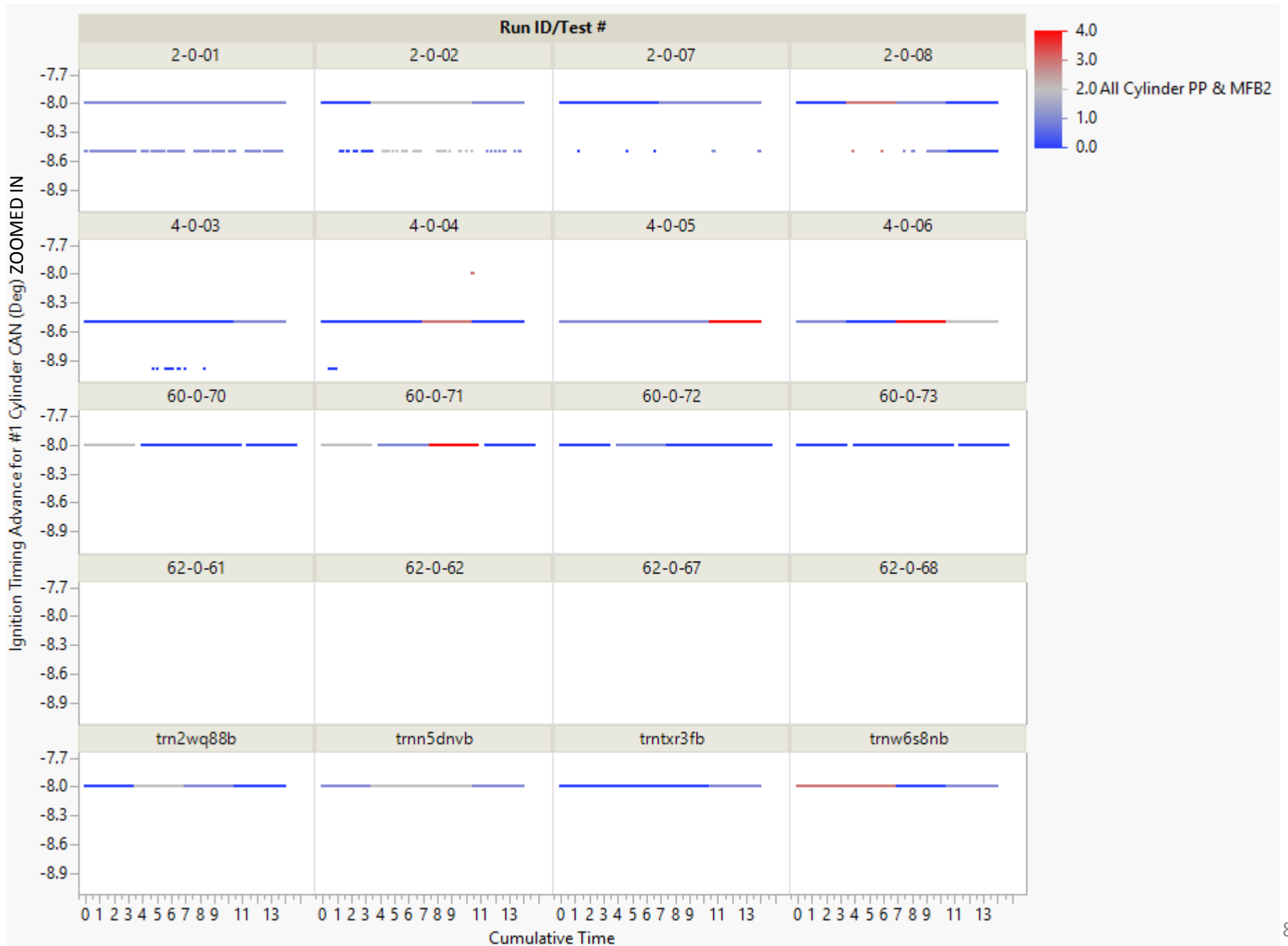


Ignition Timing Advance for #1 Cylinder CAN

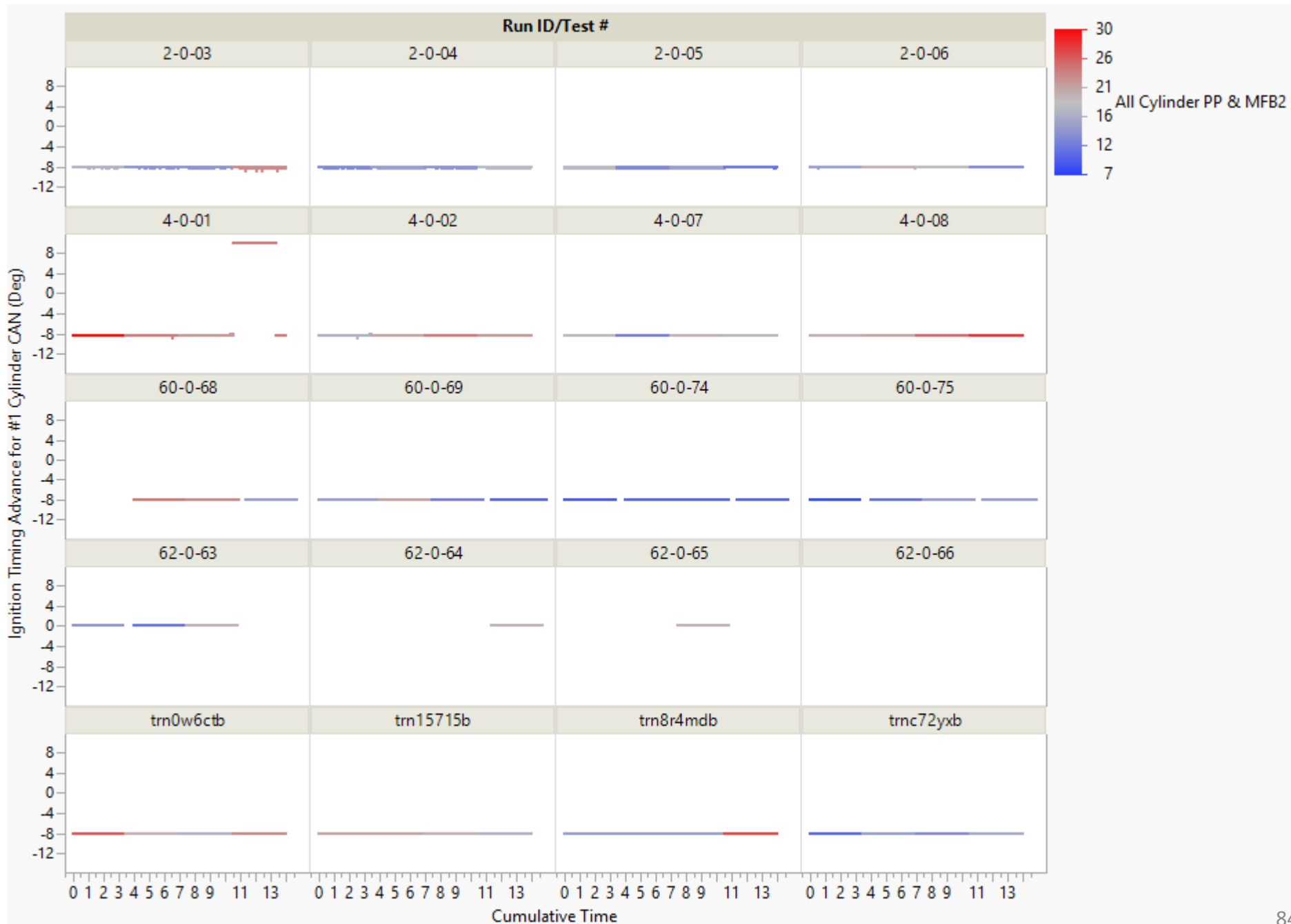




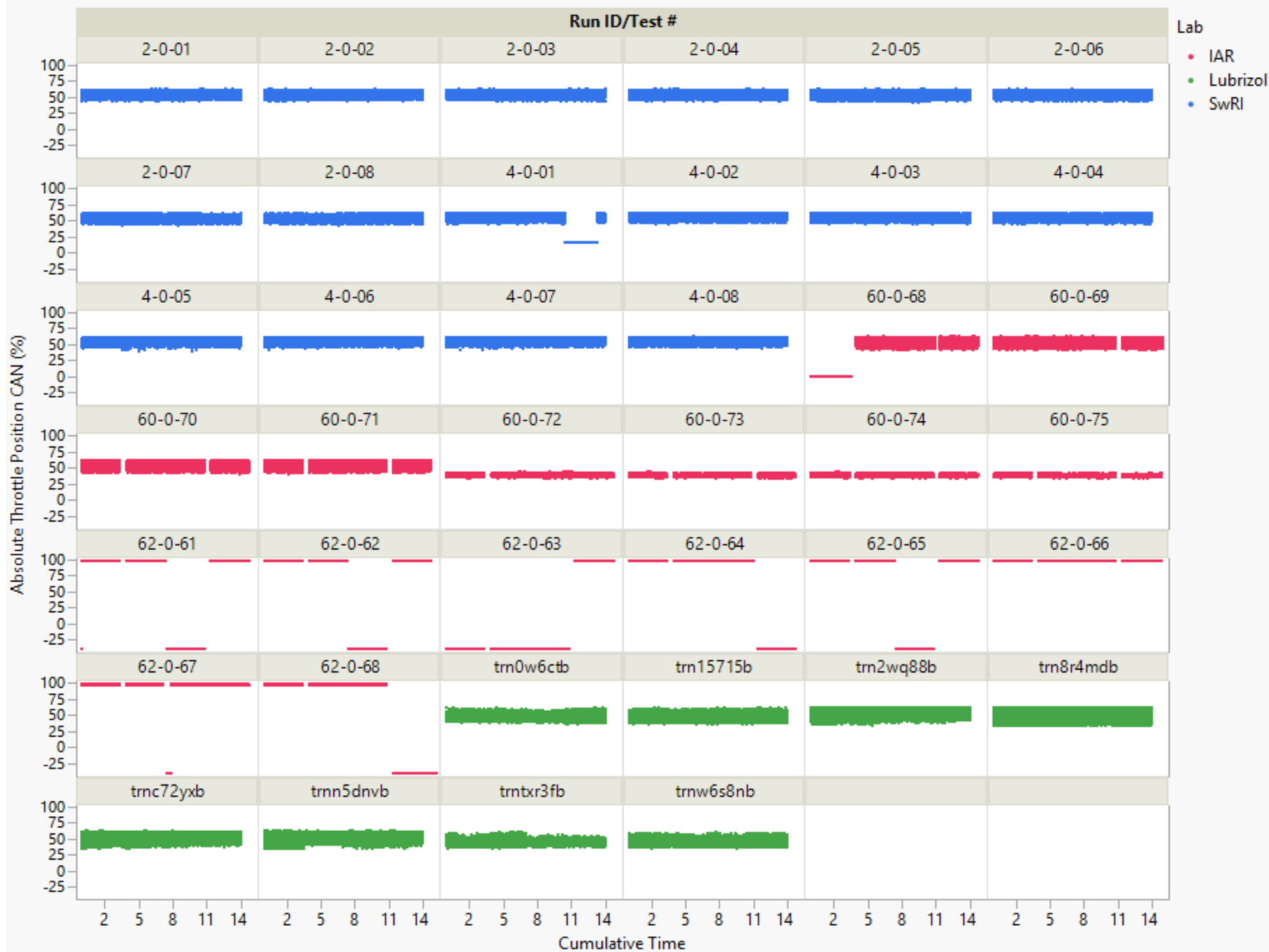
Low Event Oil

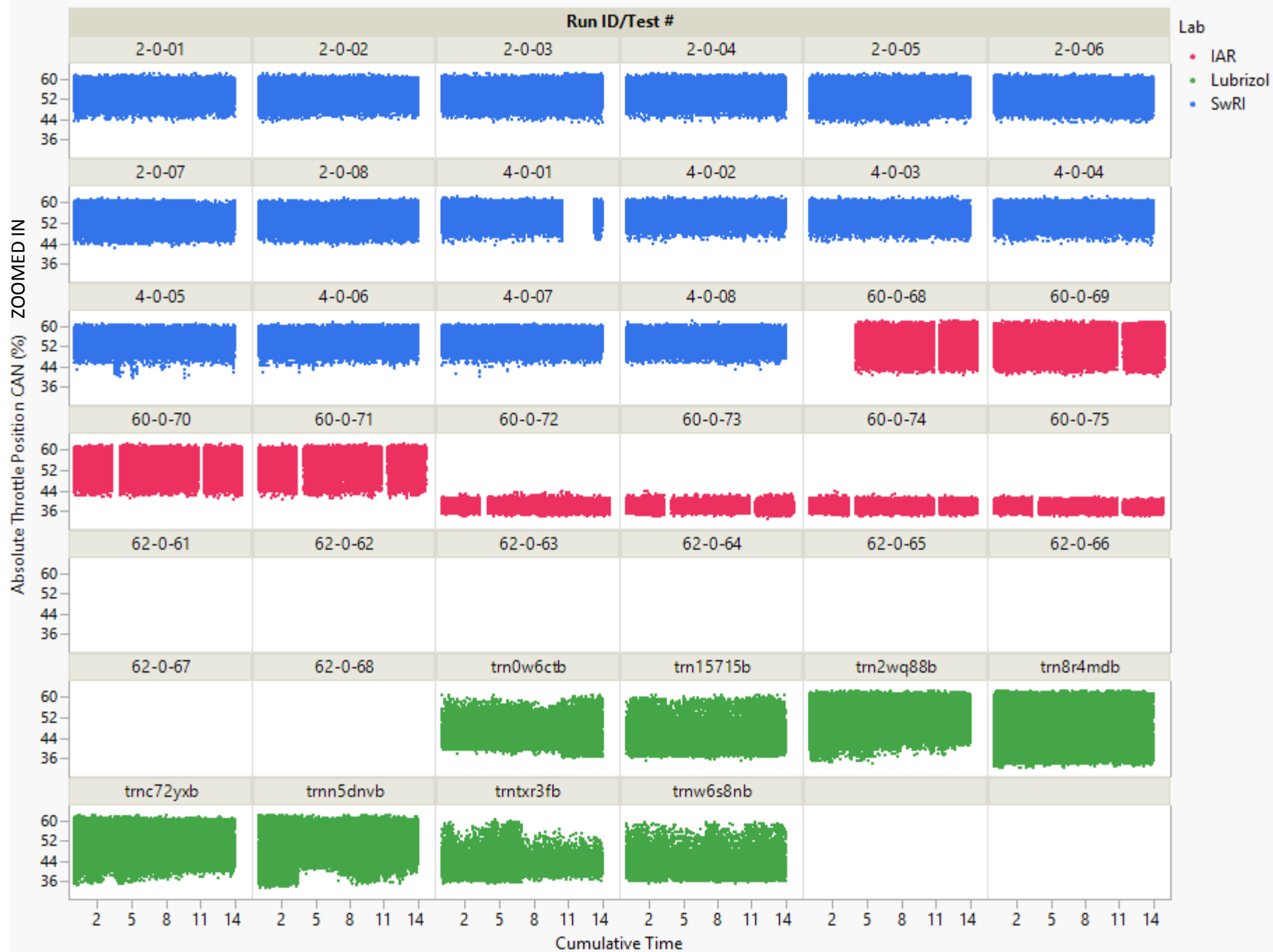


High Event Oil

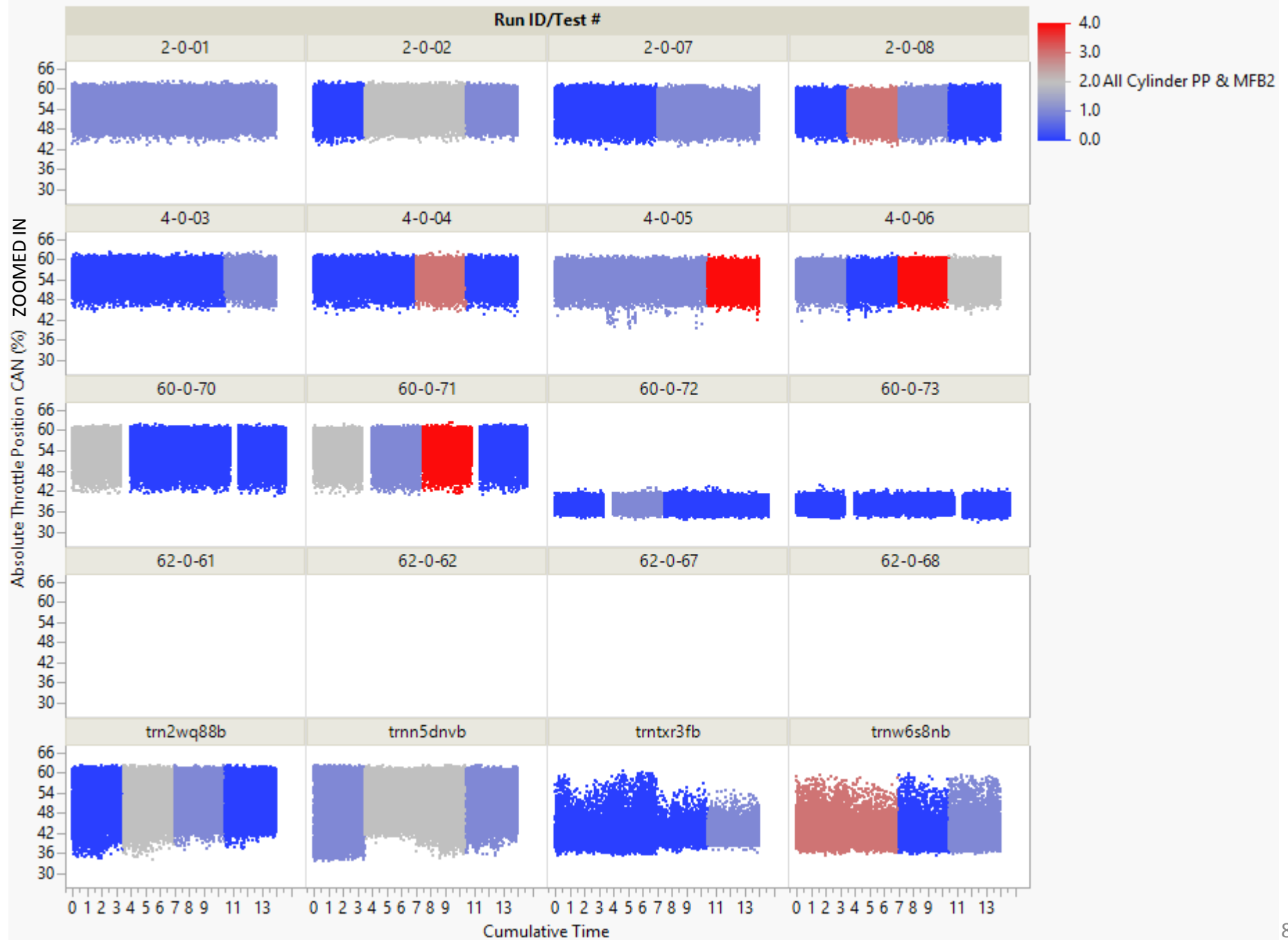


Absolute Throttle Position CAN

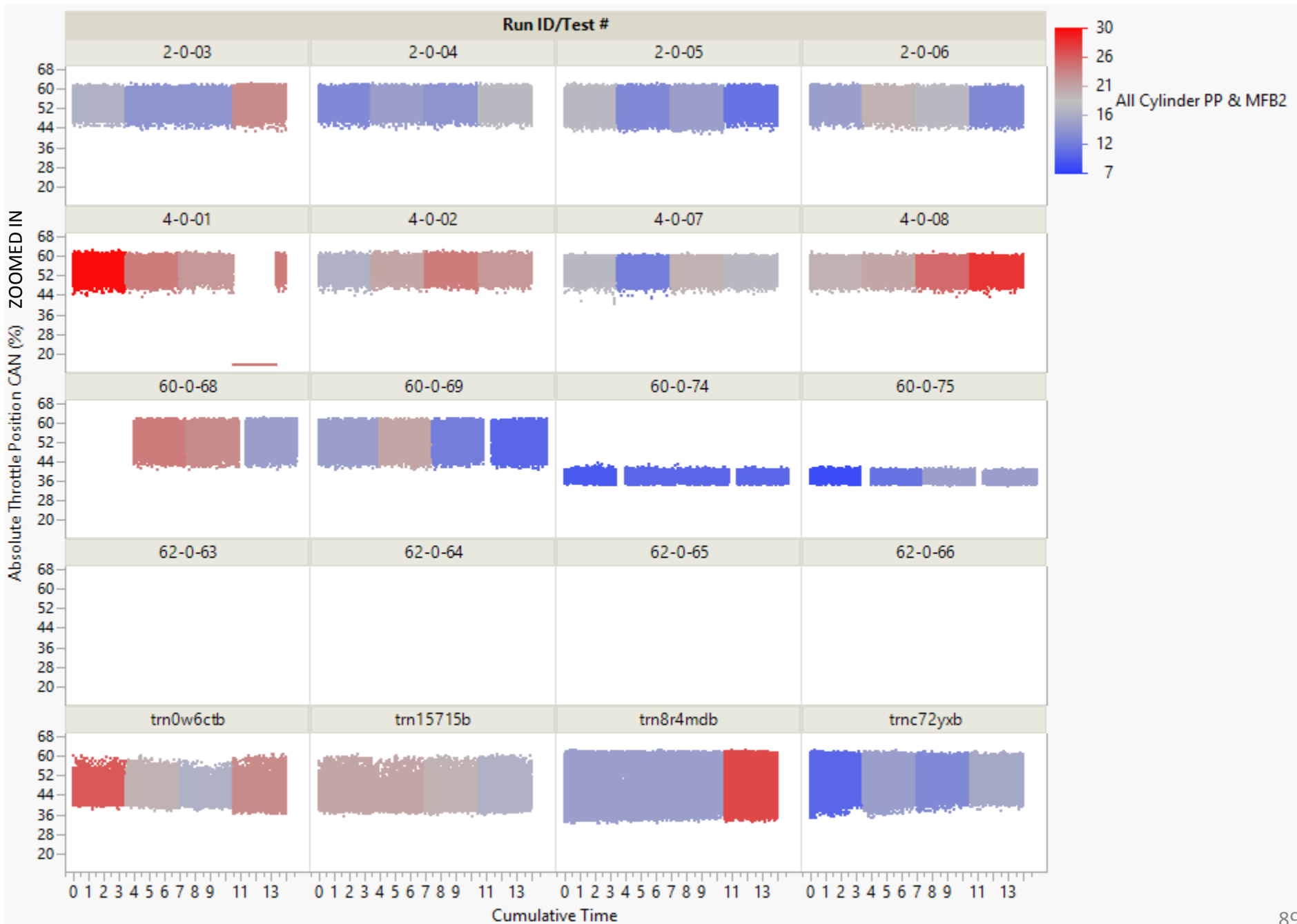




Low Event Oil

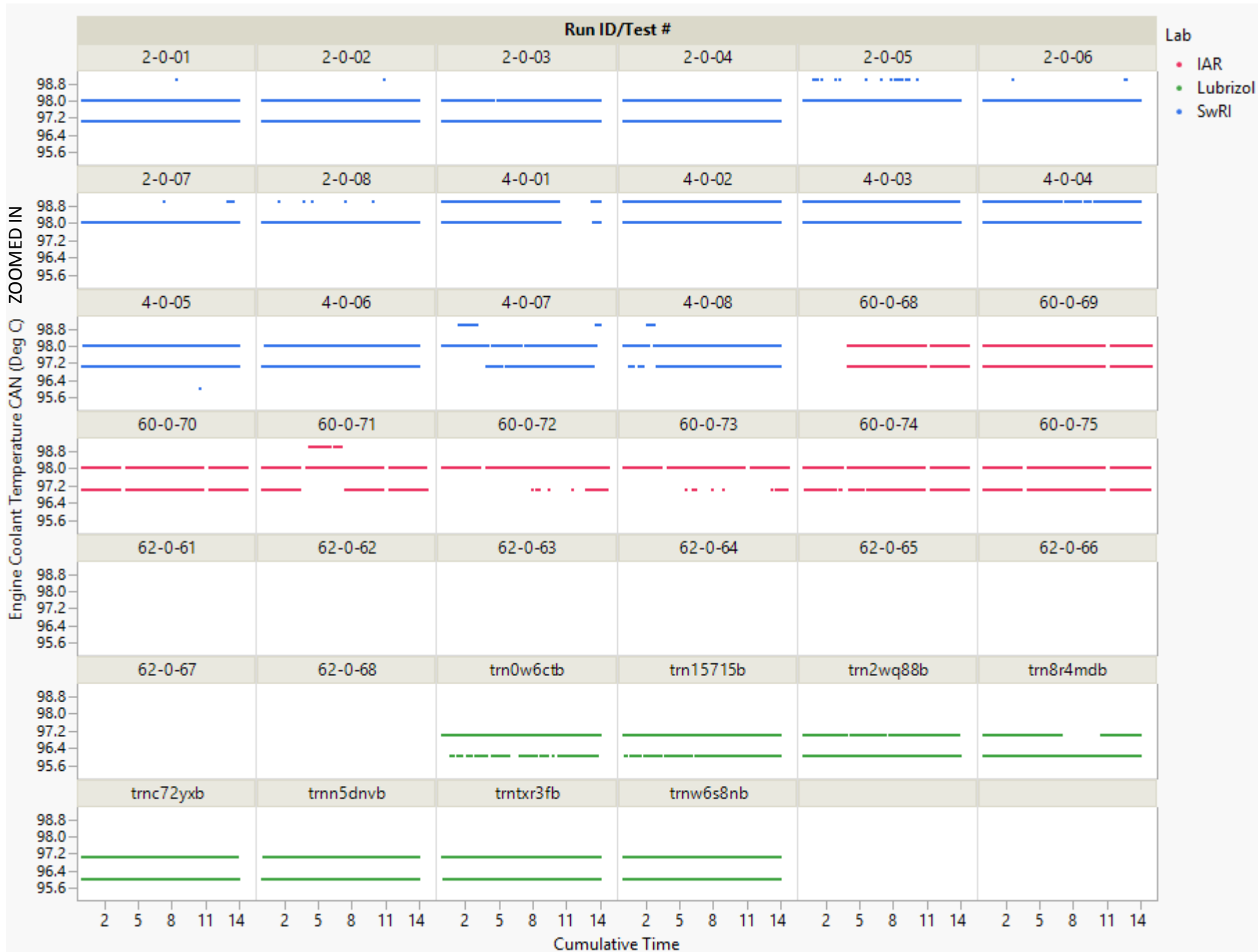


High Event Oil

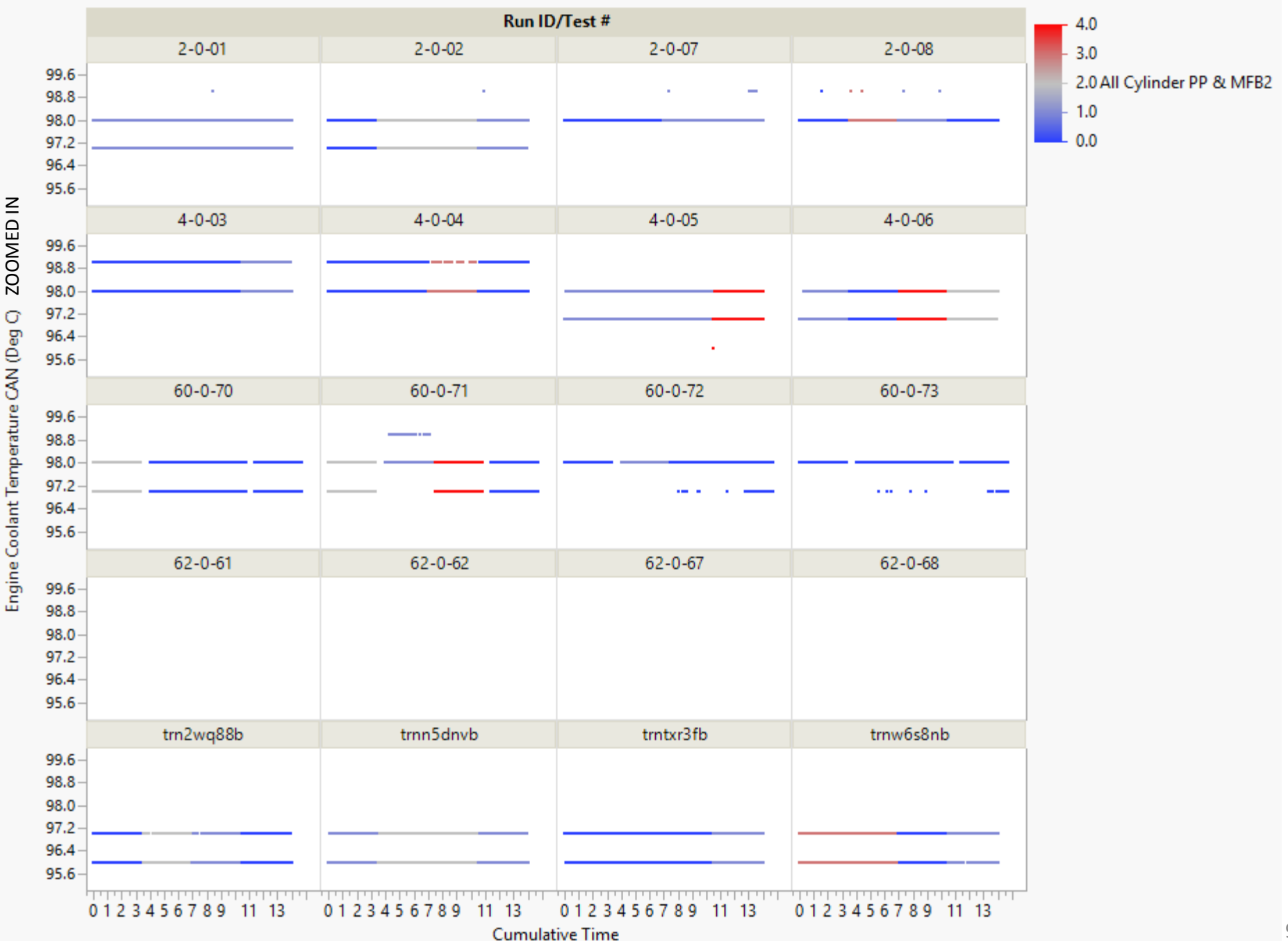


Engine
Coolant
Temperature
CAN

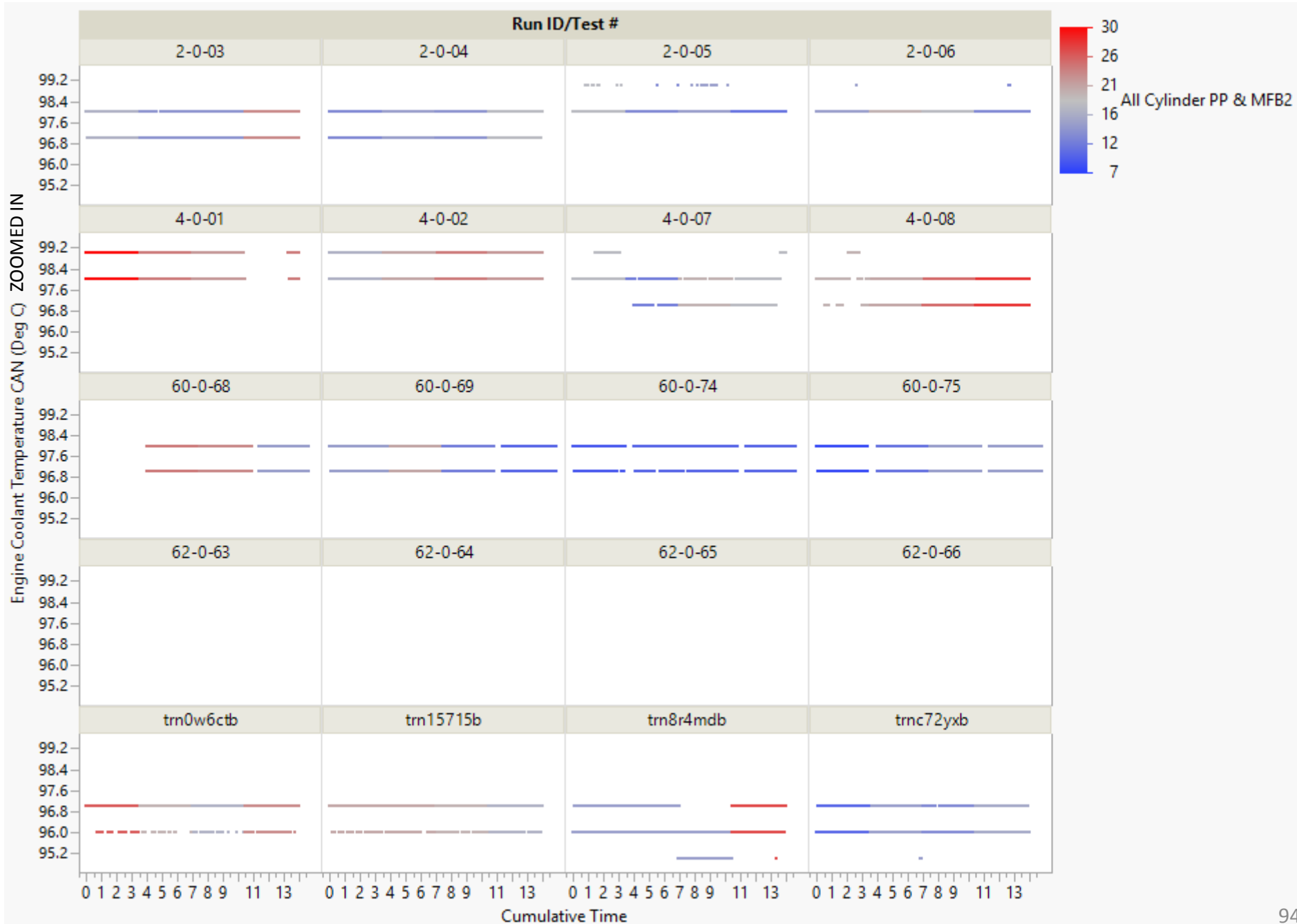




Low Event Oil

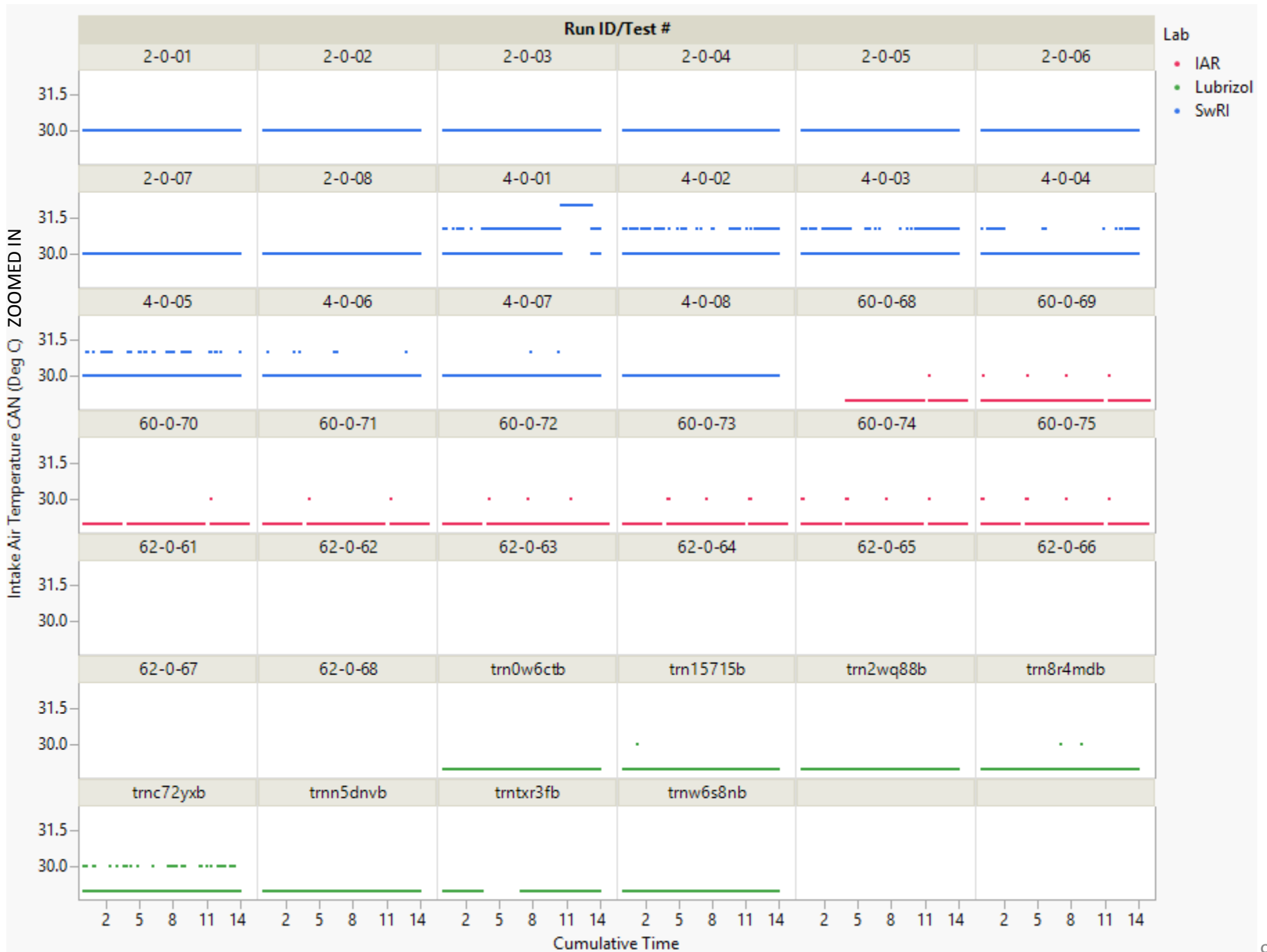


High Event Oil

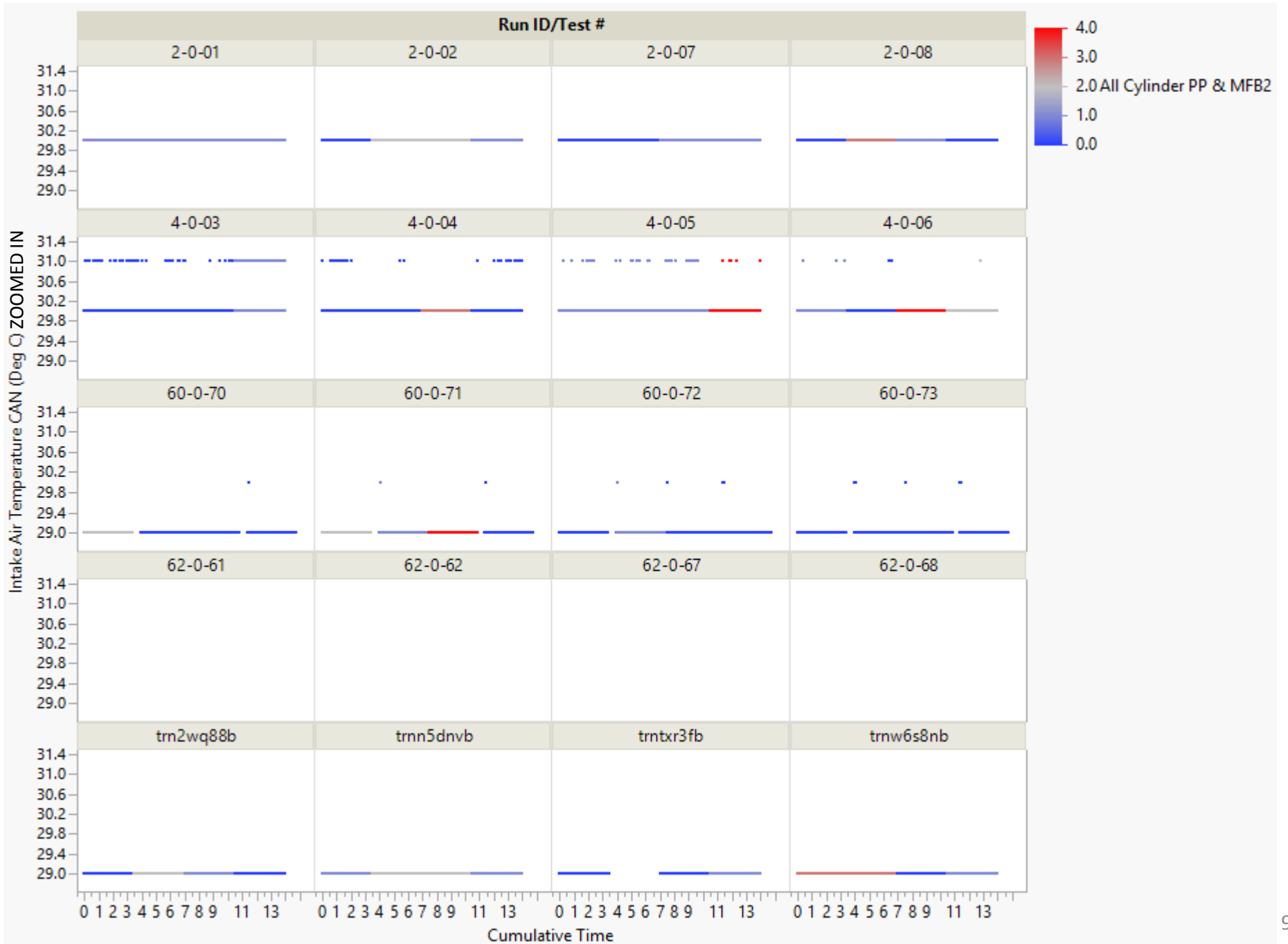


Intake Air Temperature CAN

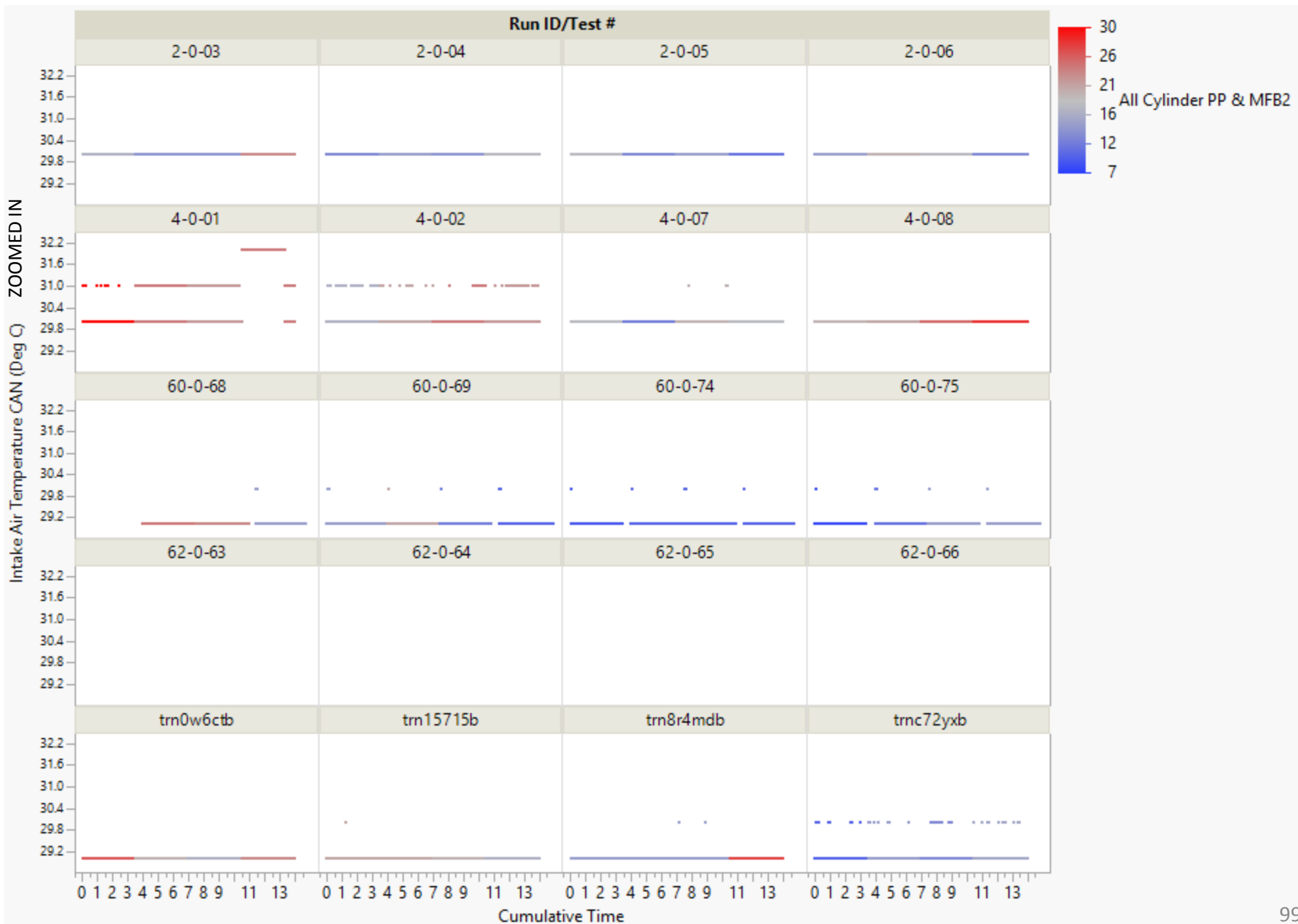




Low Event Oil



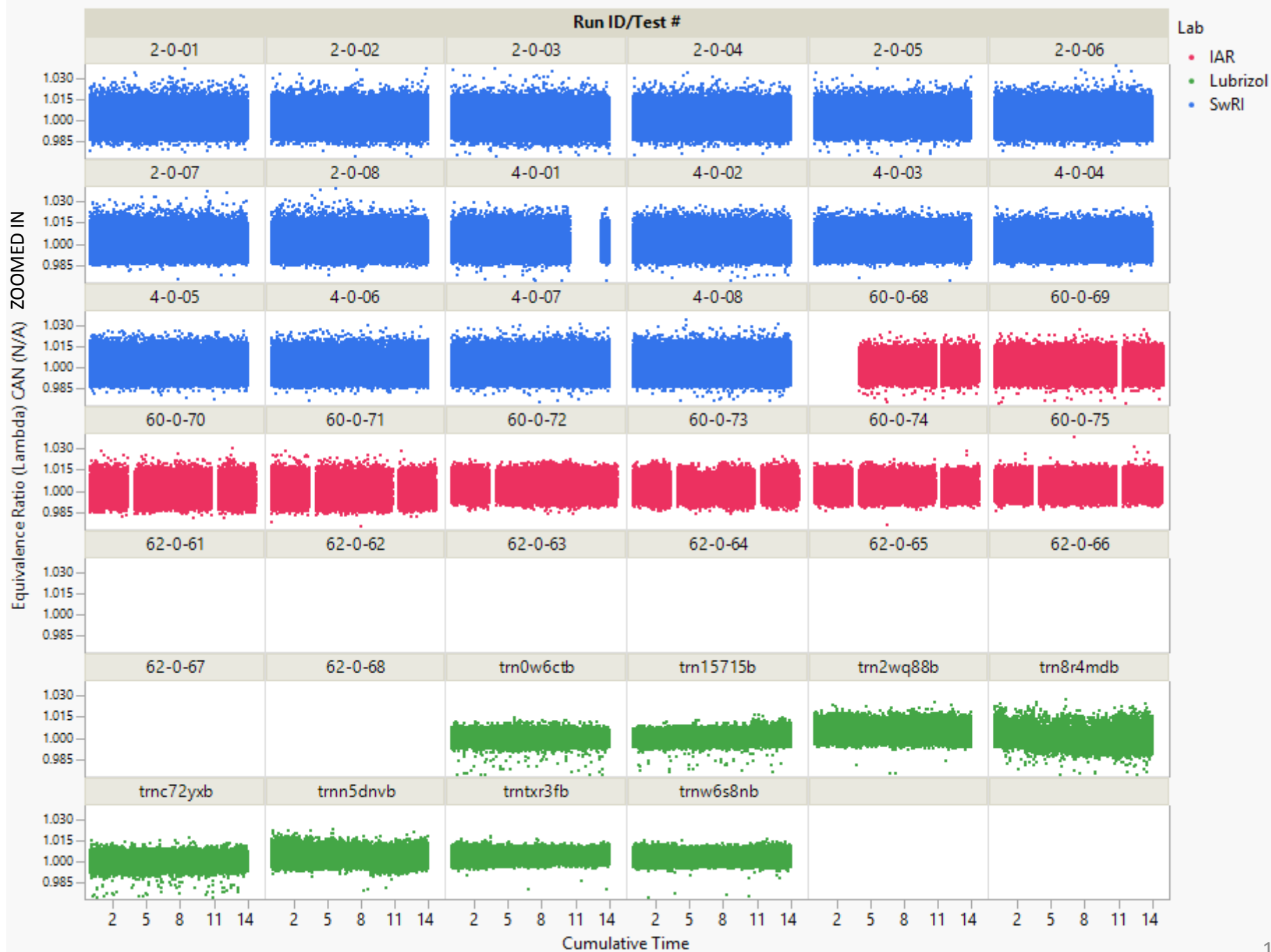
High Event Oil



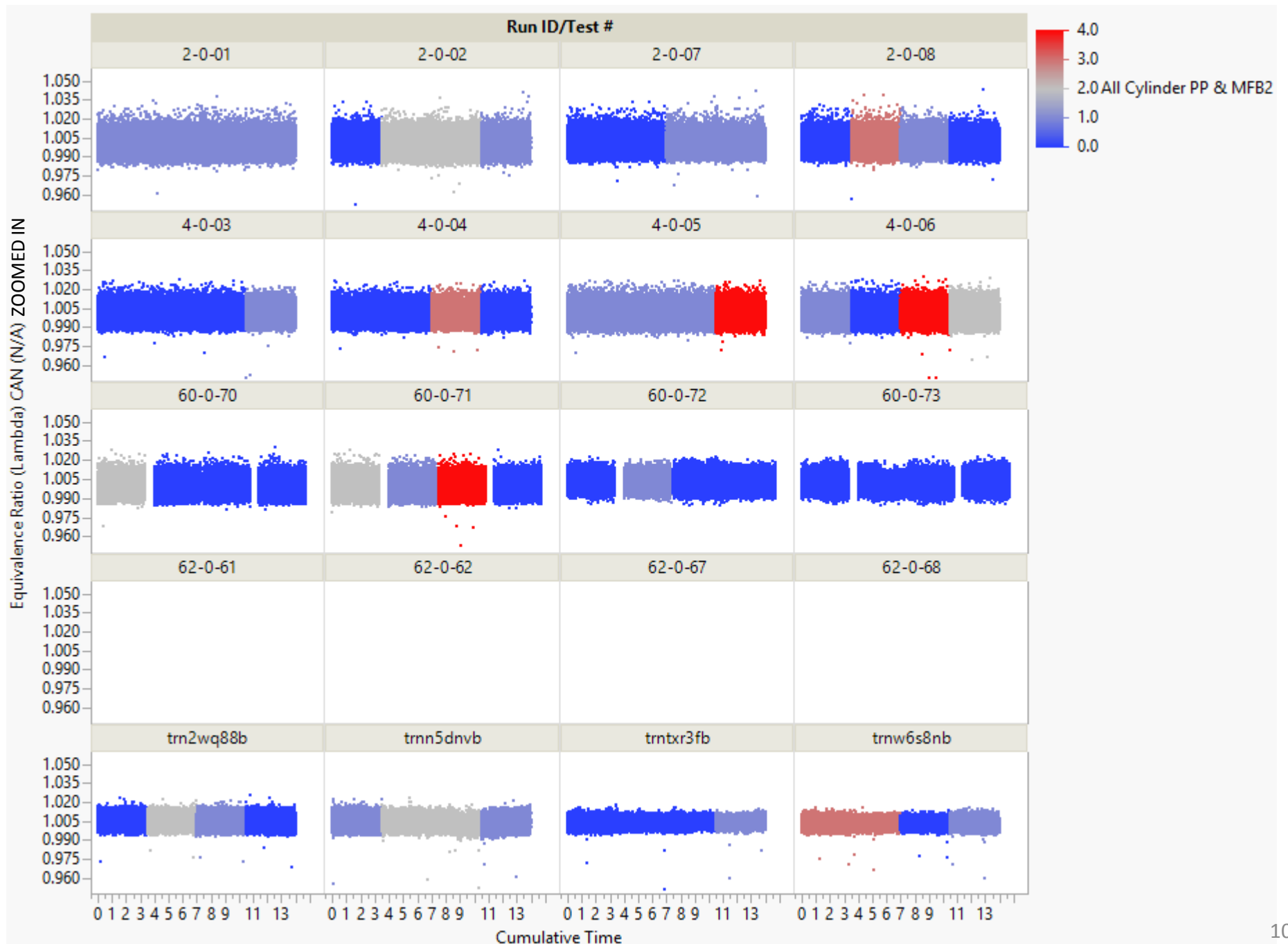
Equivalence Ratio (Lambda) CAN



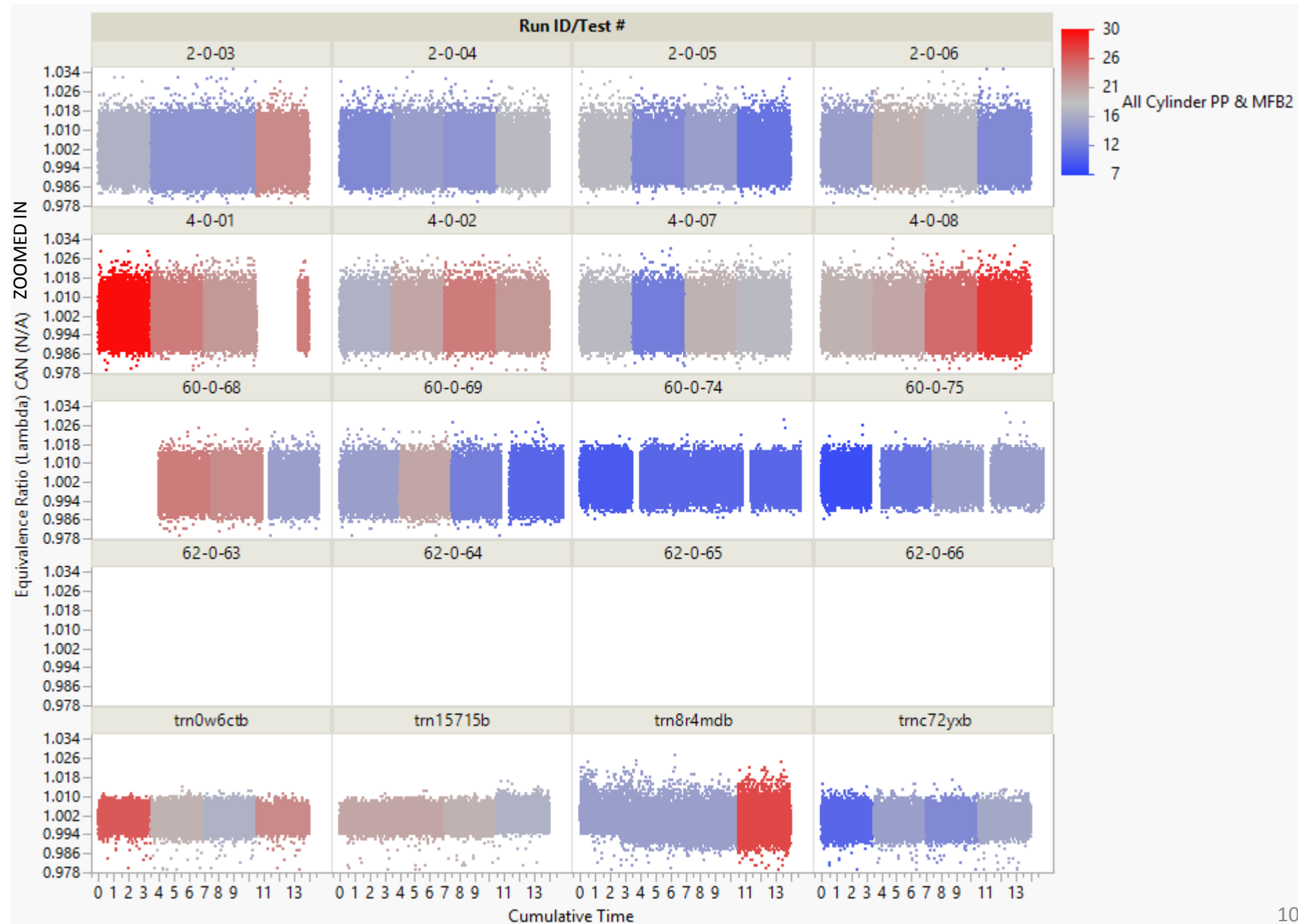




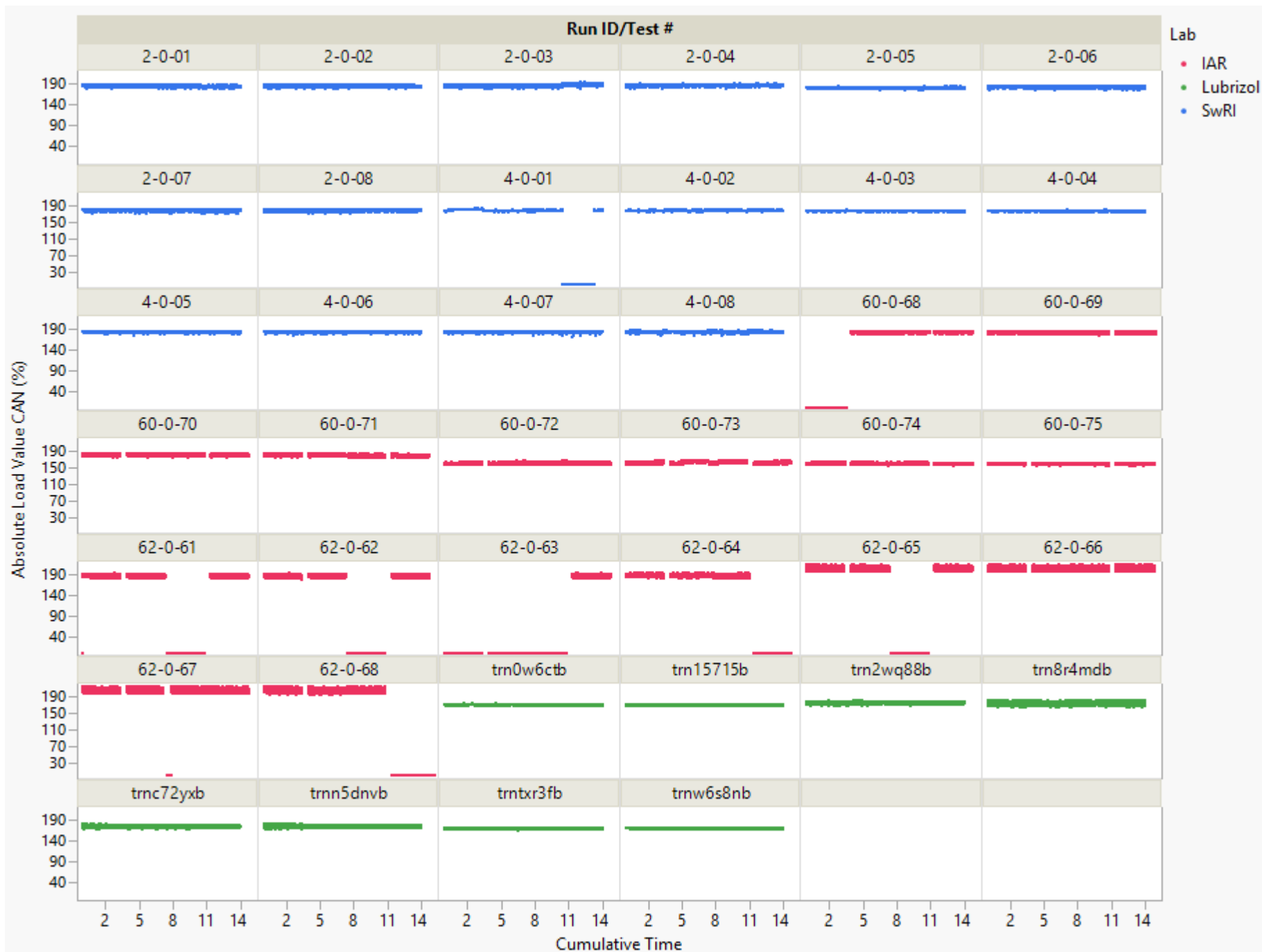
Low Event Oil

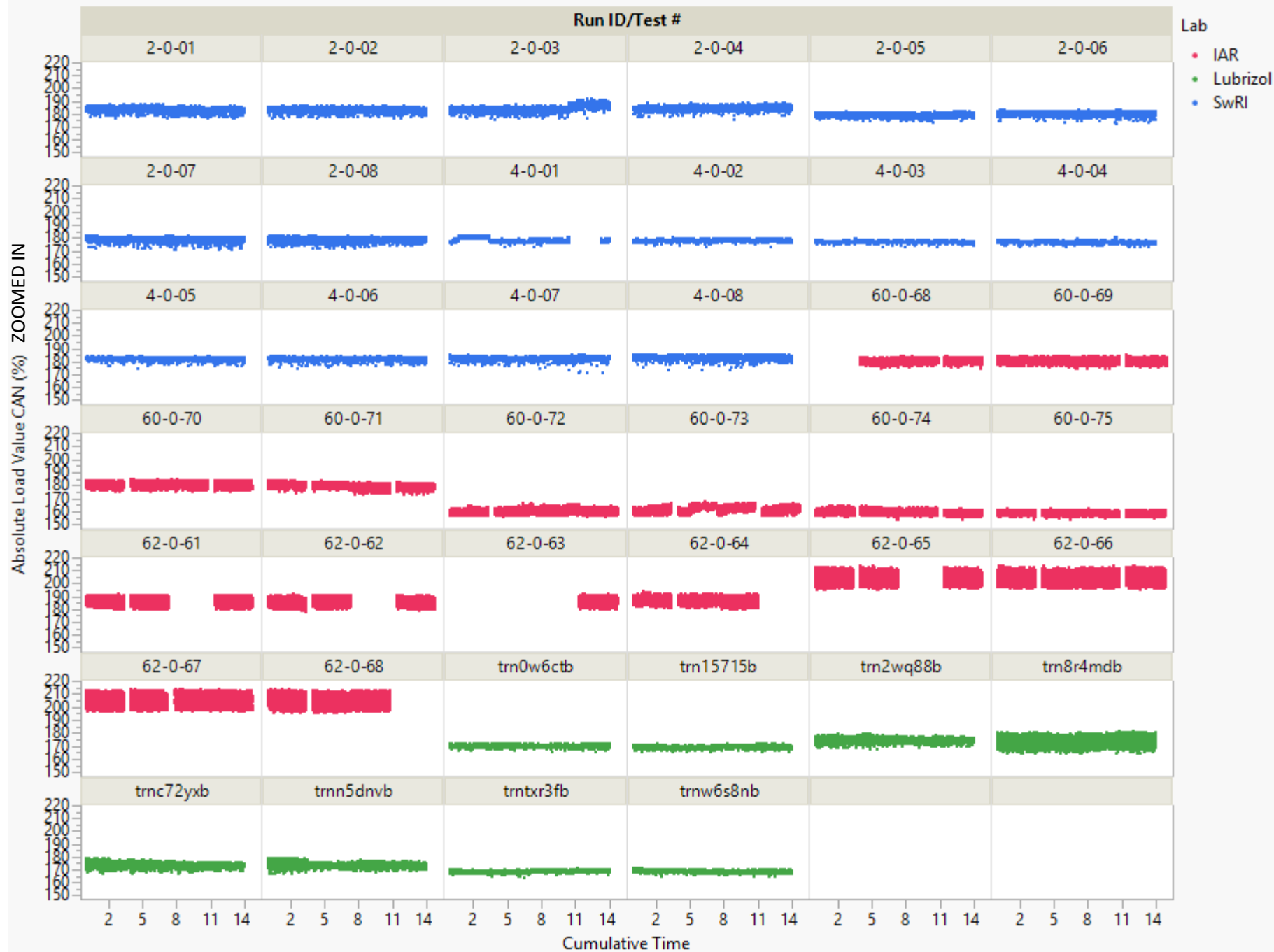


High Event Oil

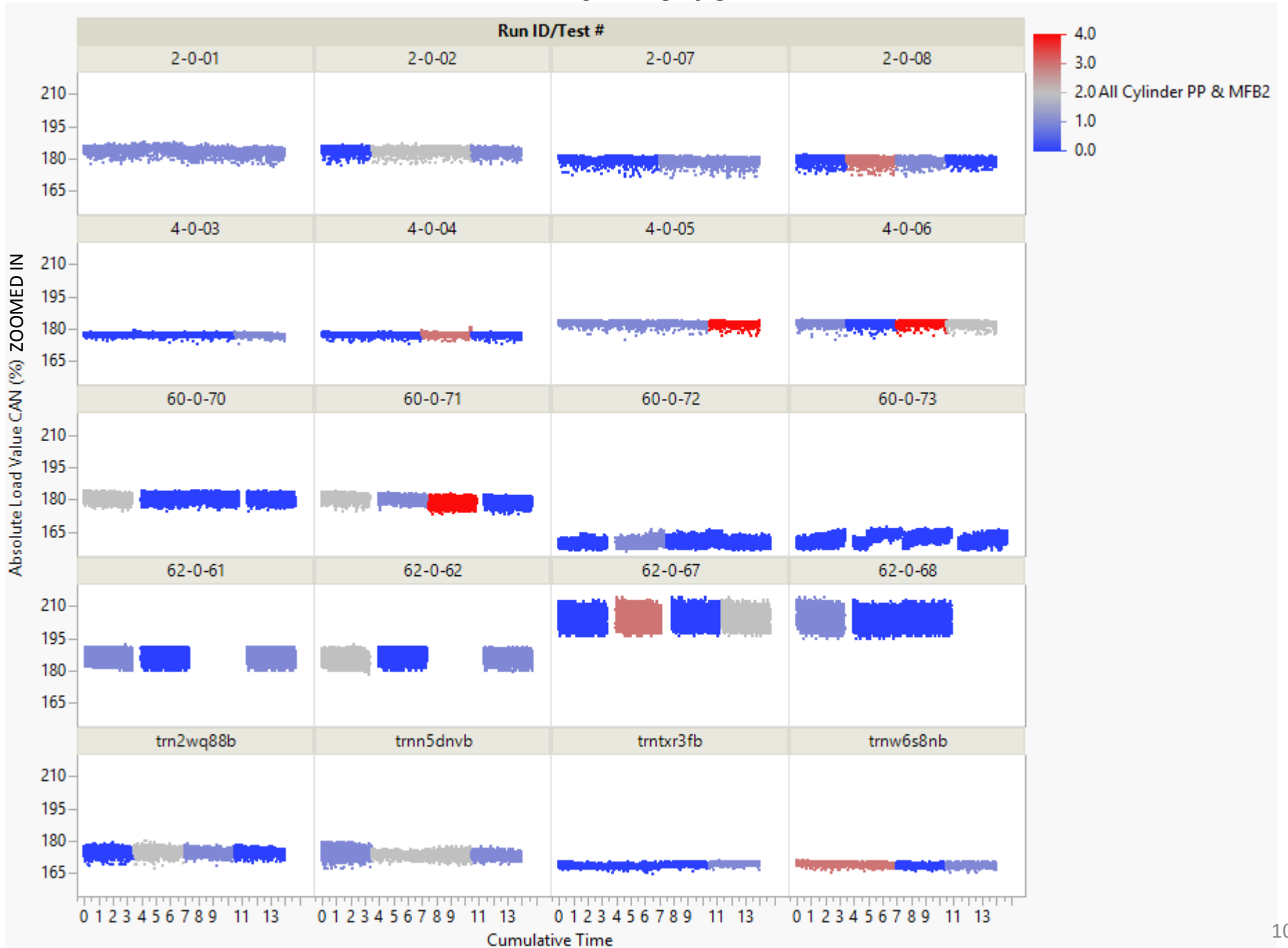


Absolute Load Value CAN

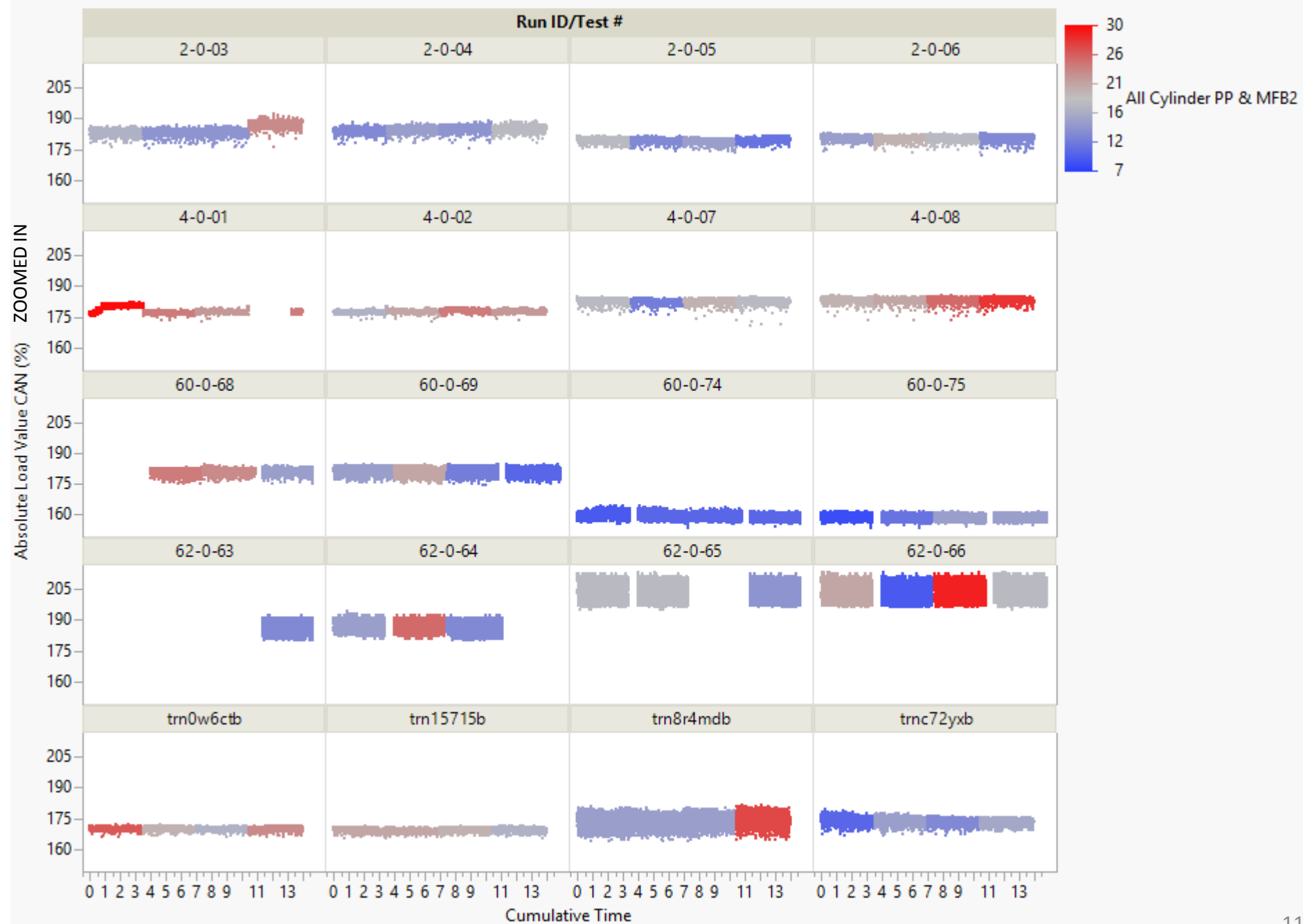




Low Event Oil



High Event Oil

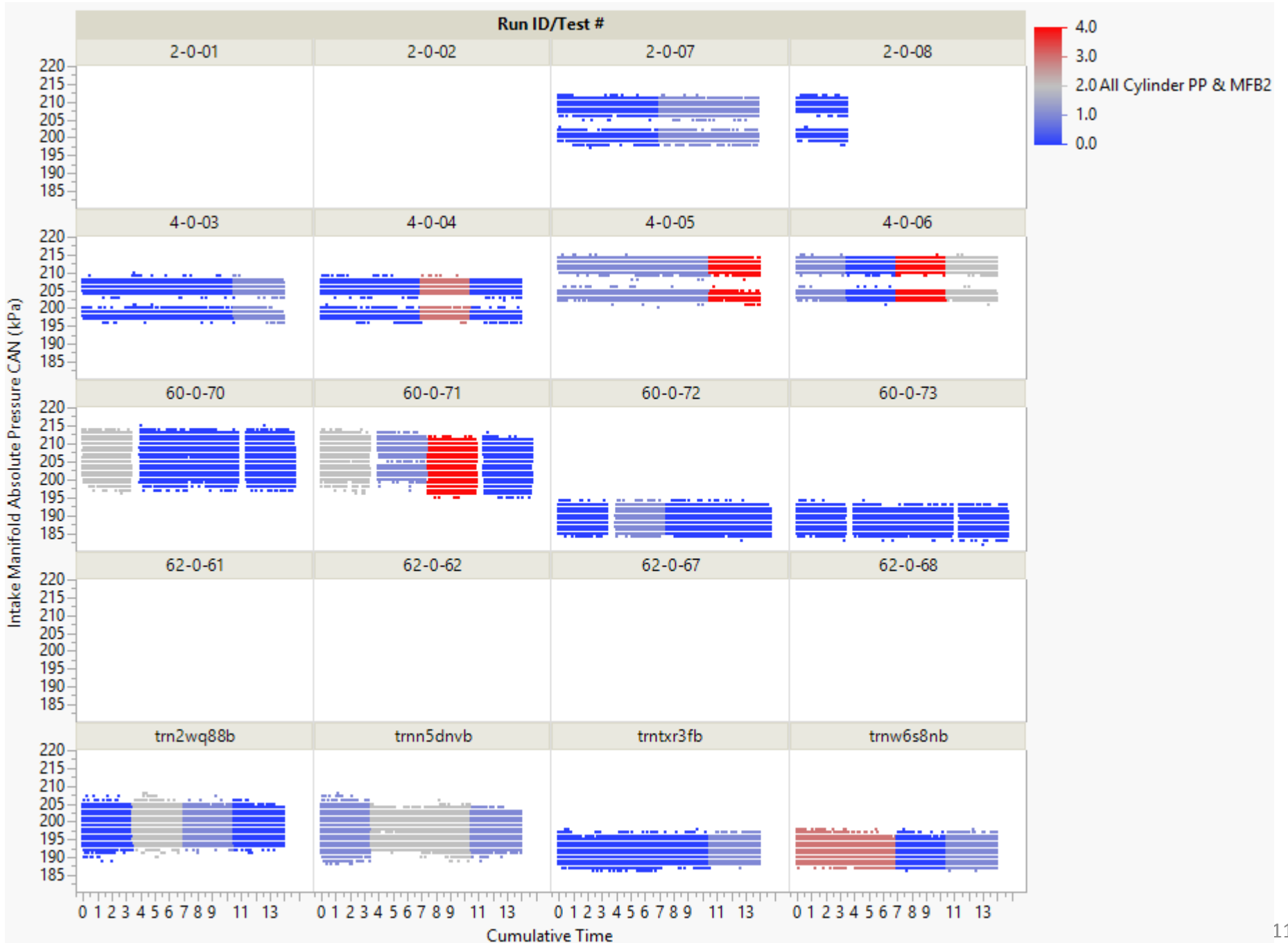


Intake
Manifold
Absolute
Pressure CAN

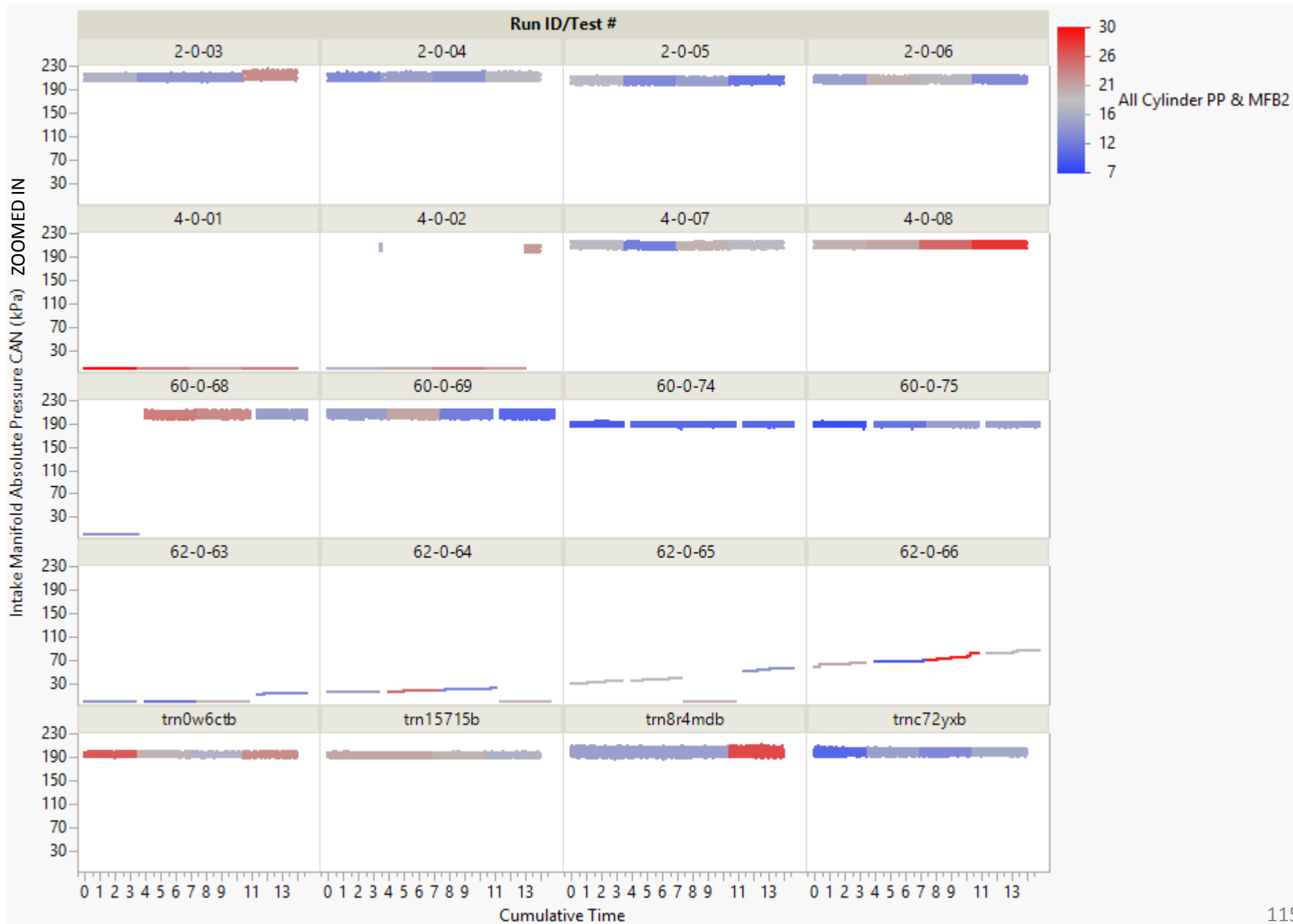




Low Event Oil



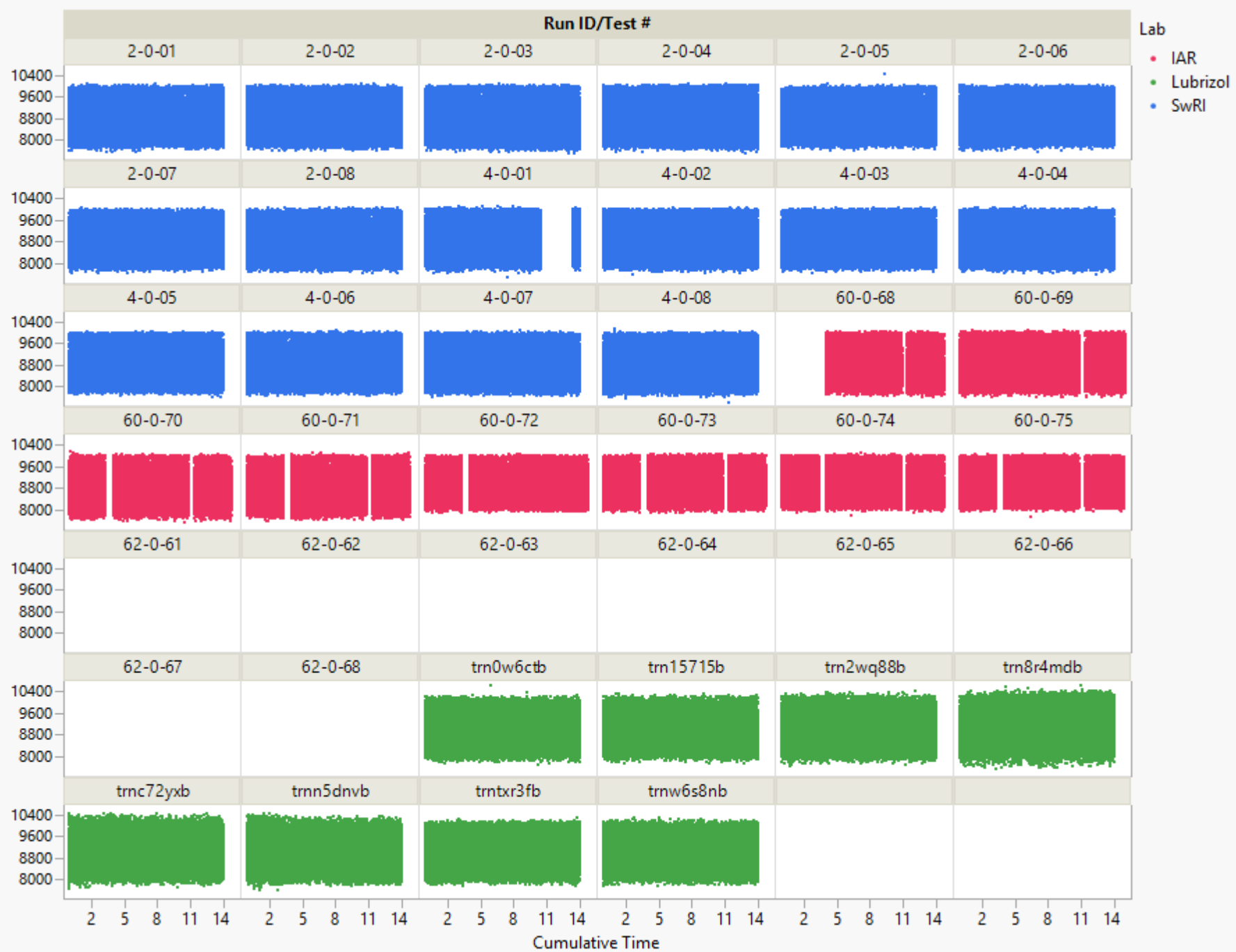
High Event Oil



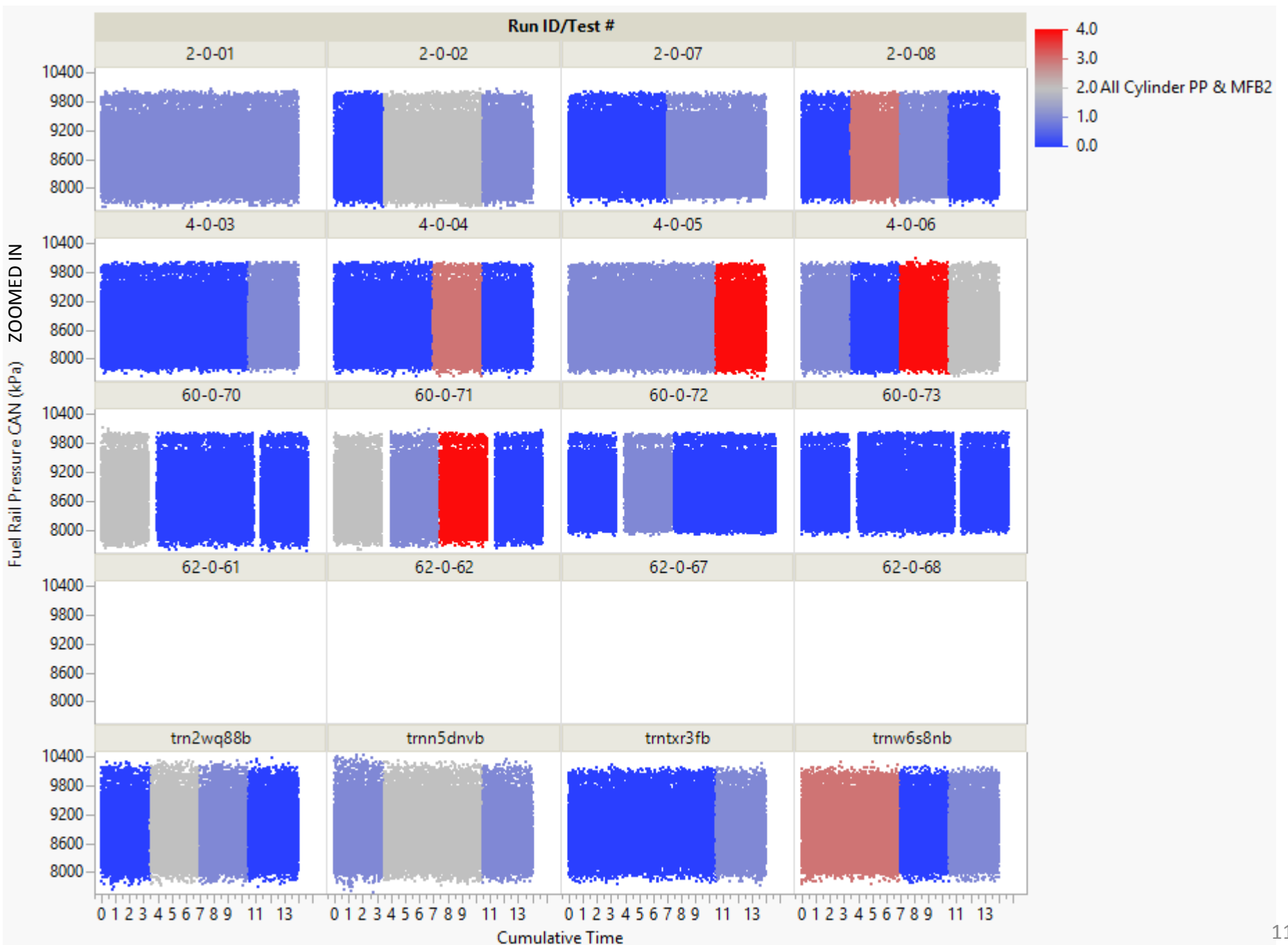
Fuel Rail Pressure CAN



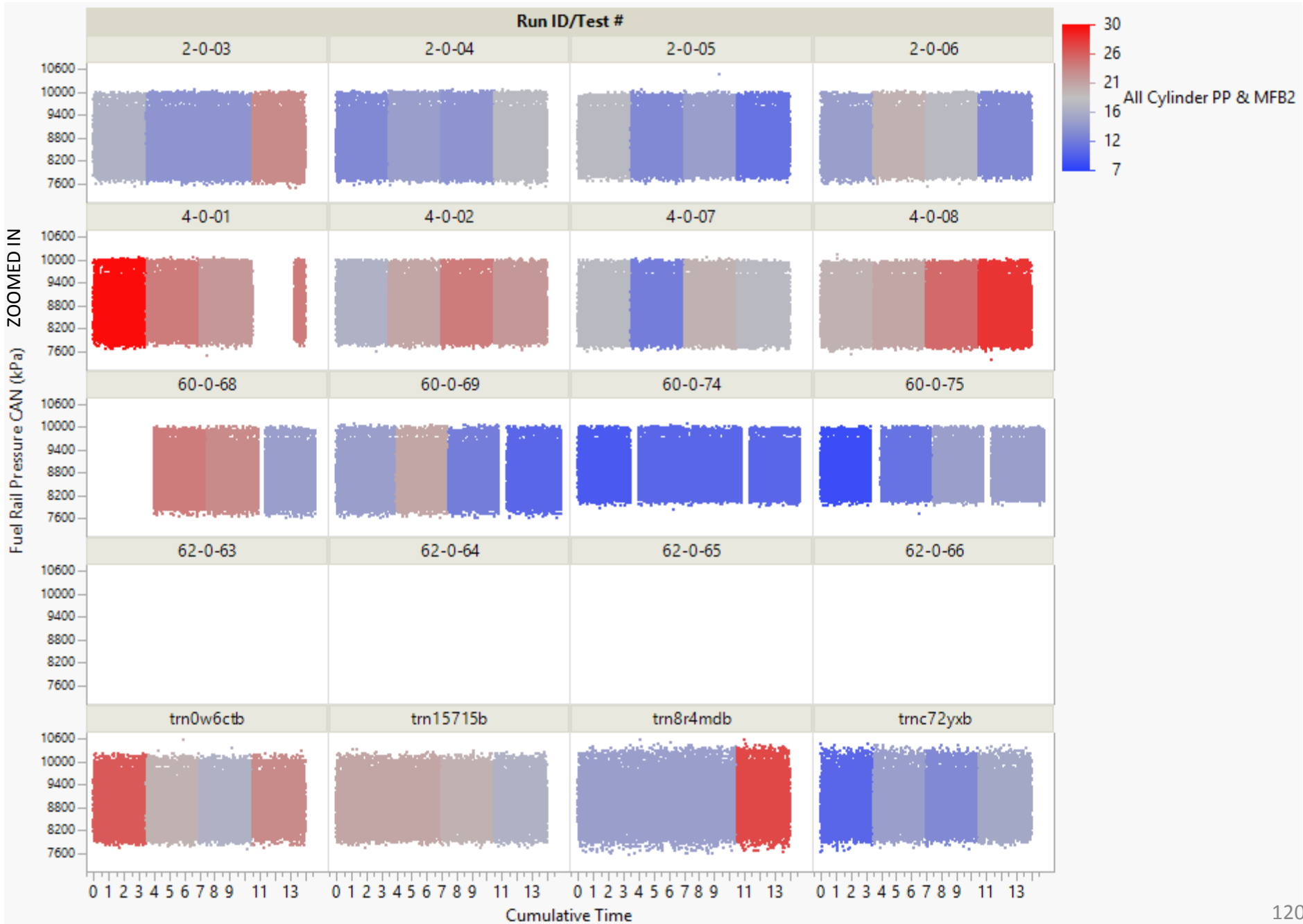
Fuel Rail Pressure CAN (kPa) ZOOMED IN



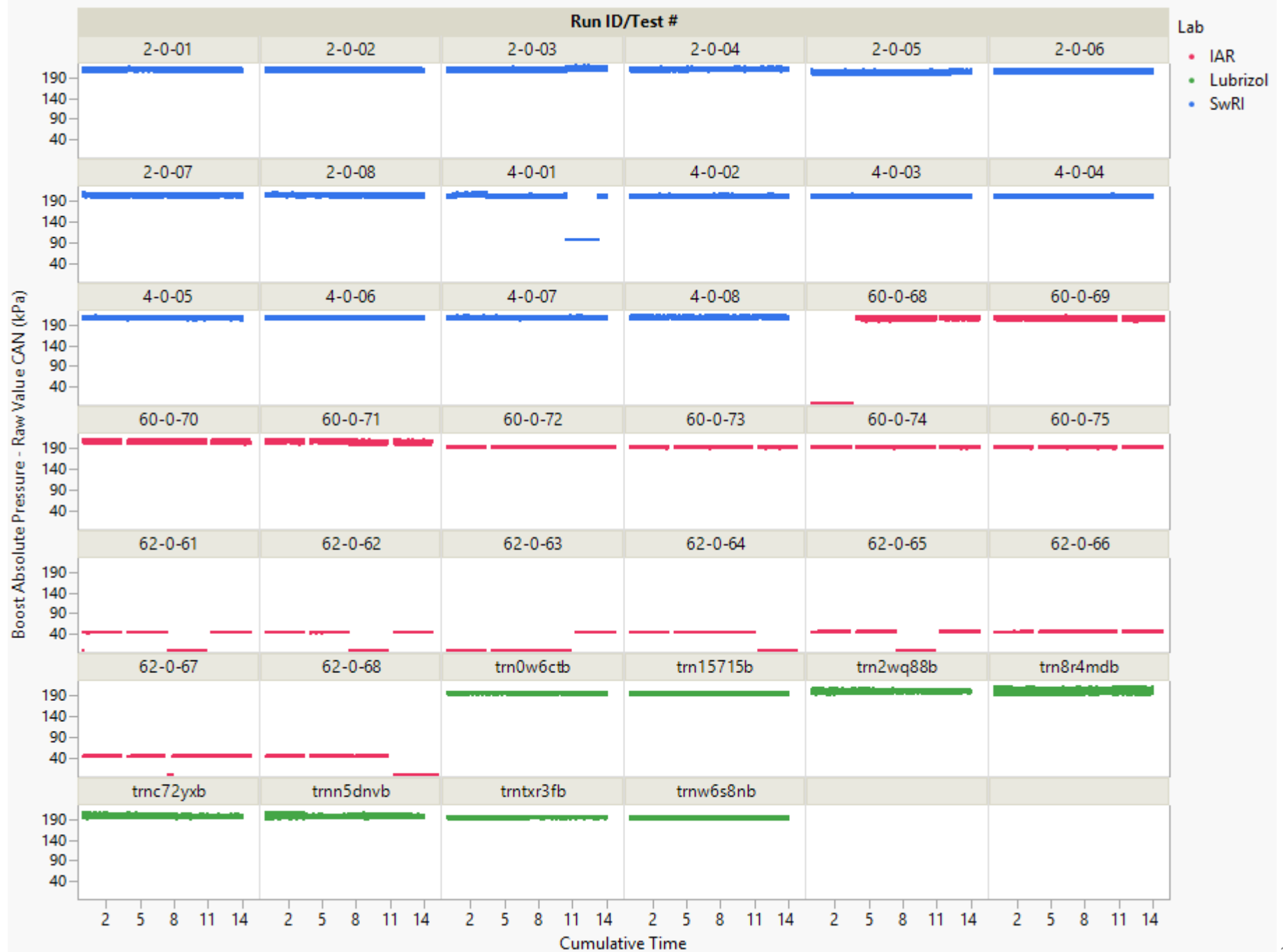
Low Event Oil



High Event Oil

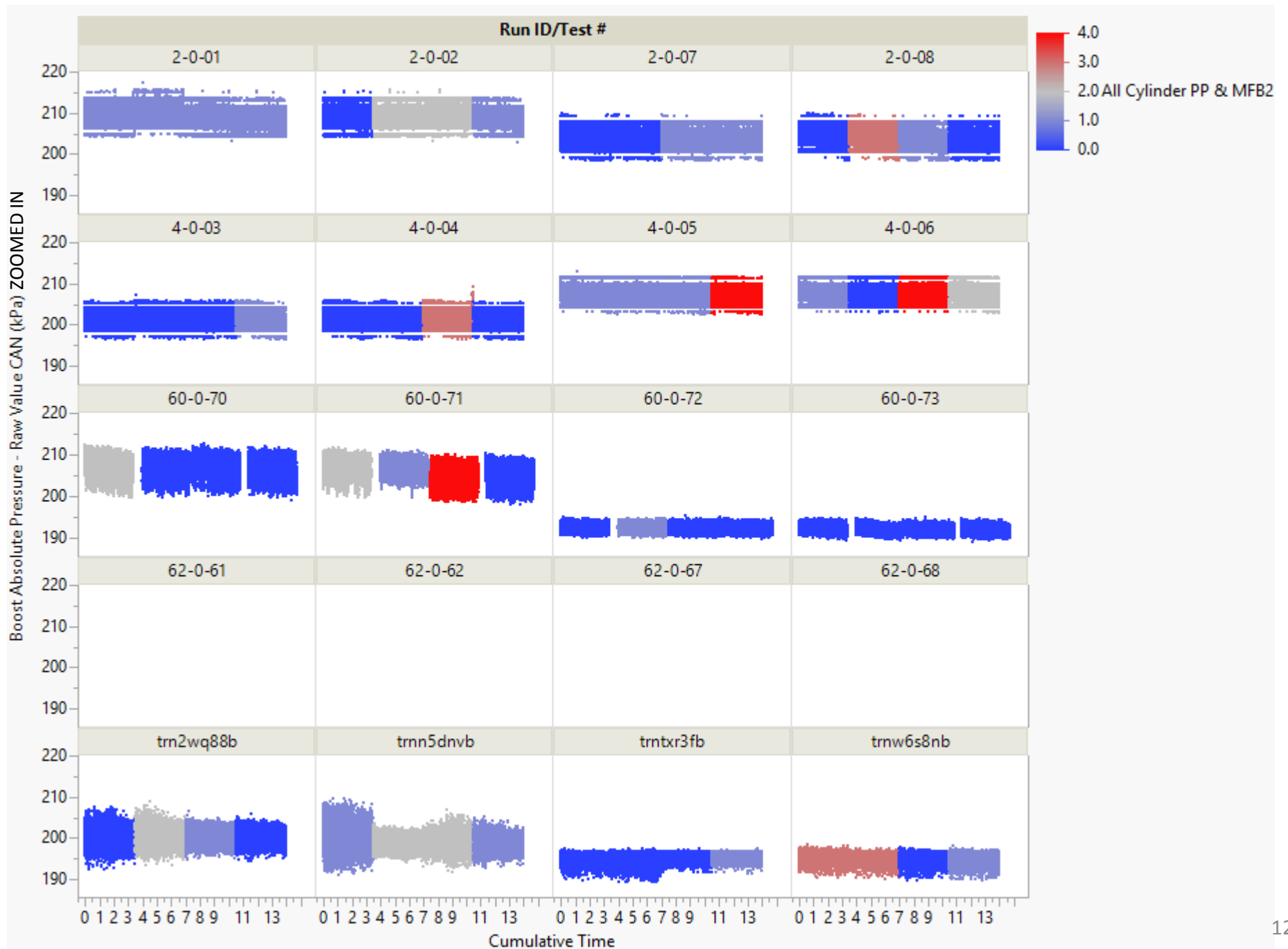


Boost Absolute Pressure - Raw Value CAN

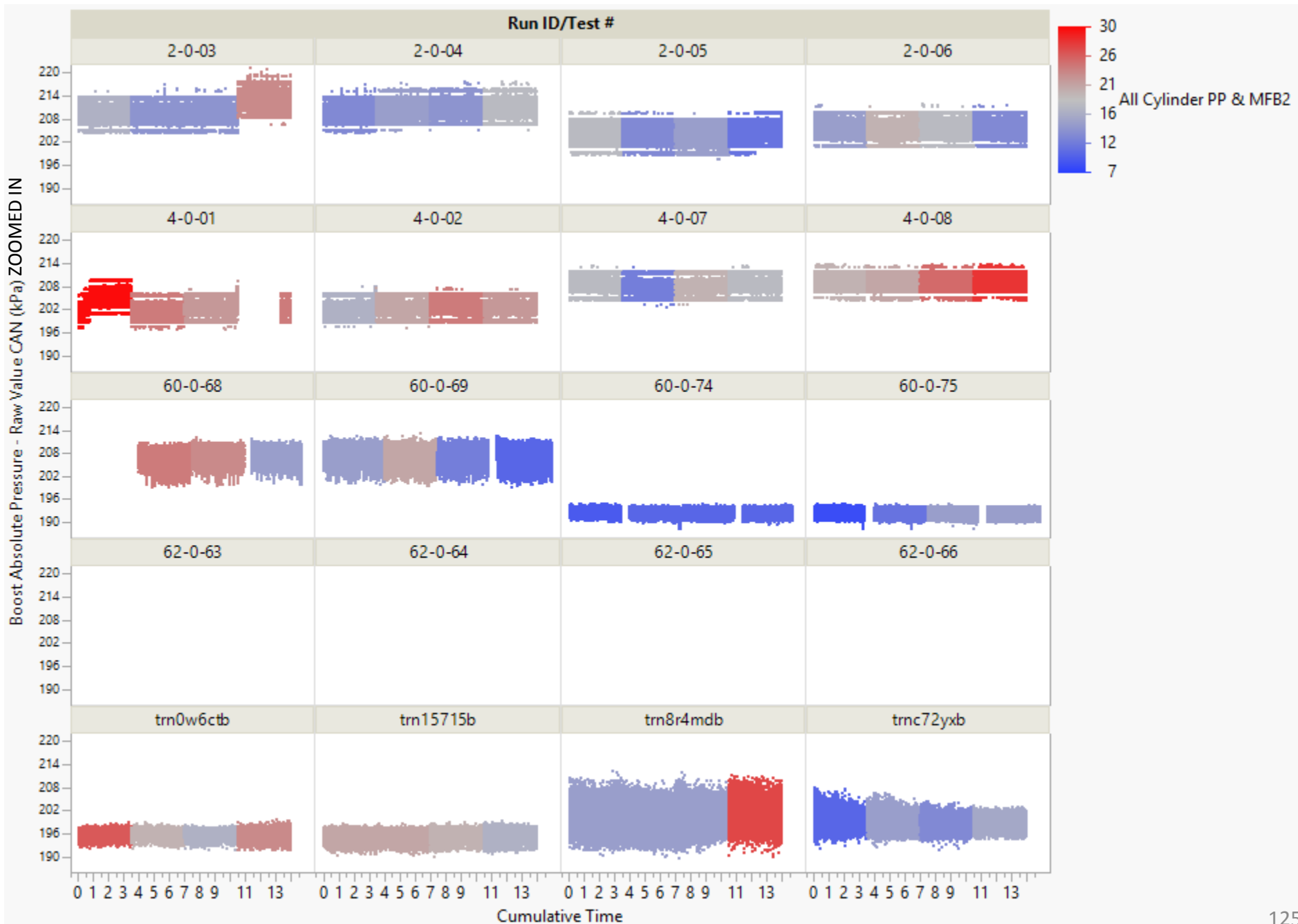




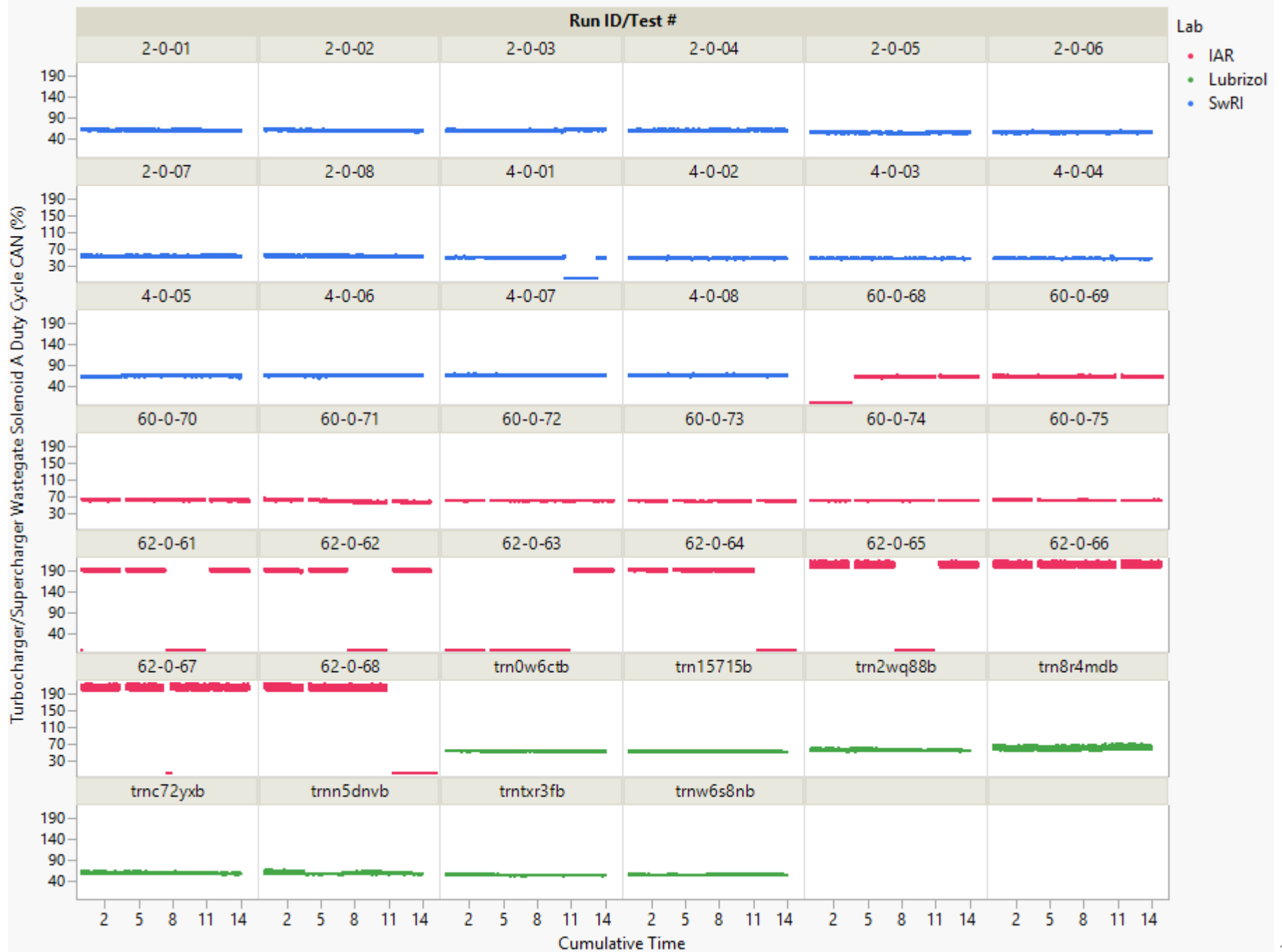
Low Event Oil



High Event Oil

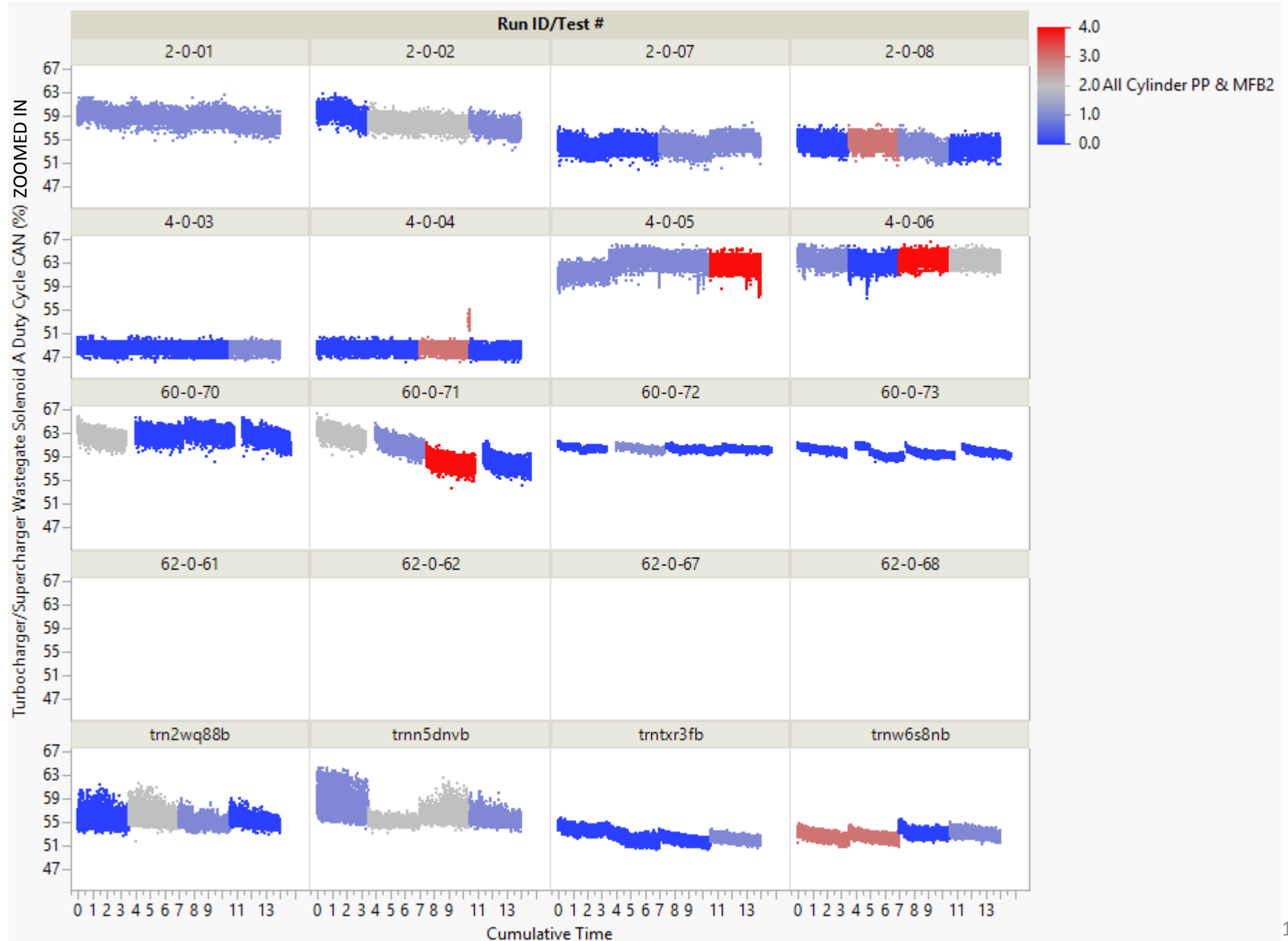


Turbocharger/Supercharger
Wastegate Solenoid A Duty
Cycle CAN

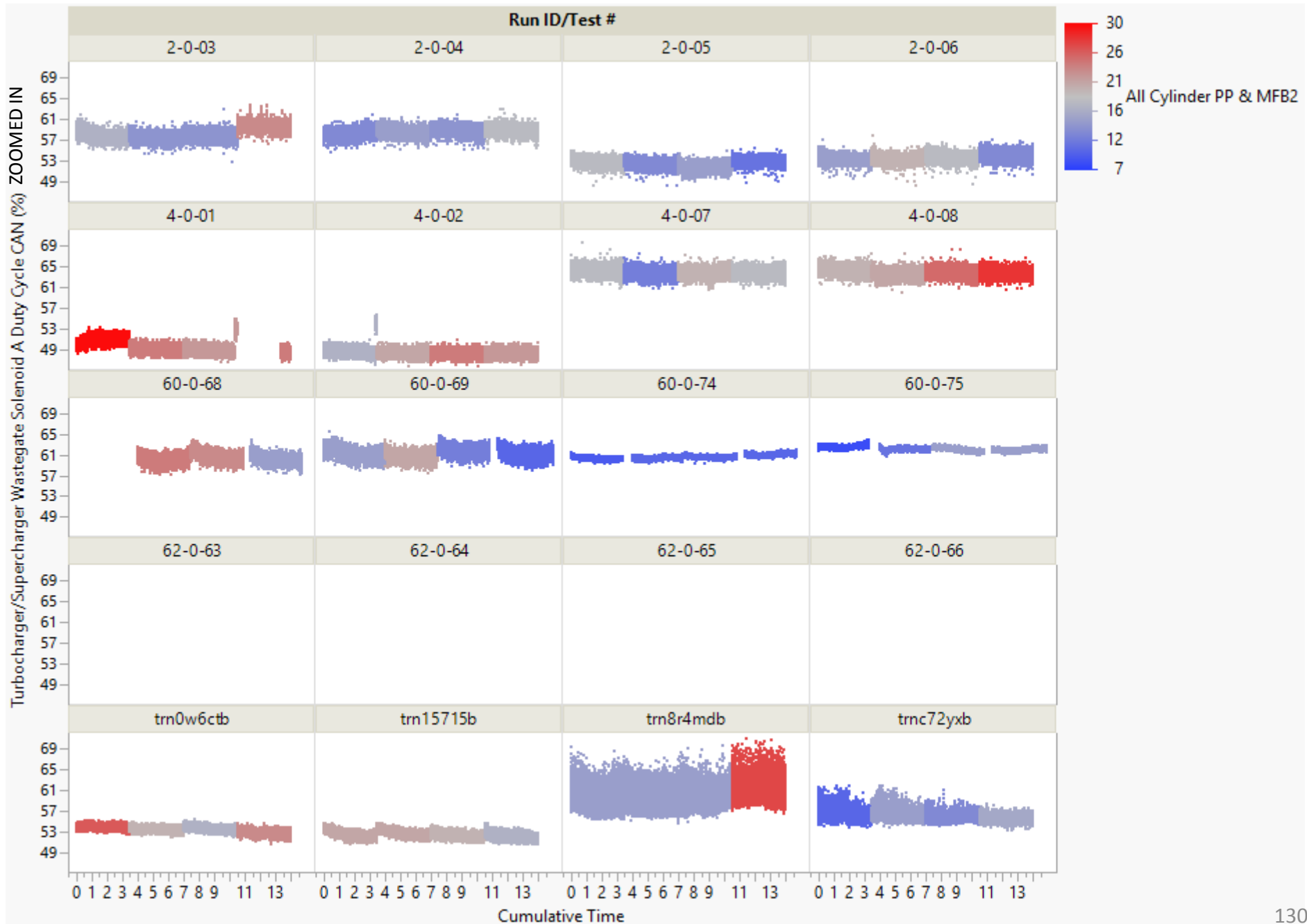




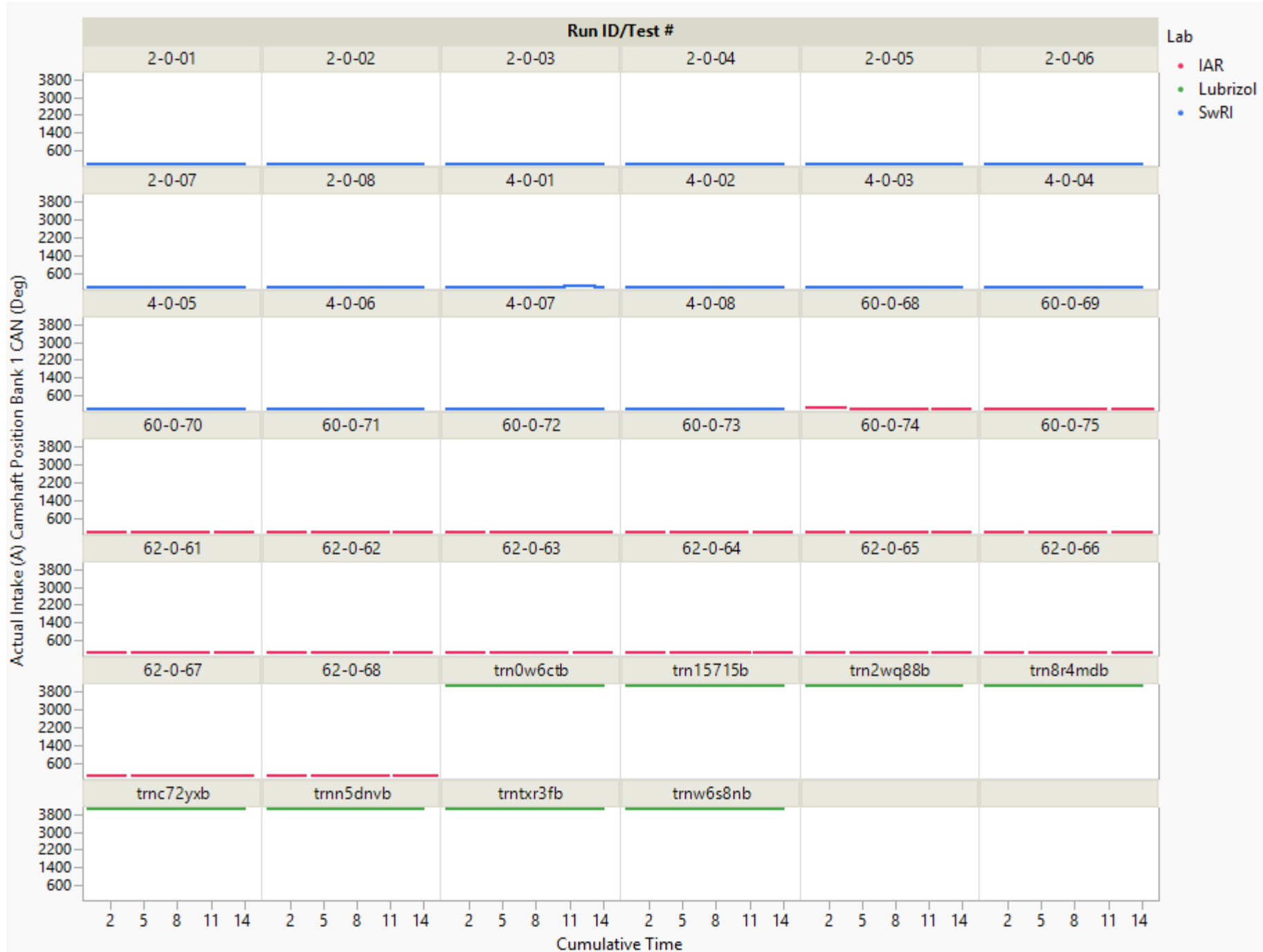
Low Event Oil



High Event Oil

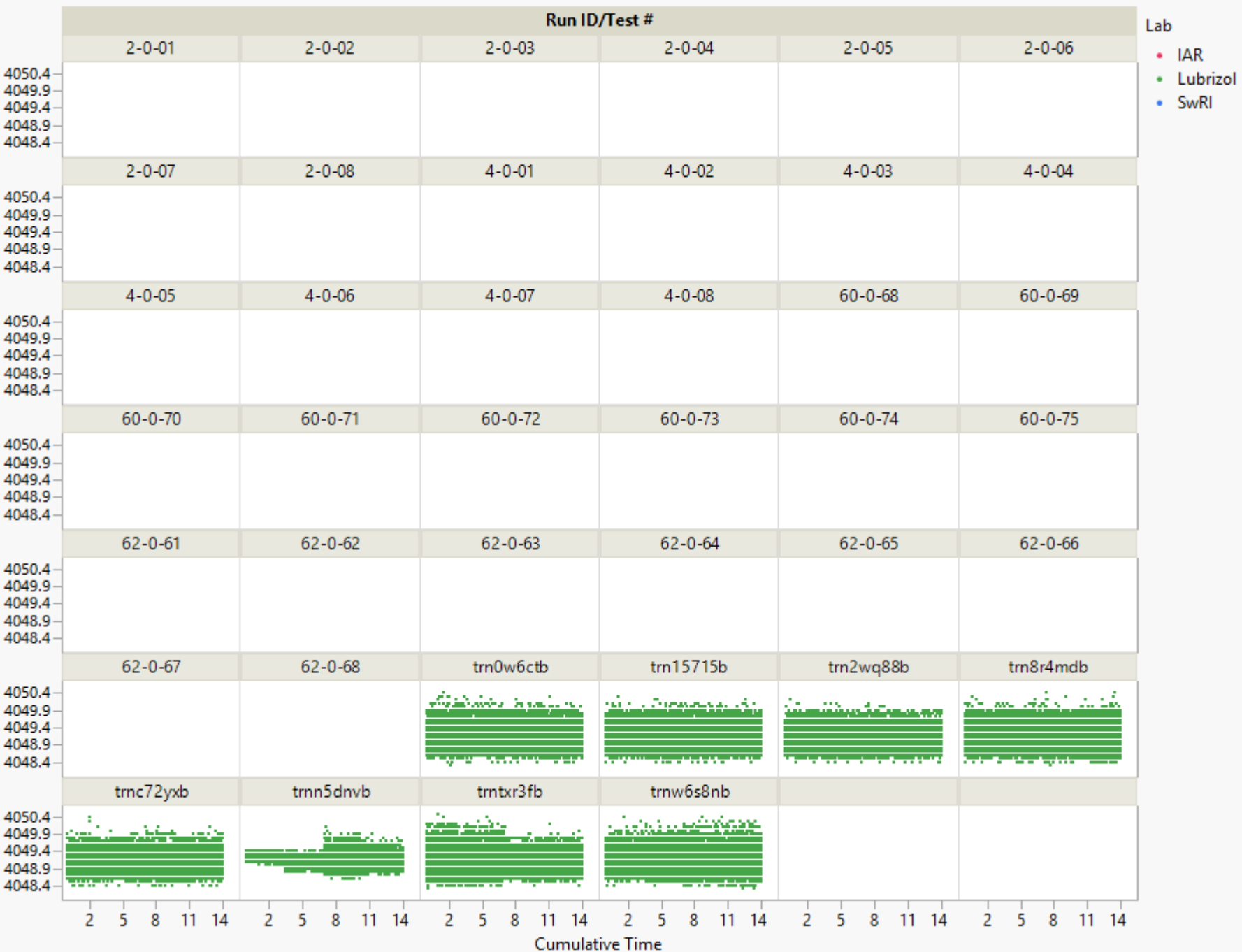


Actual Intake (A)
Camshaft Position
Bank 1 CAN





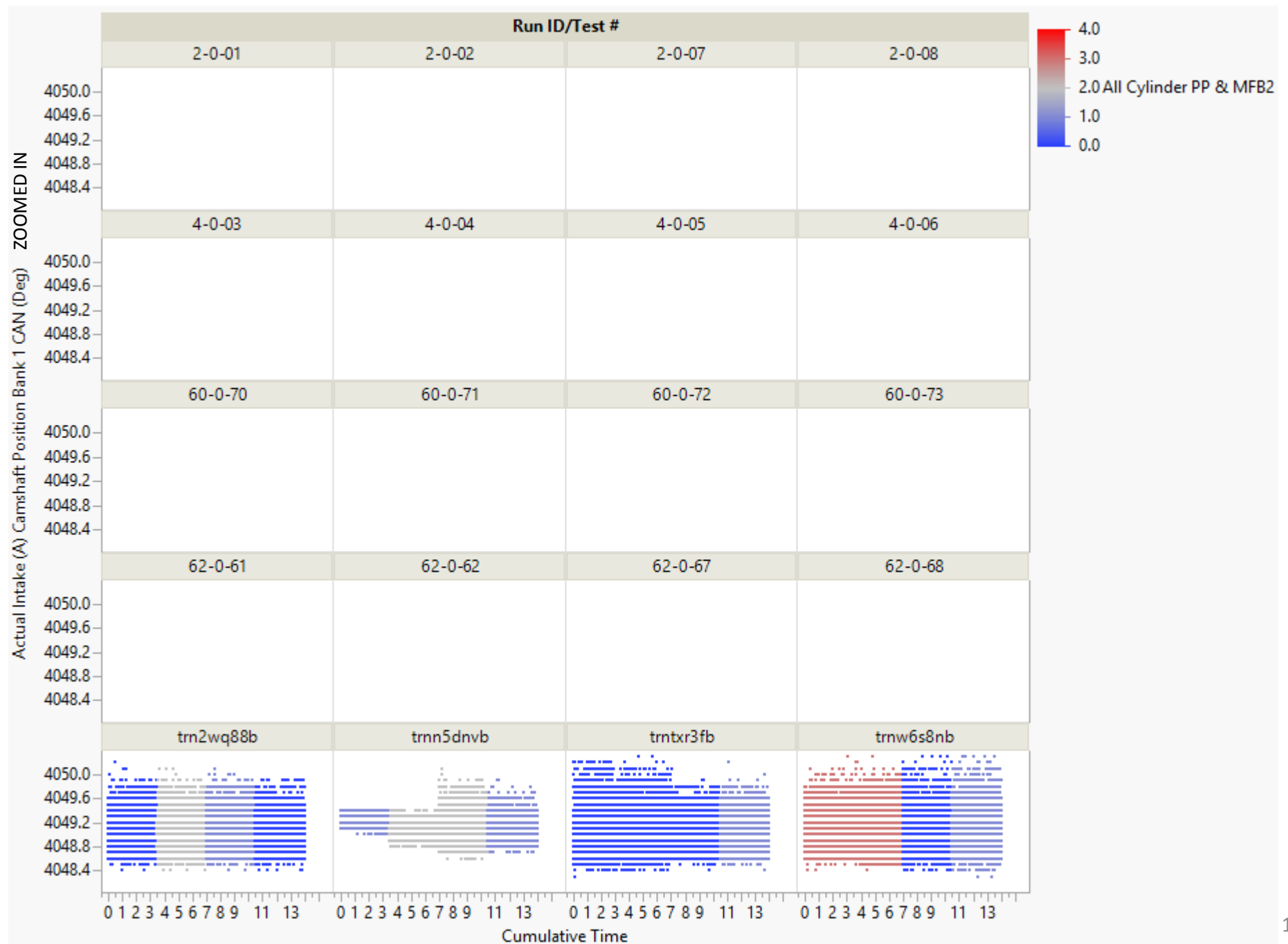
Actual Intake (A) Camshaft Position Bank 1 CAN (Deg) ZOOMED IN



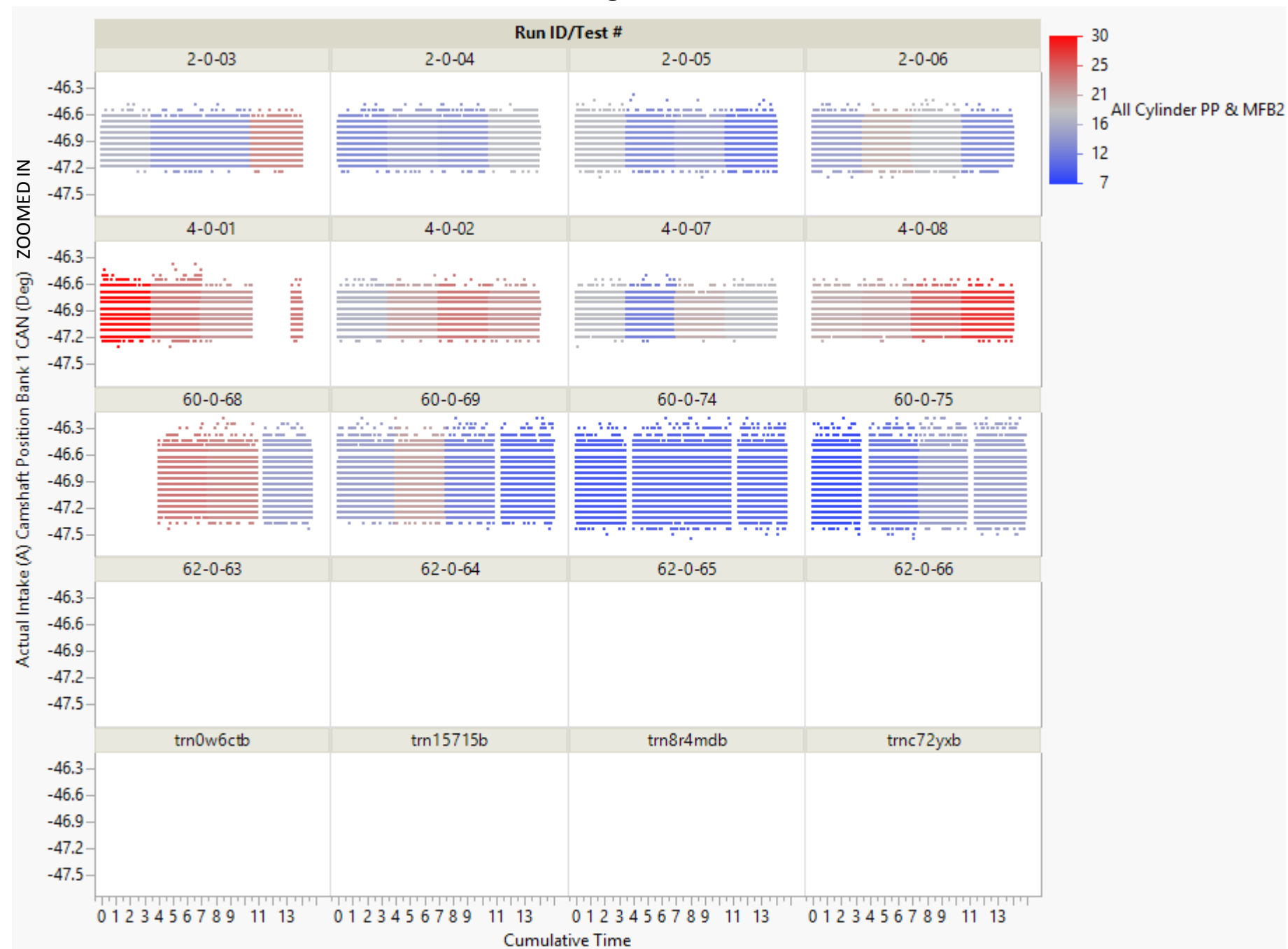
Low Event Oil



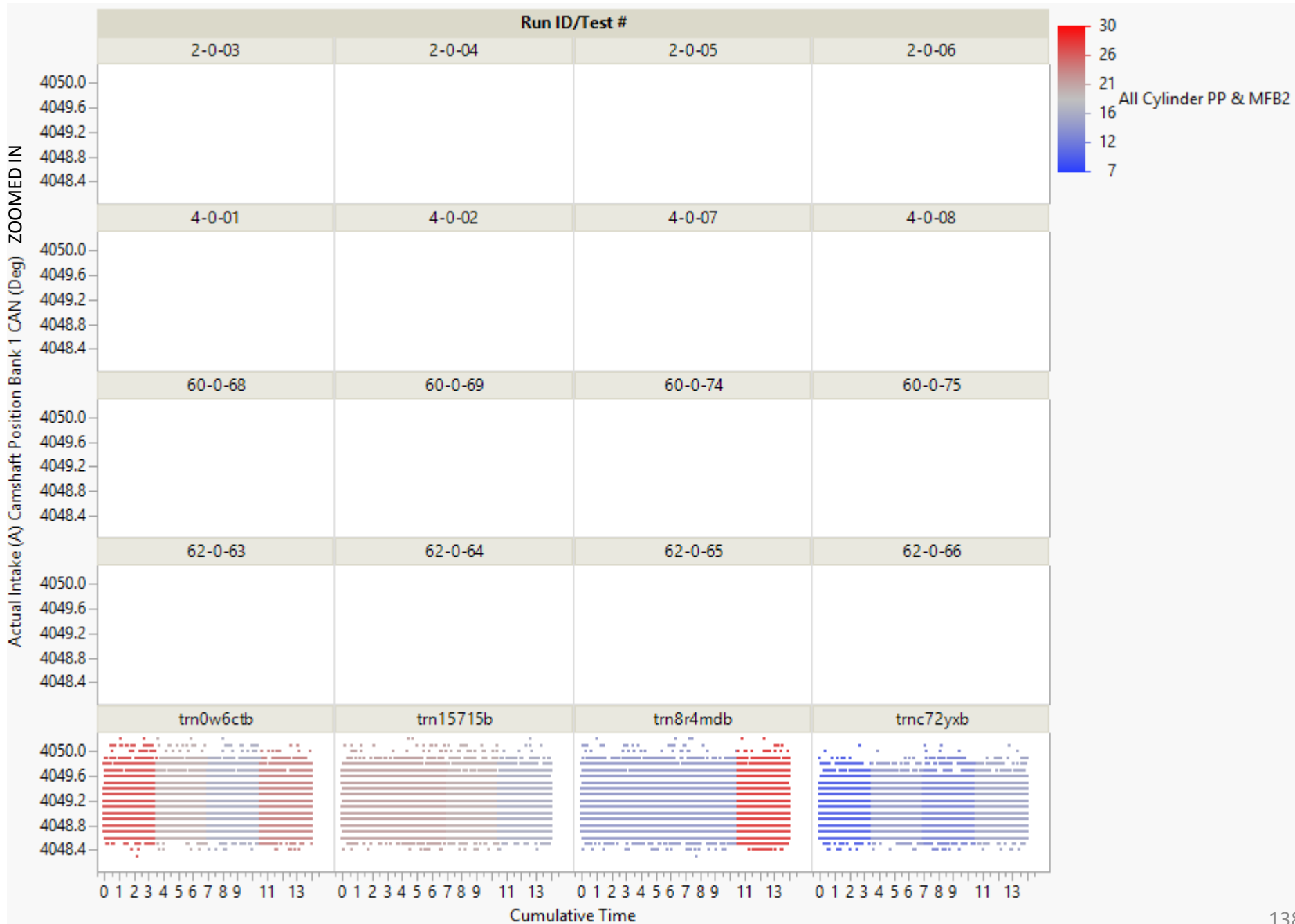
Low Event Oil



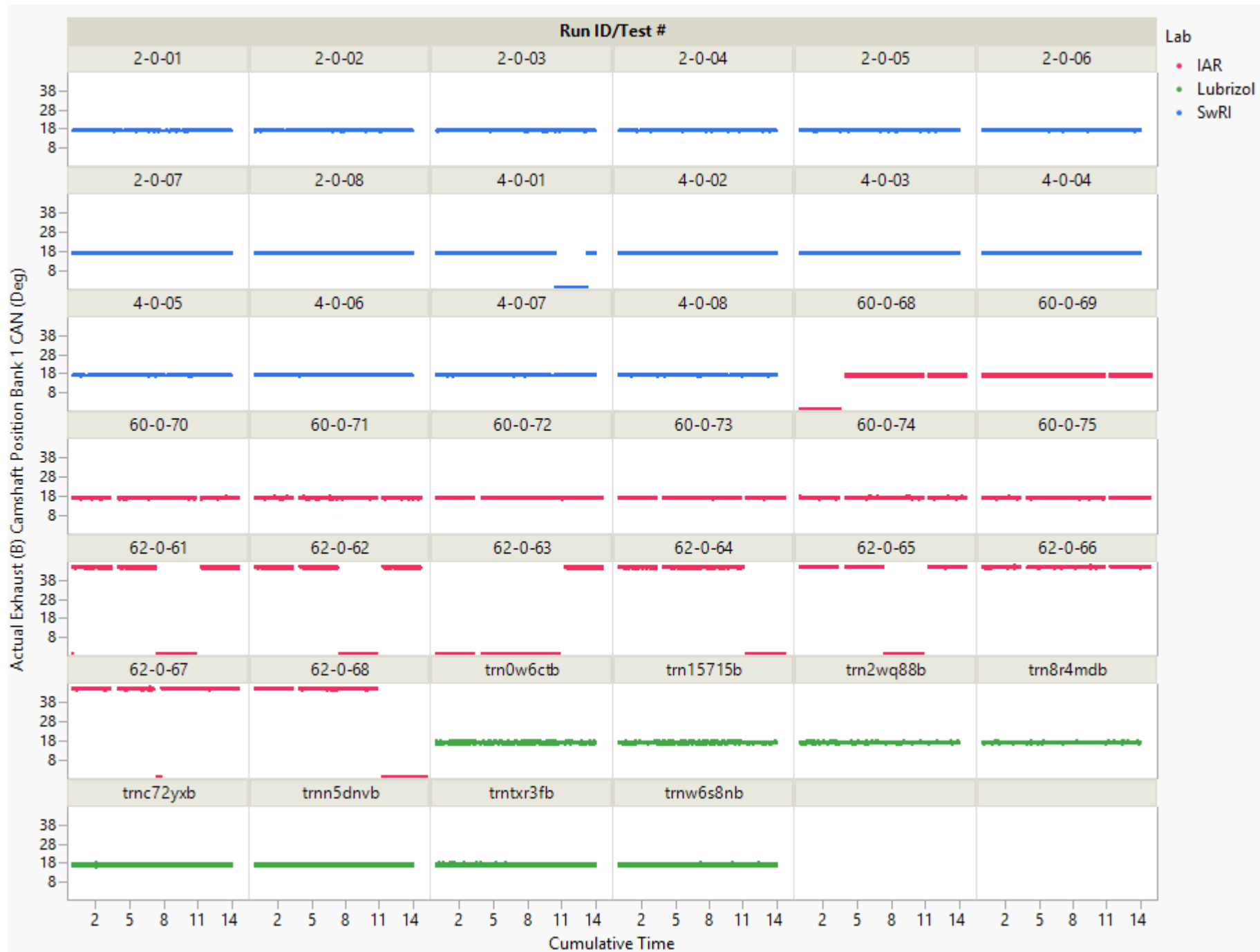
High Event Oil

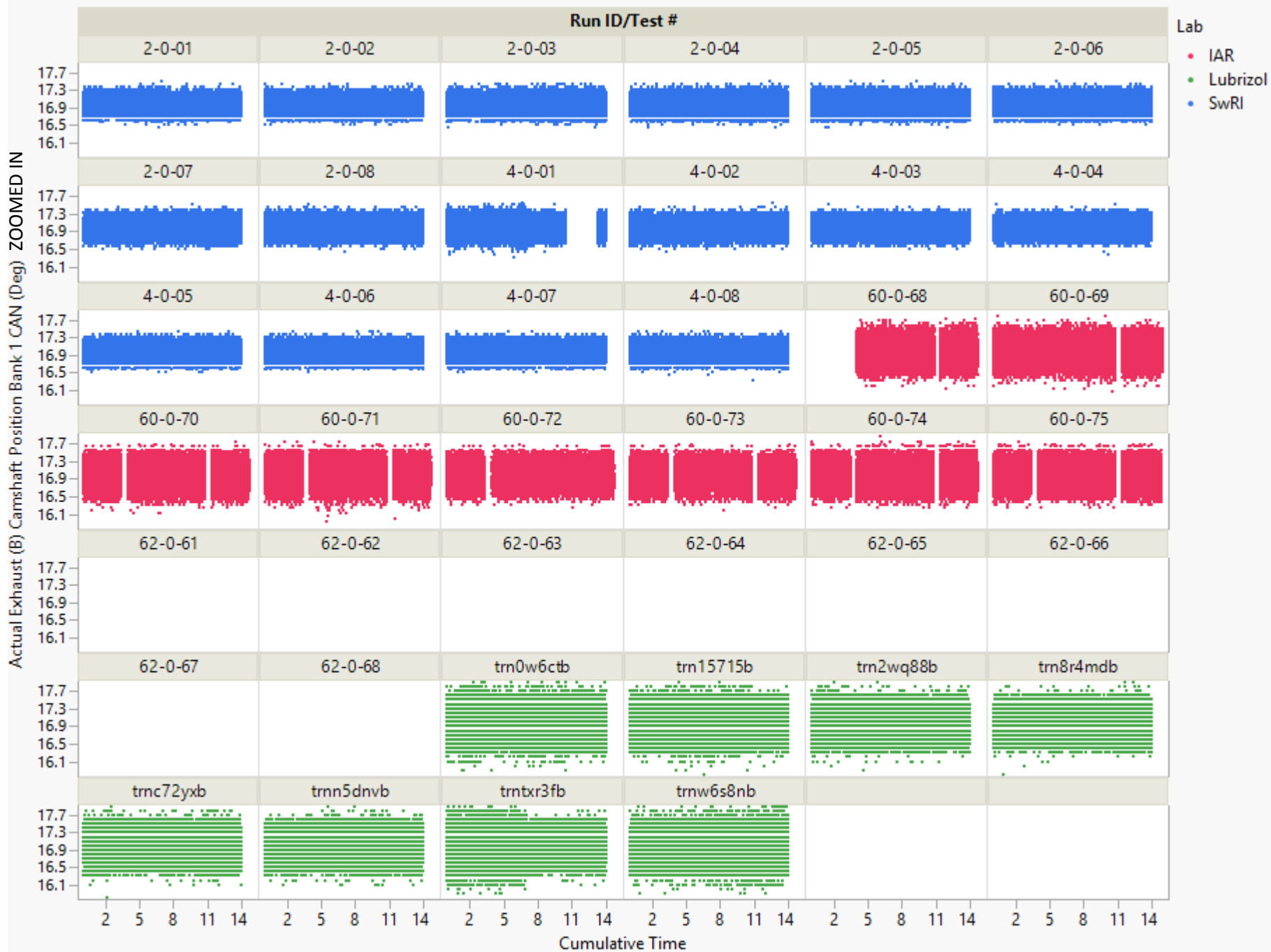


High Event Oil

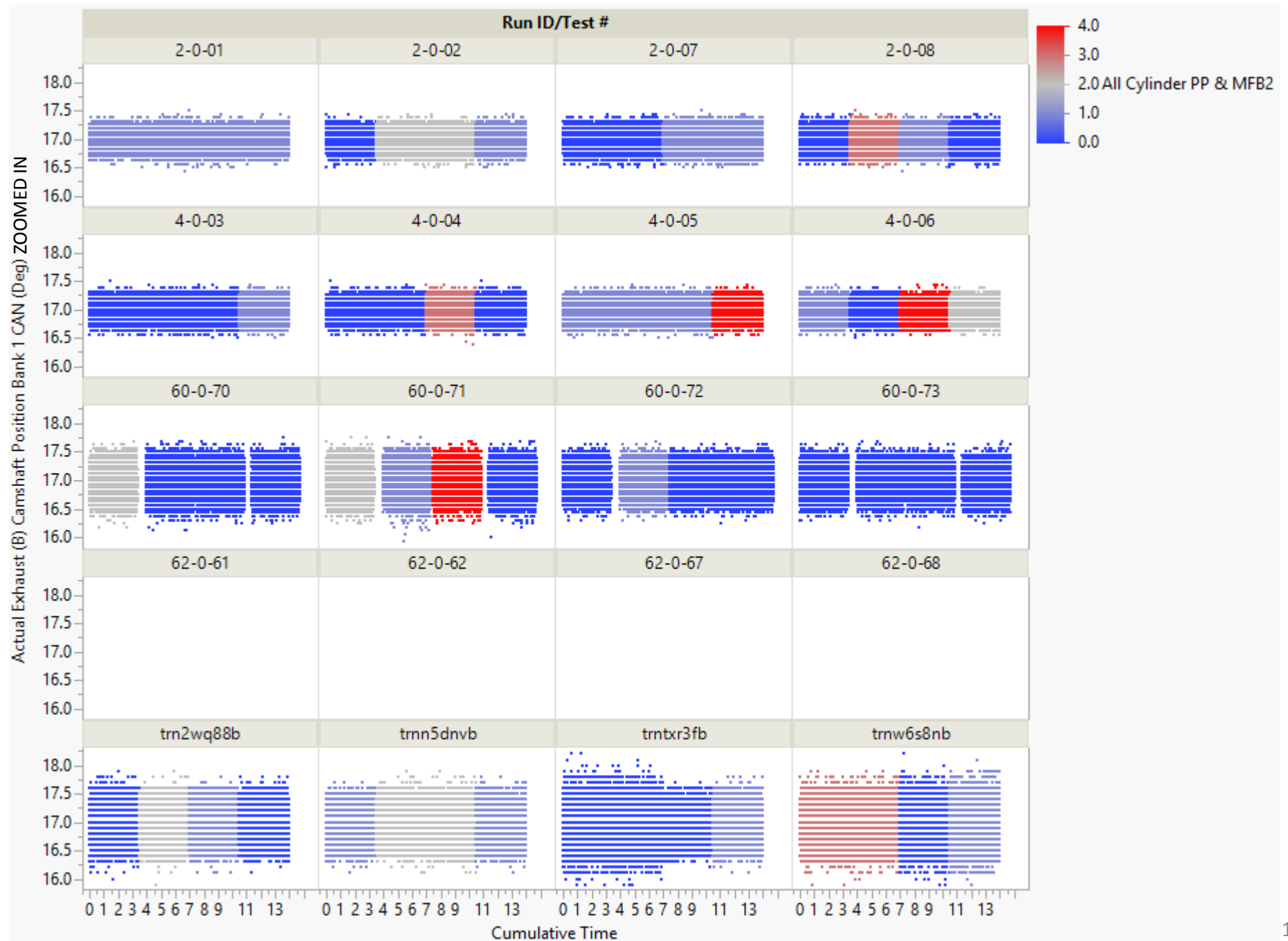


Actual Exhaust
(B) Camshaft
Position Bank 1
CAN

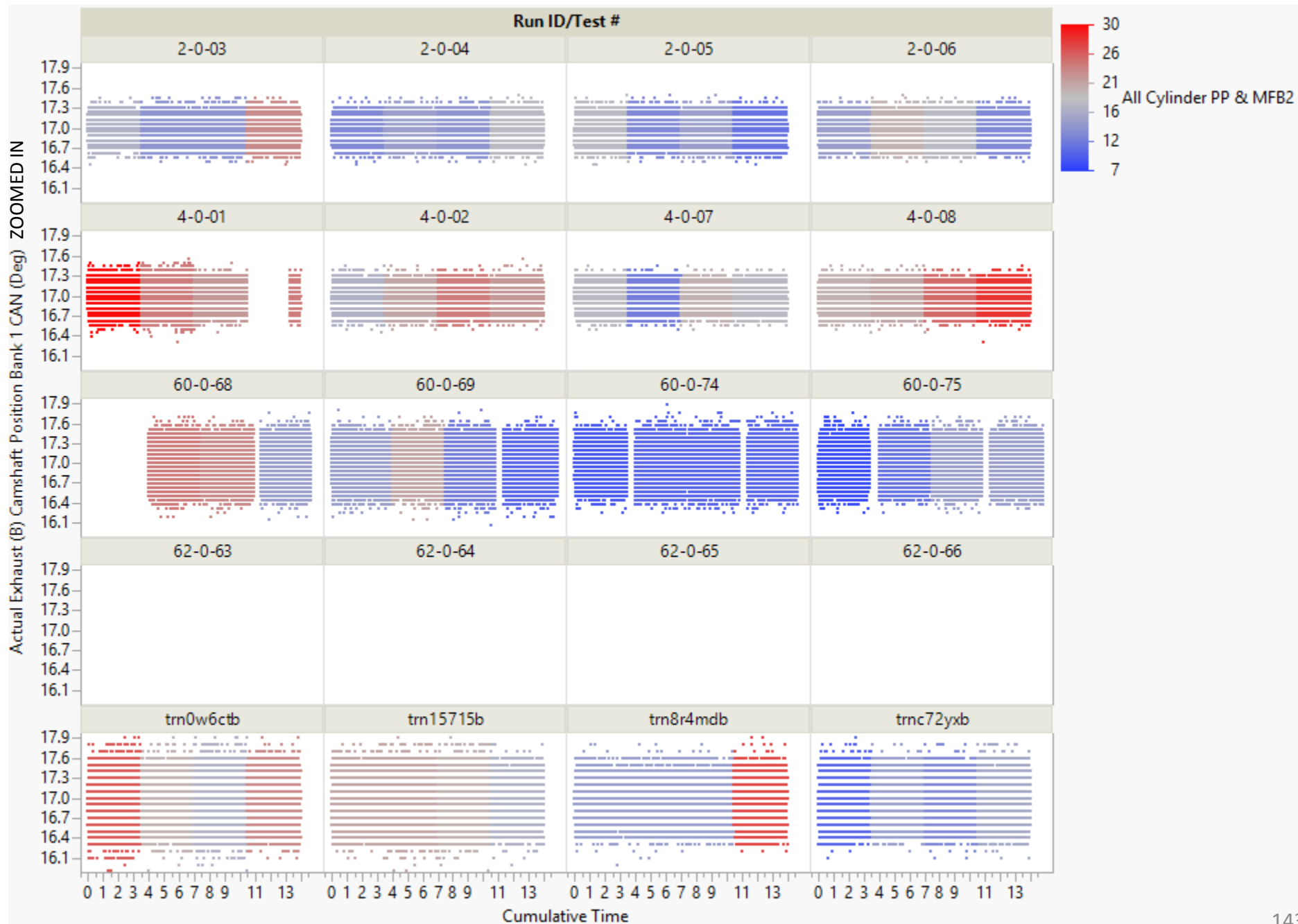




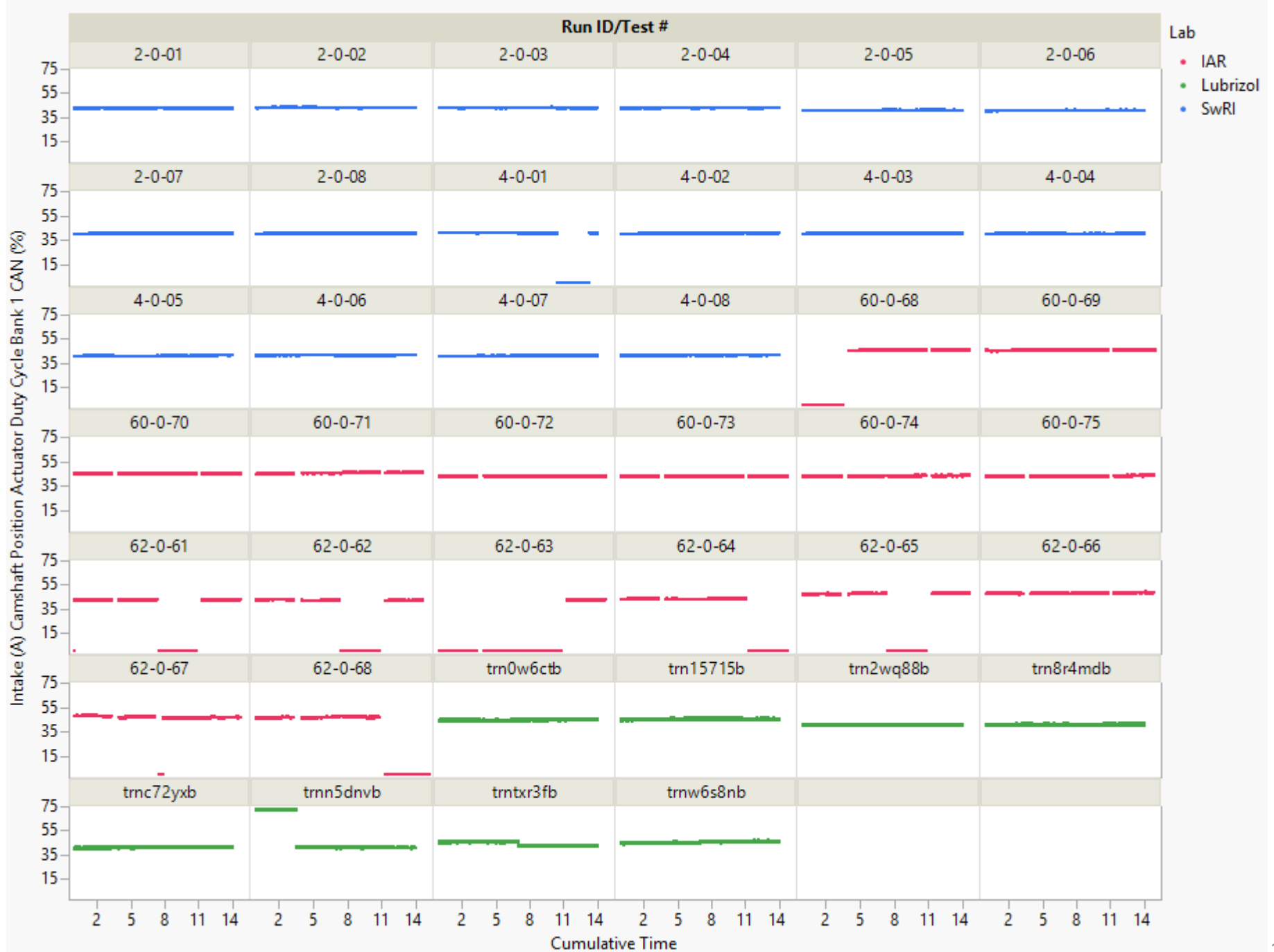
Low Event Oil

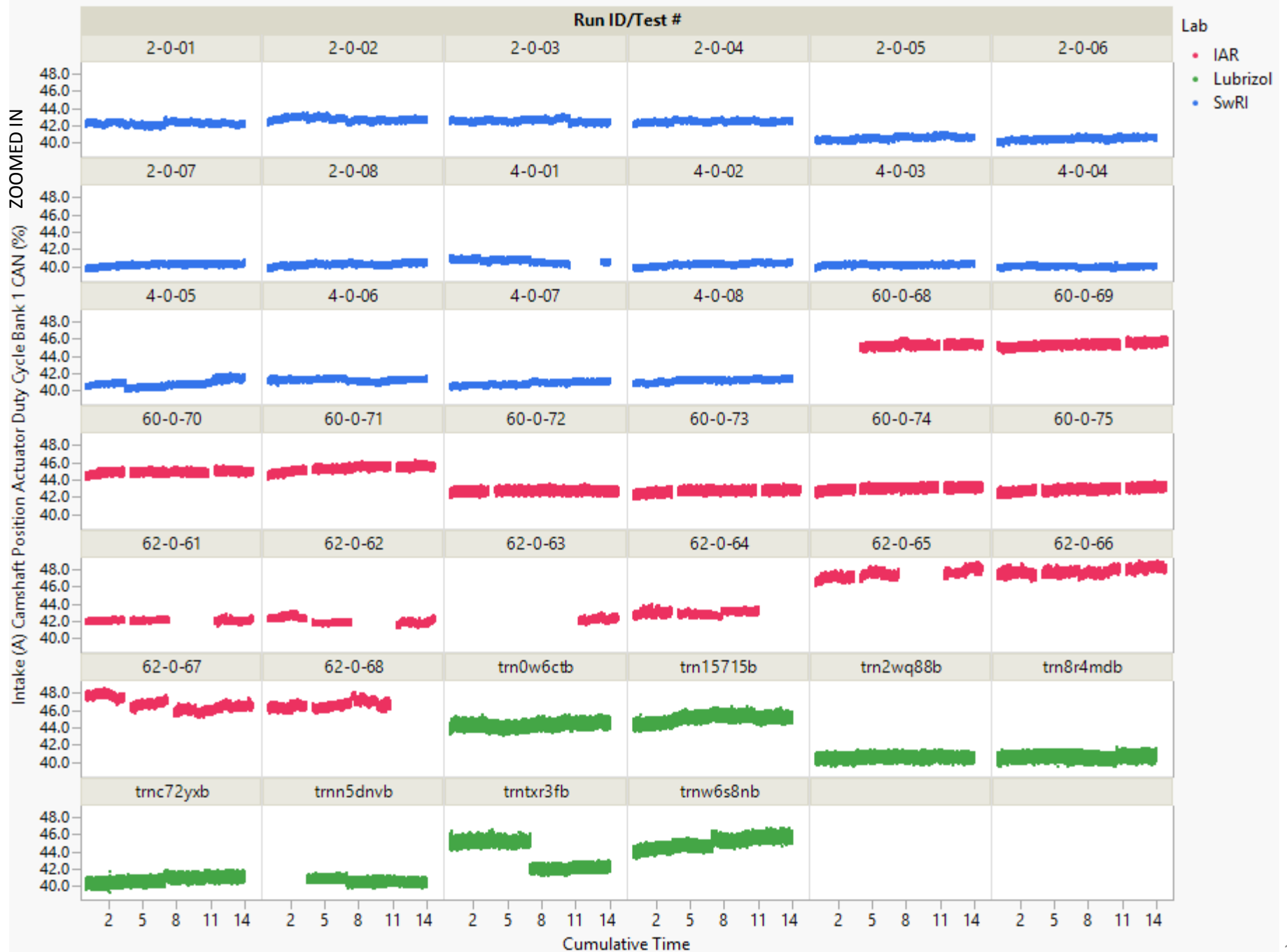


High Event Oil

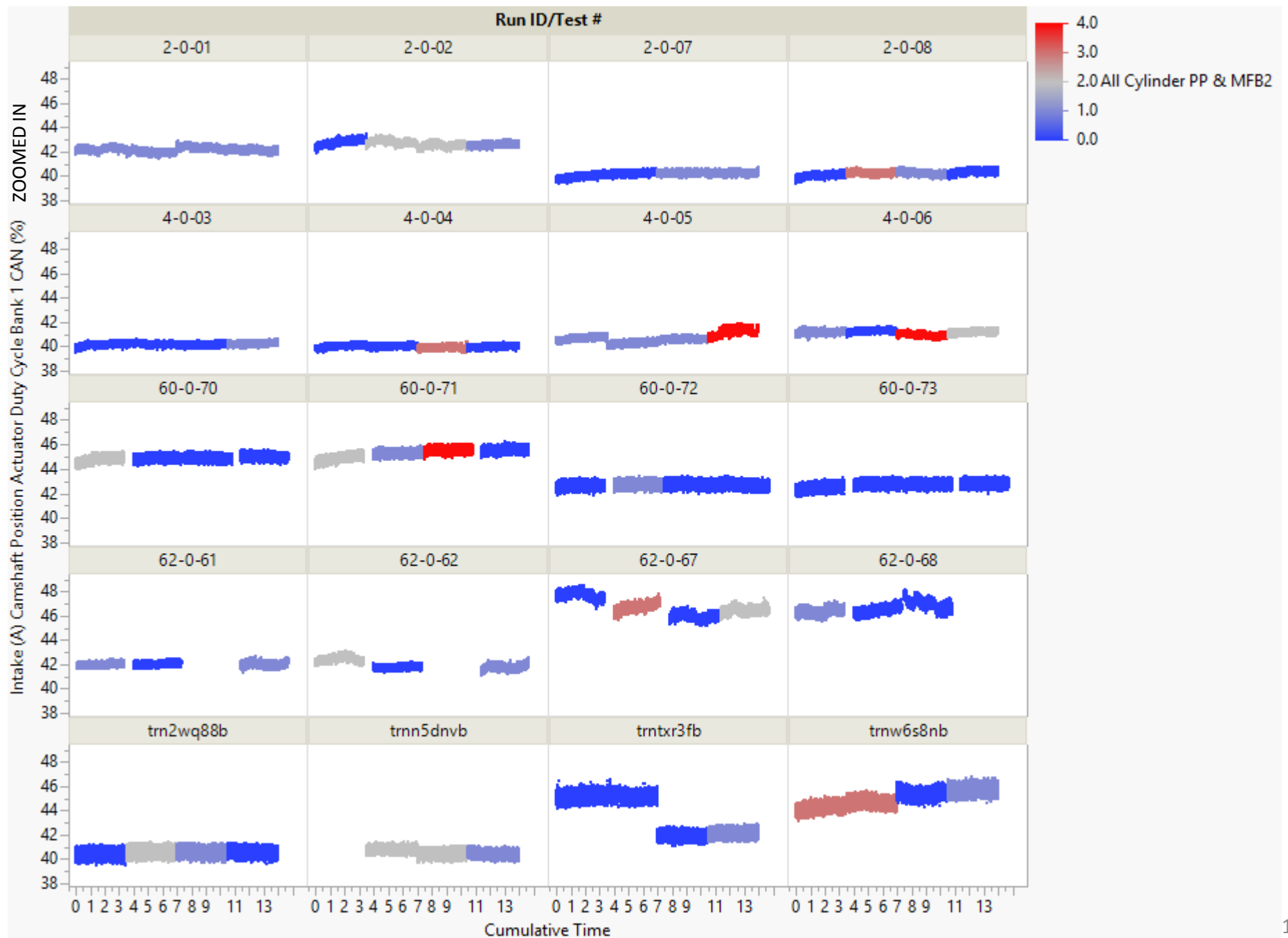


Intake (A) Camshaft
Position Actuator
Duty Cycle Bank 1
CAN

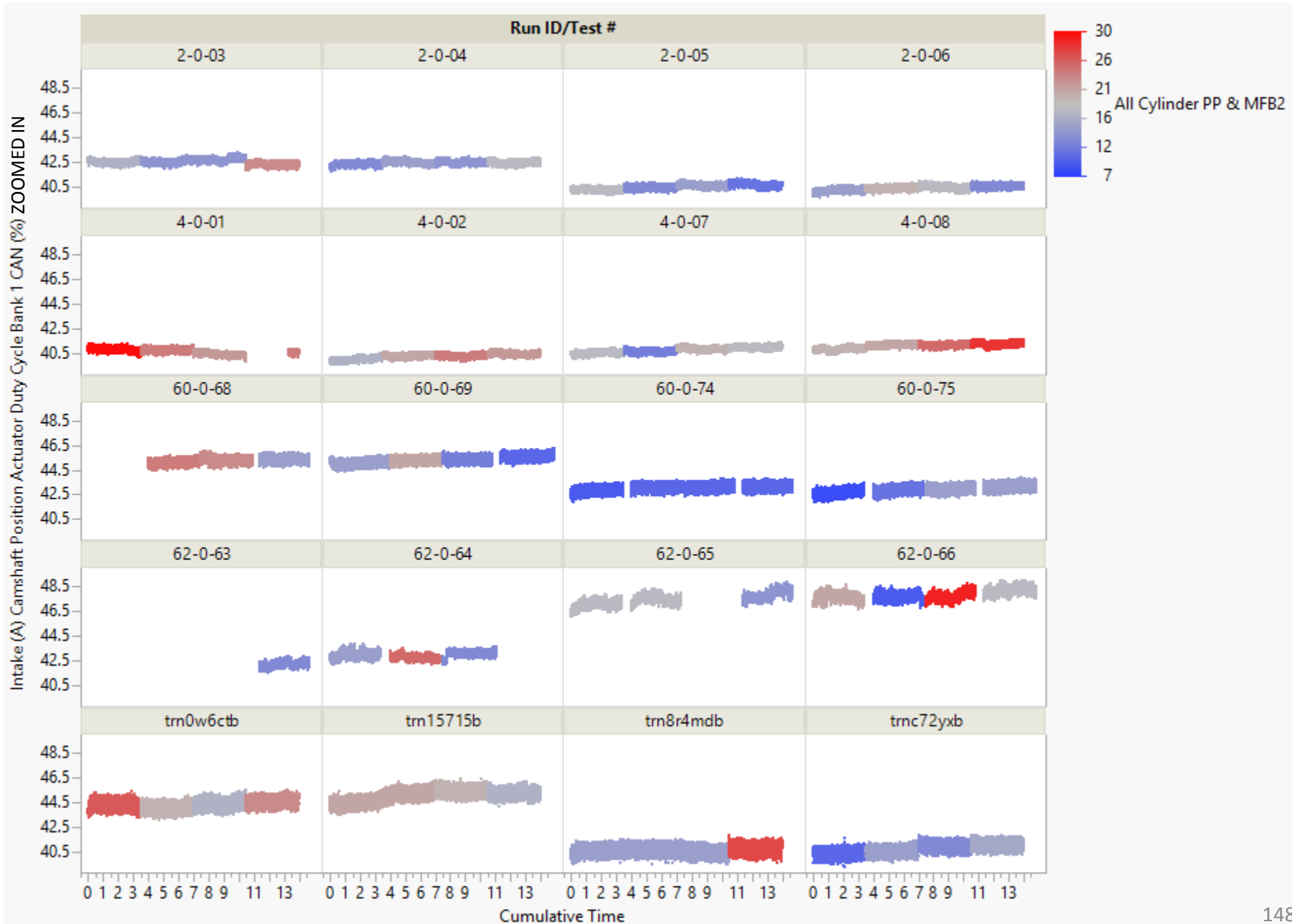




Low Event Oil



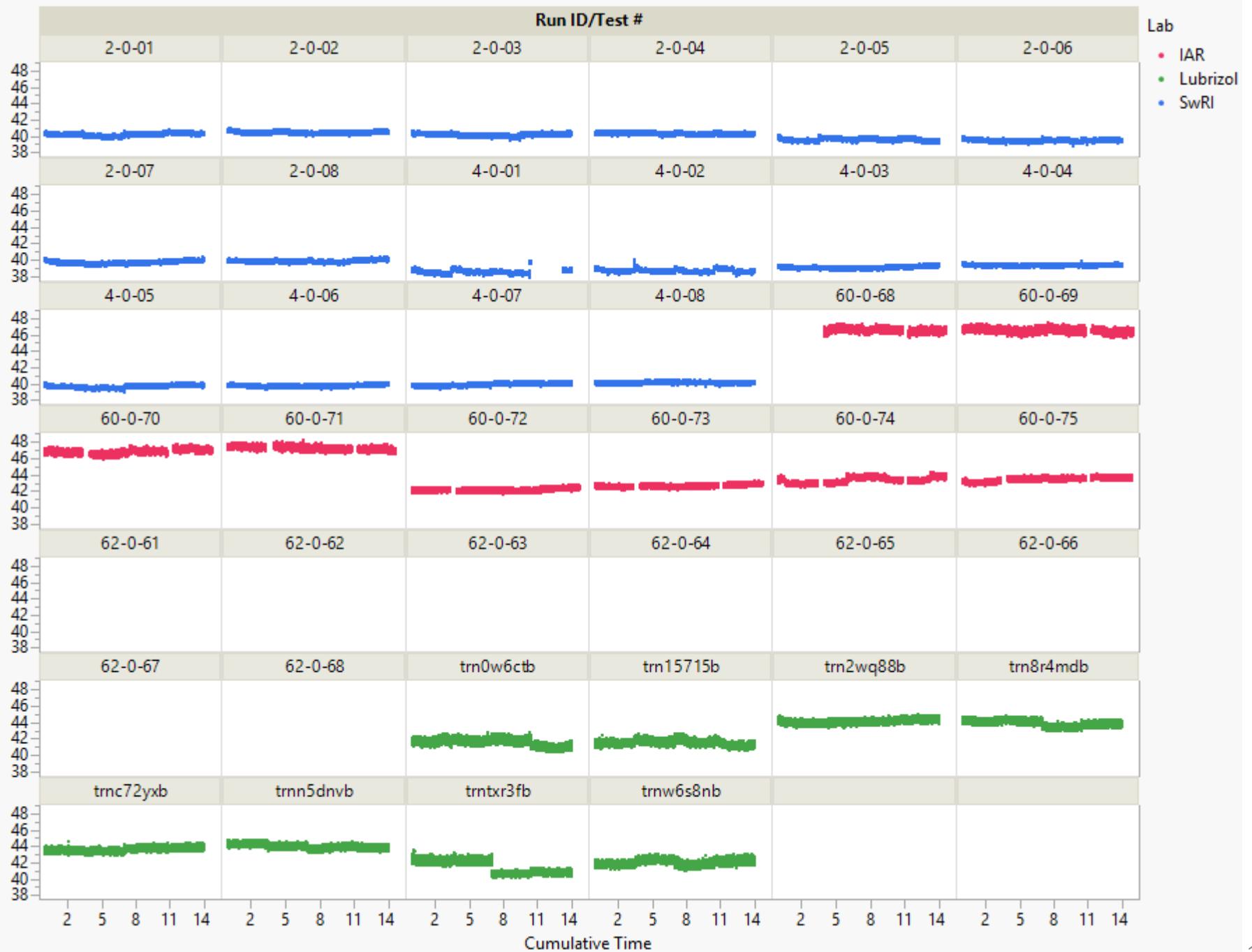
High Event Oil



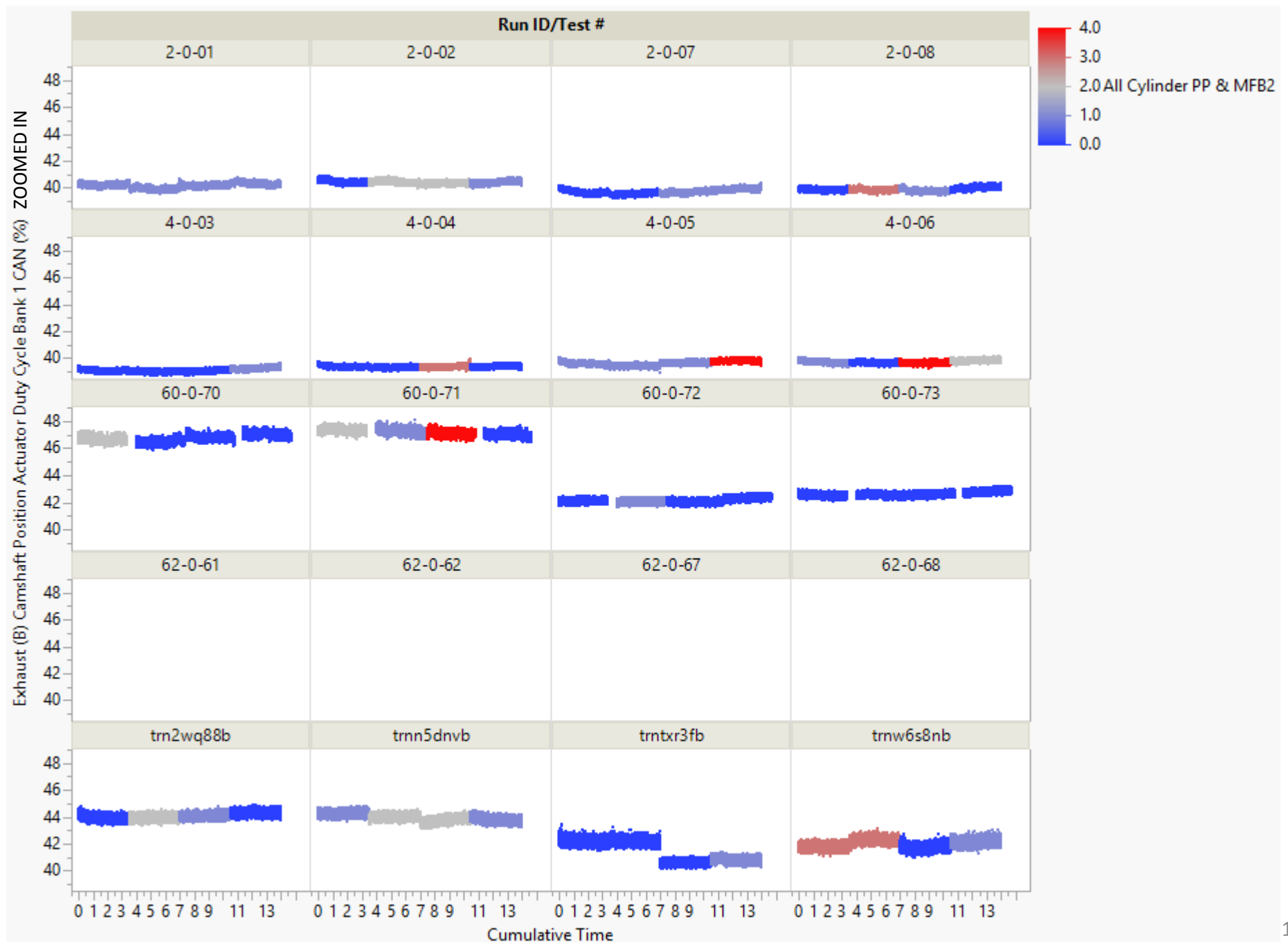
Exhaust (B) Camshaft
Position Actuator
Duty Cycle Bank 1
CAN



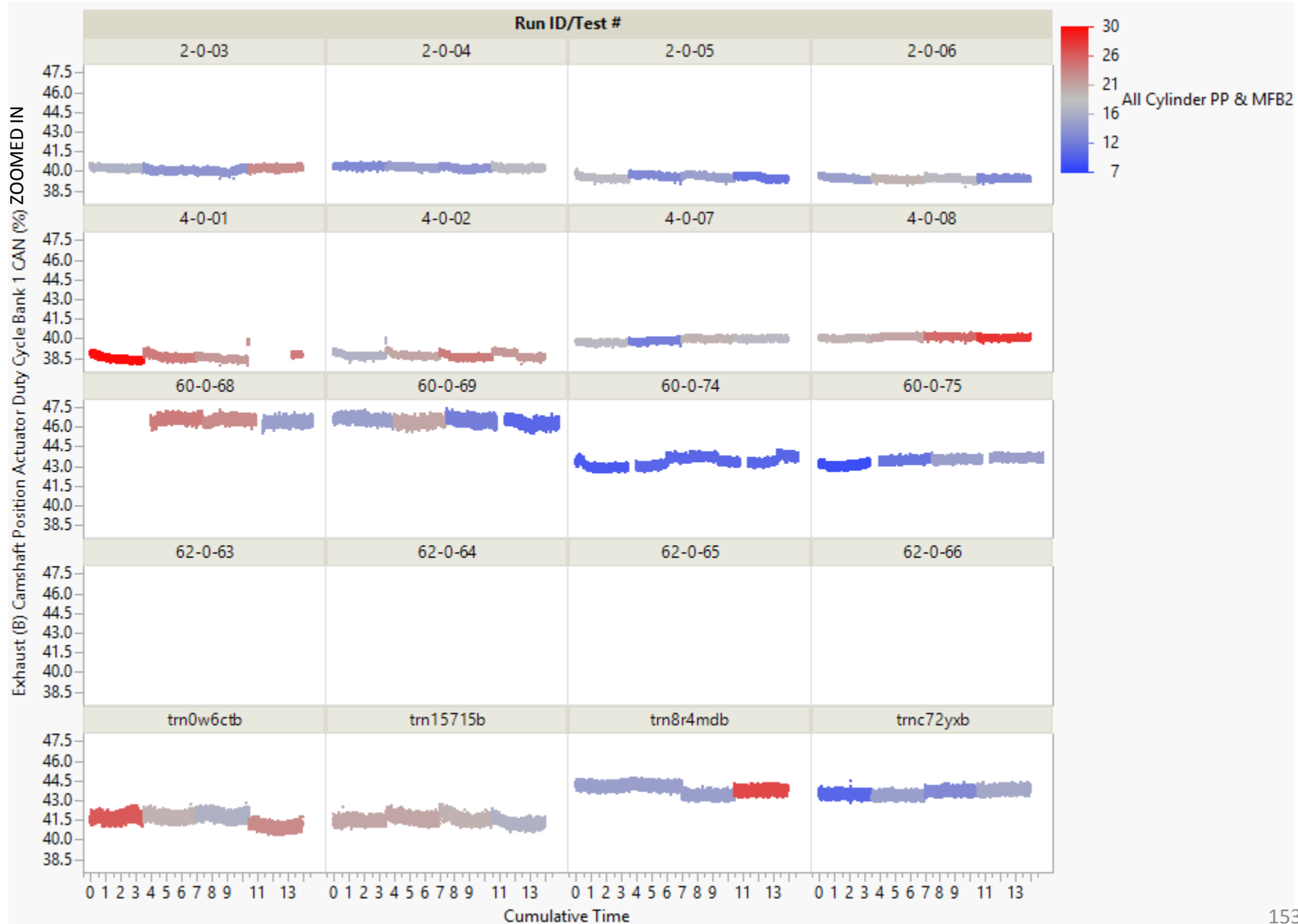
Exhaust (B) Camshaft Position Actuator Duty Cycle Bank 1 CAN (%) ZOOMED IN



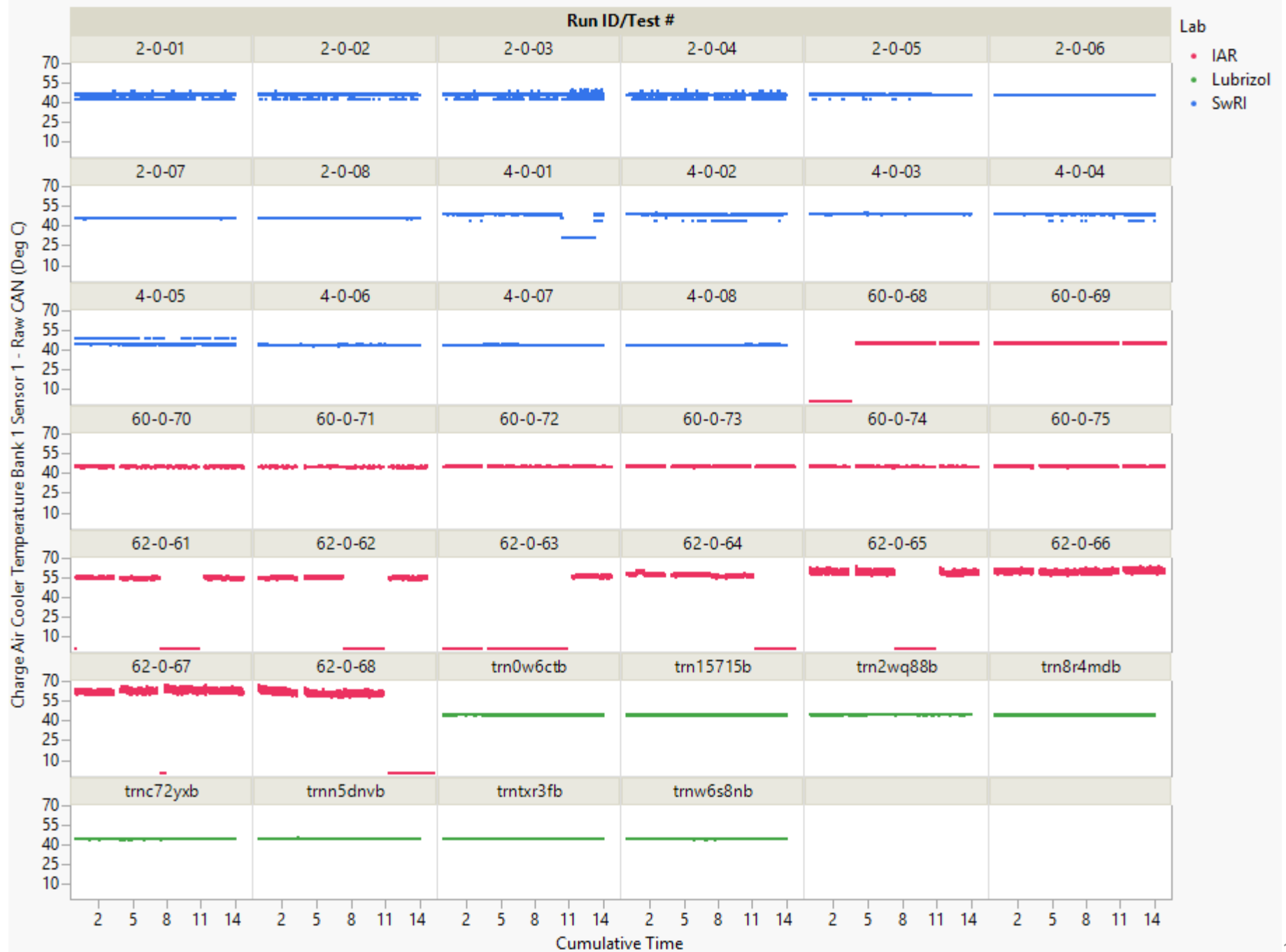
Low Event Oil

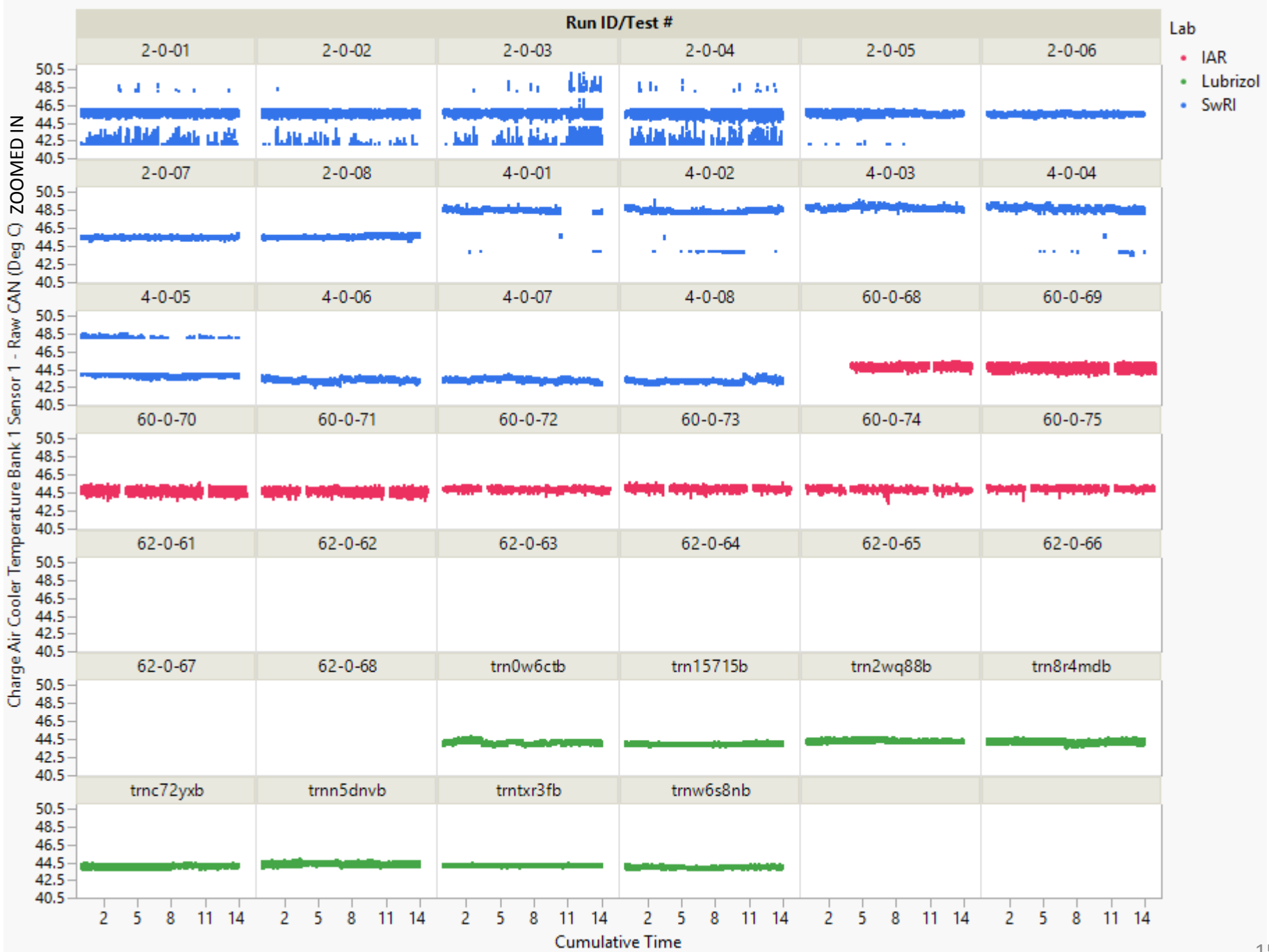


High Event Oil

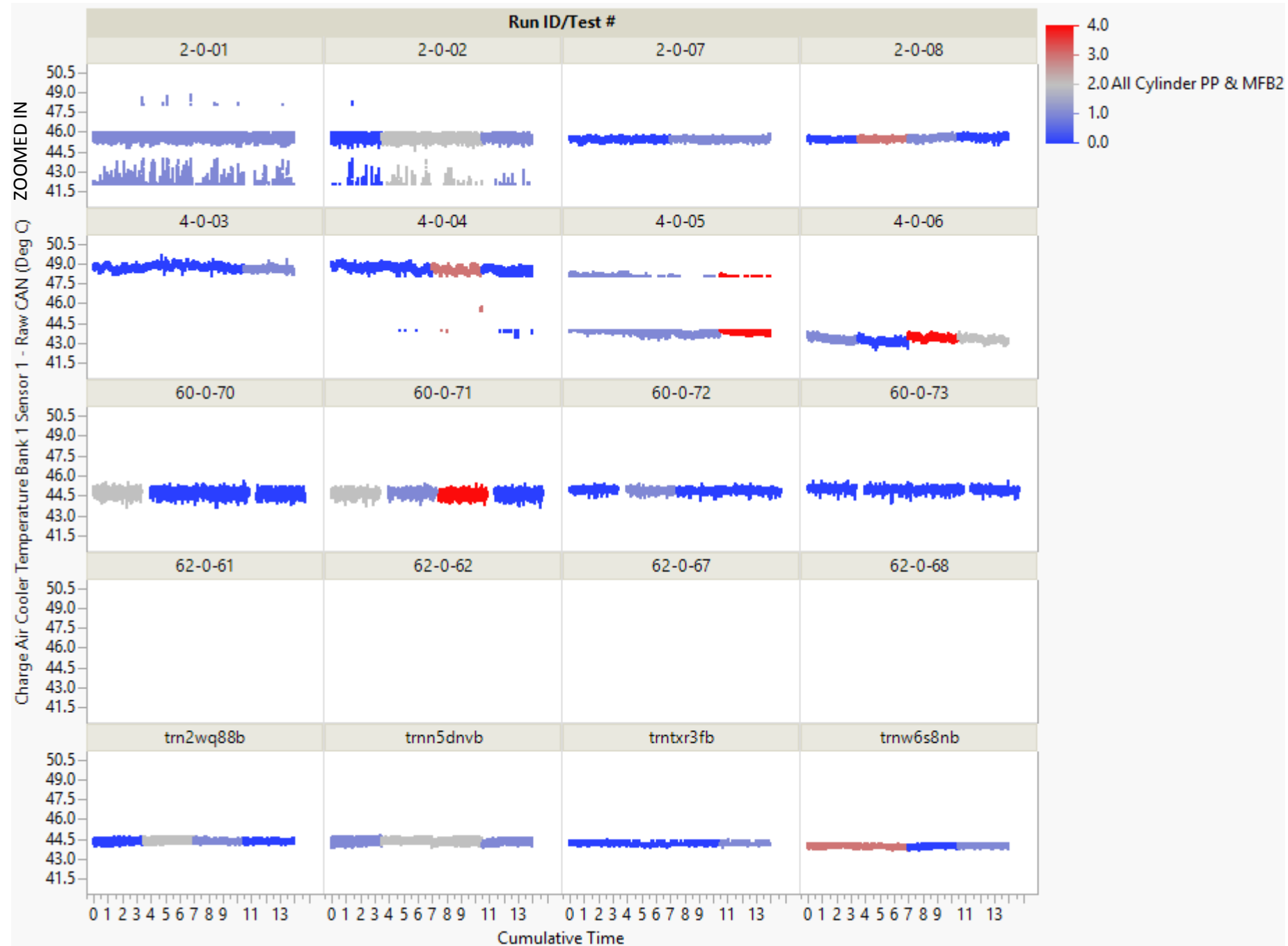


Charge Air Cooler
Temperature Bank
1 Sensor 1 - Raw
CAN

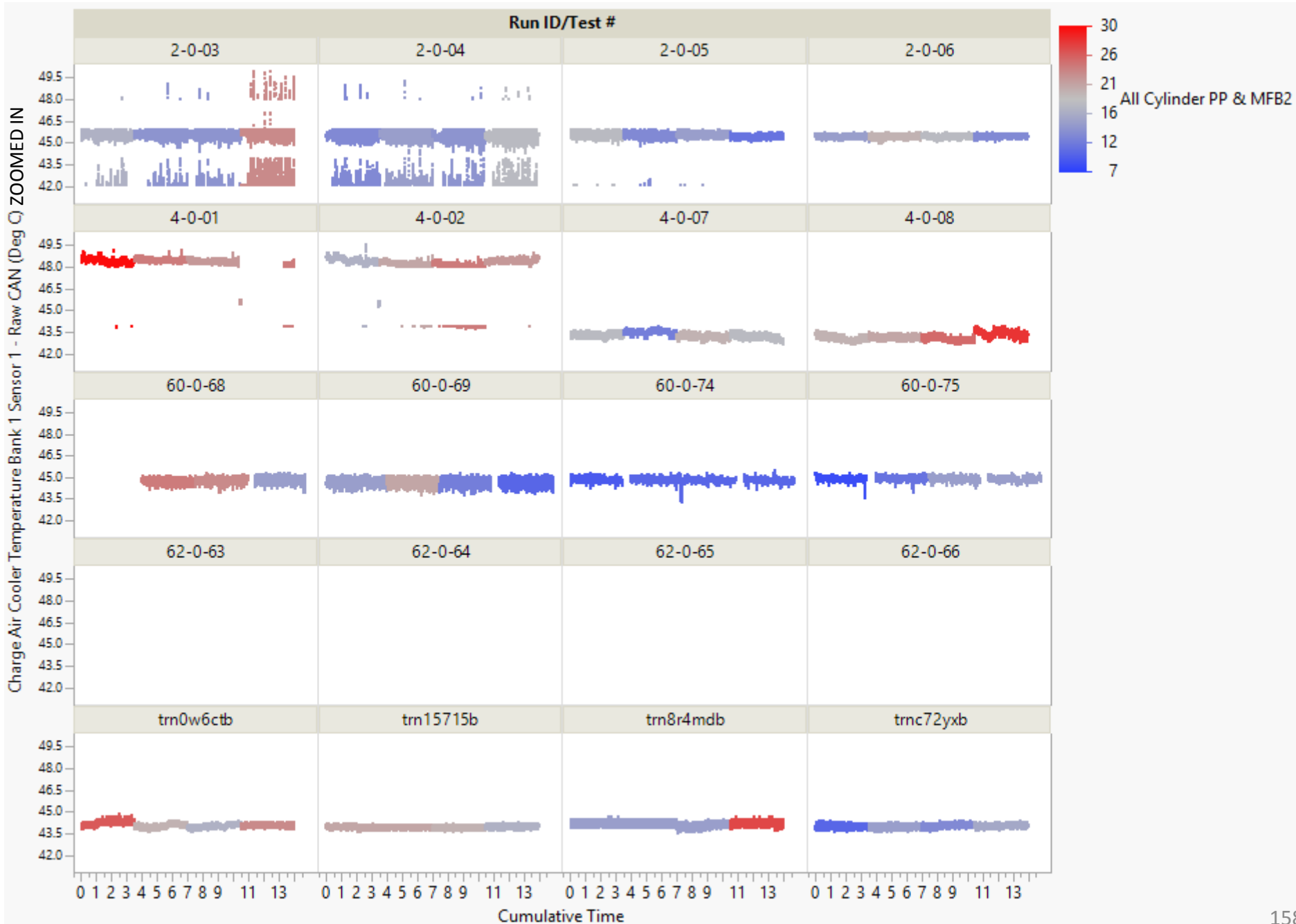




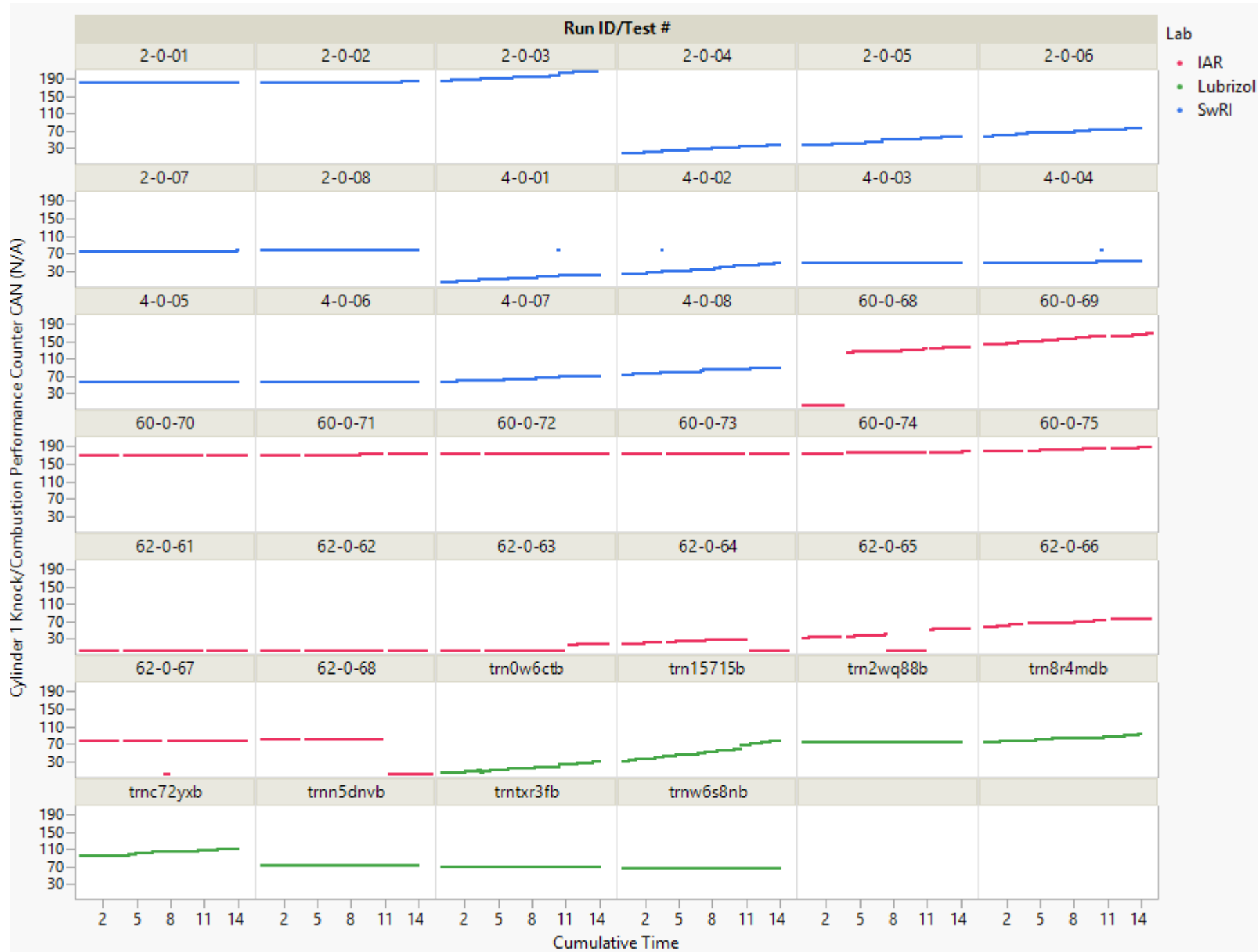
Low Event Oil



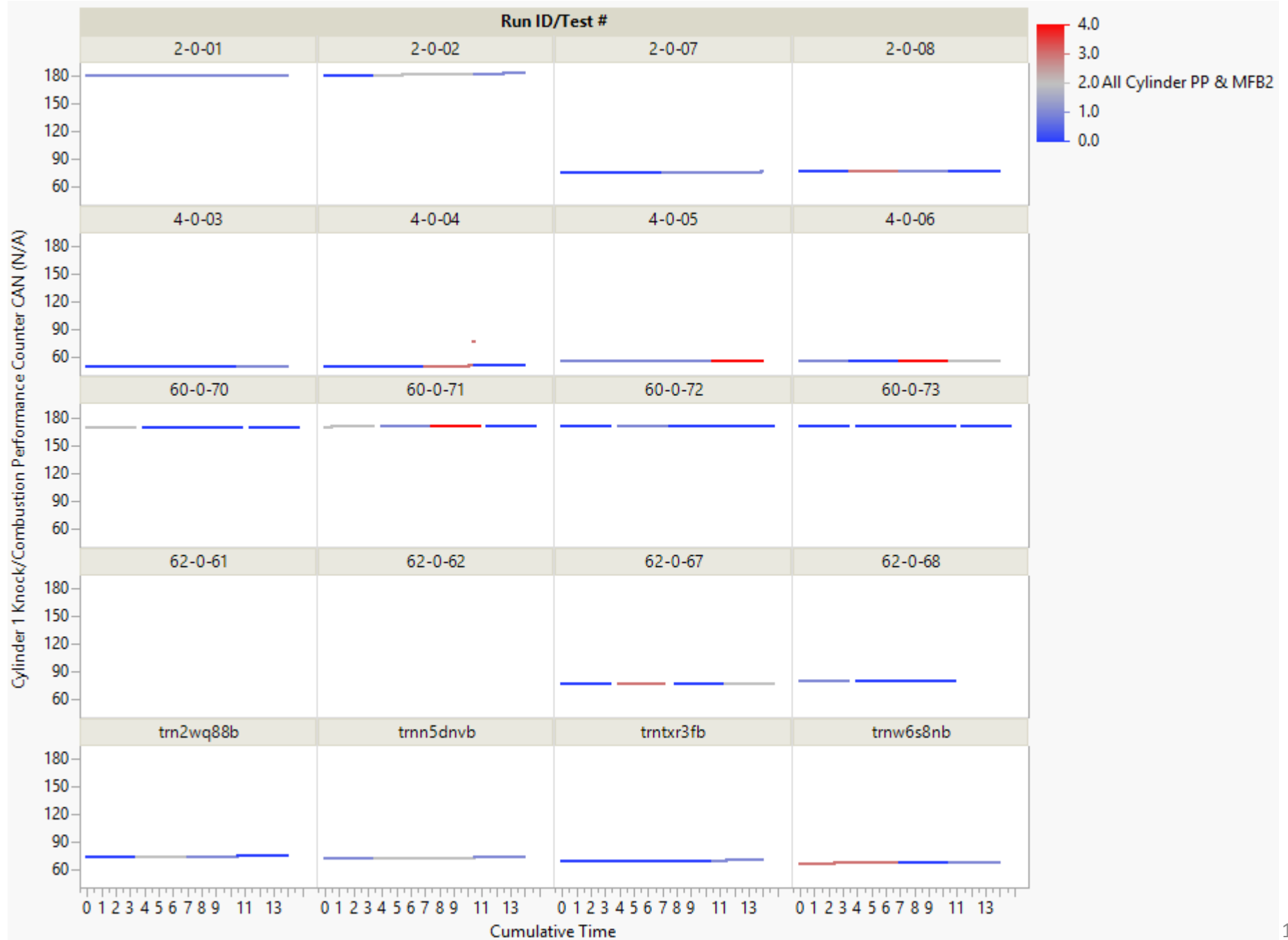
High Event Oil



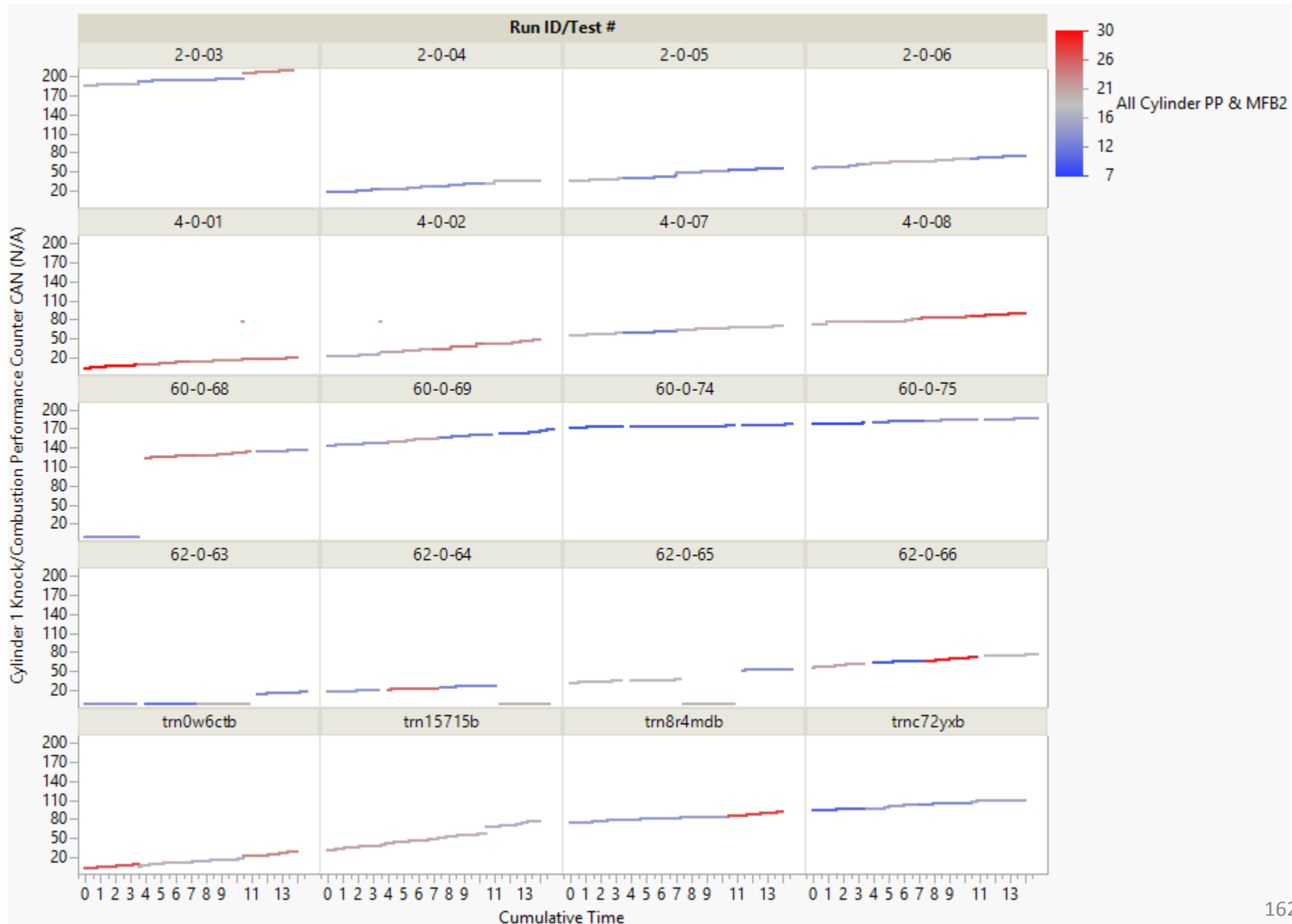
Cylinder 1 Knock/Combustion Performance Counter CAN



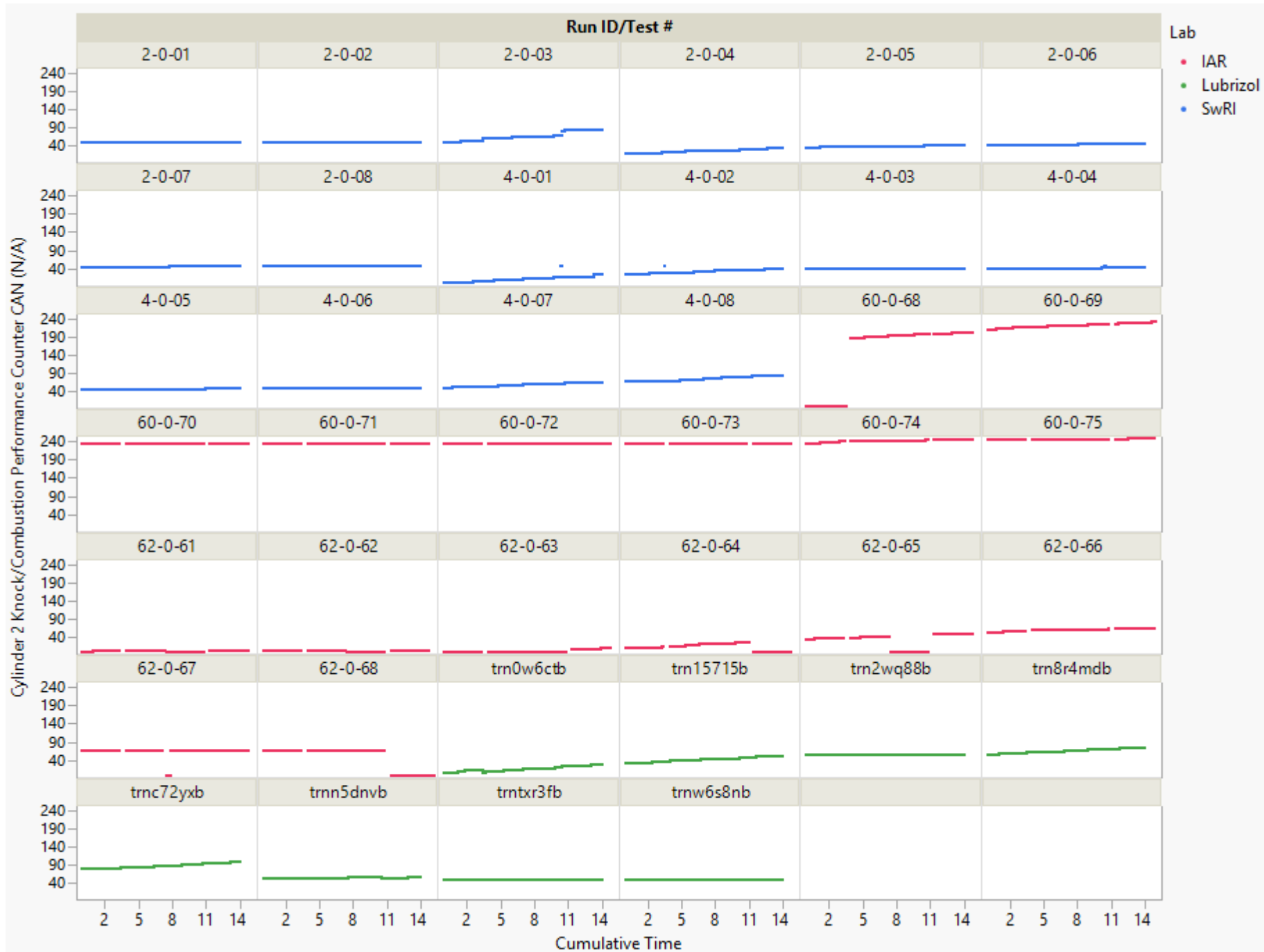
Low Event Oil



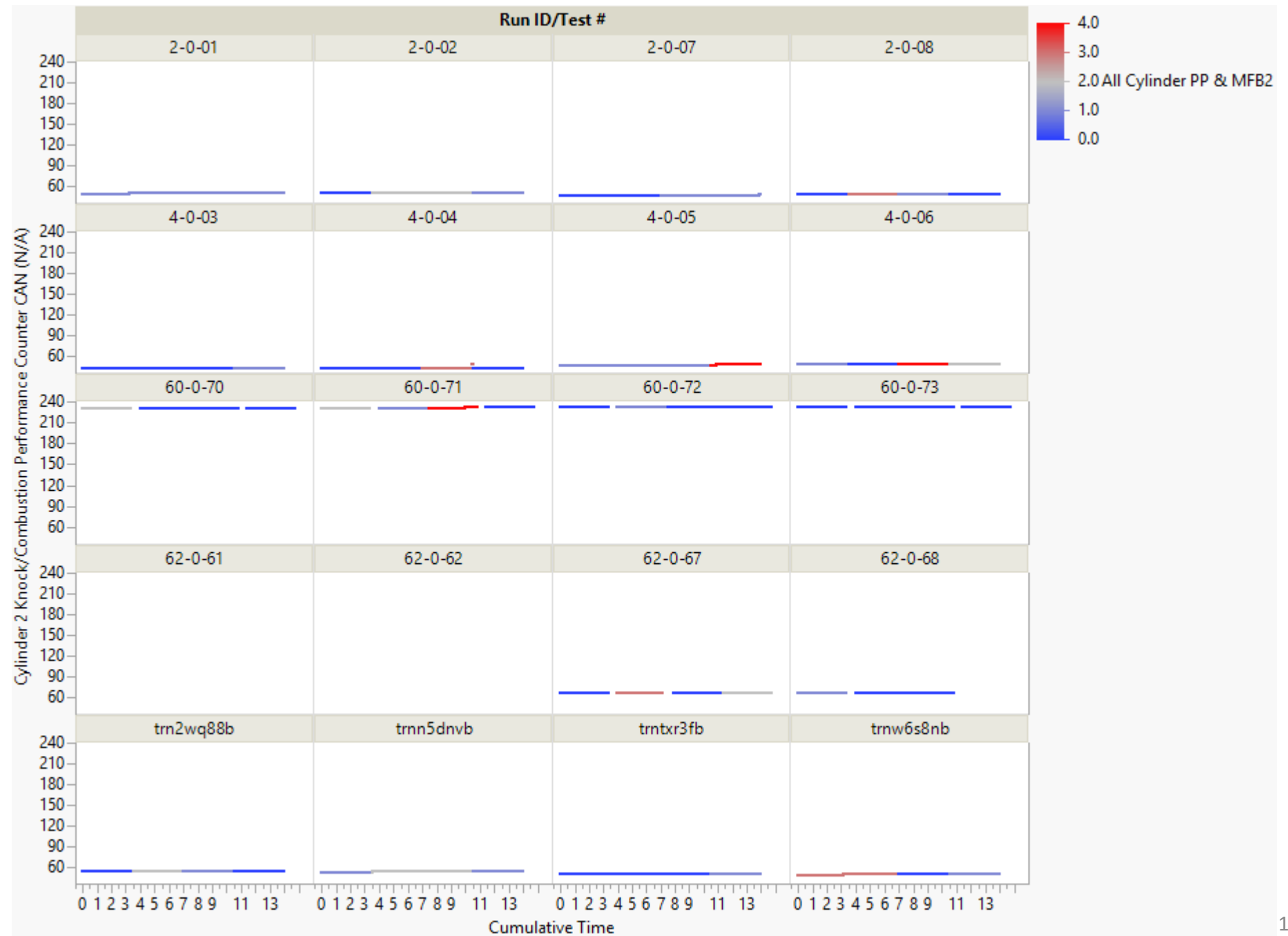
High Event Oil



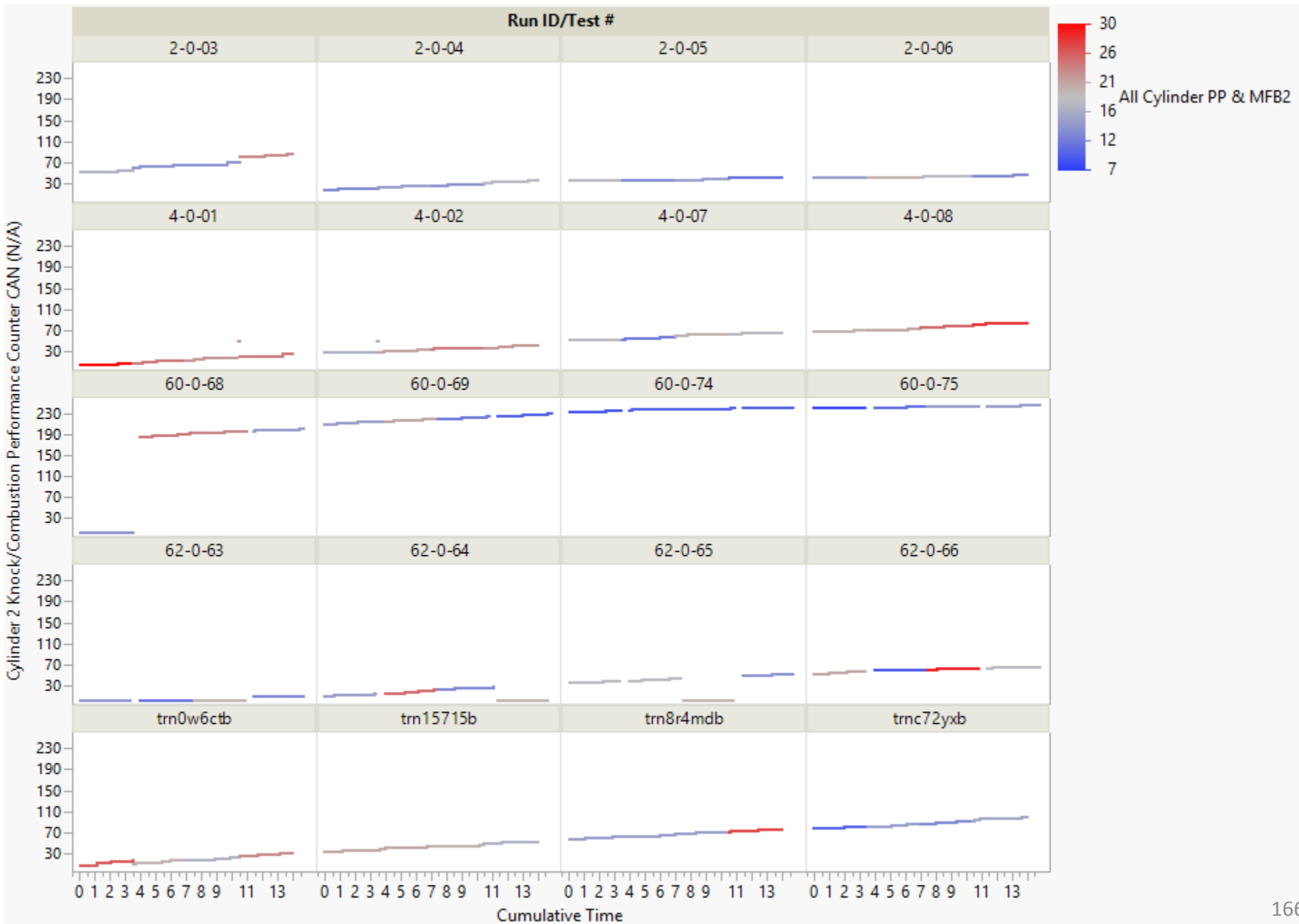
Cylinder 2 Knock/Combustion Performance Counter CAN



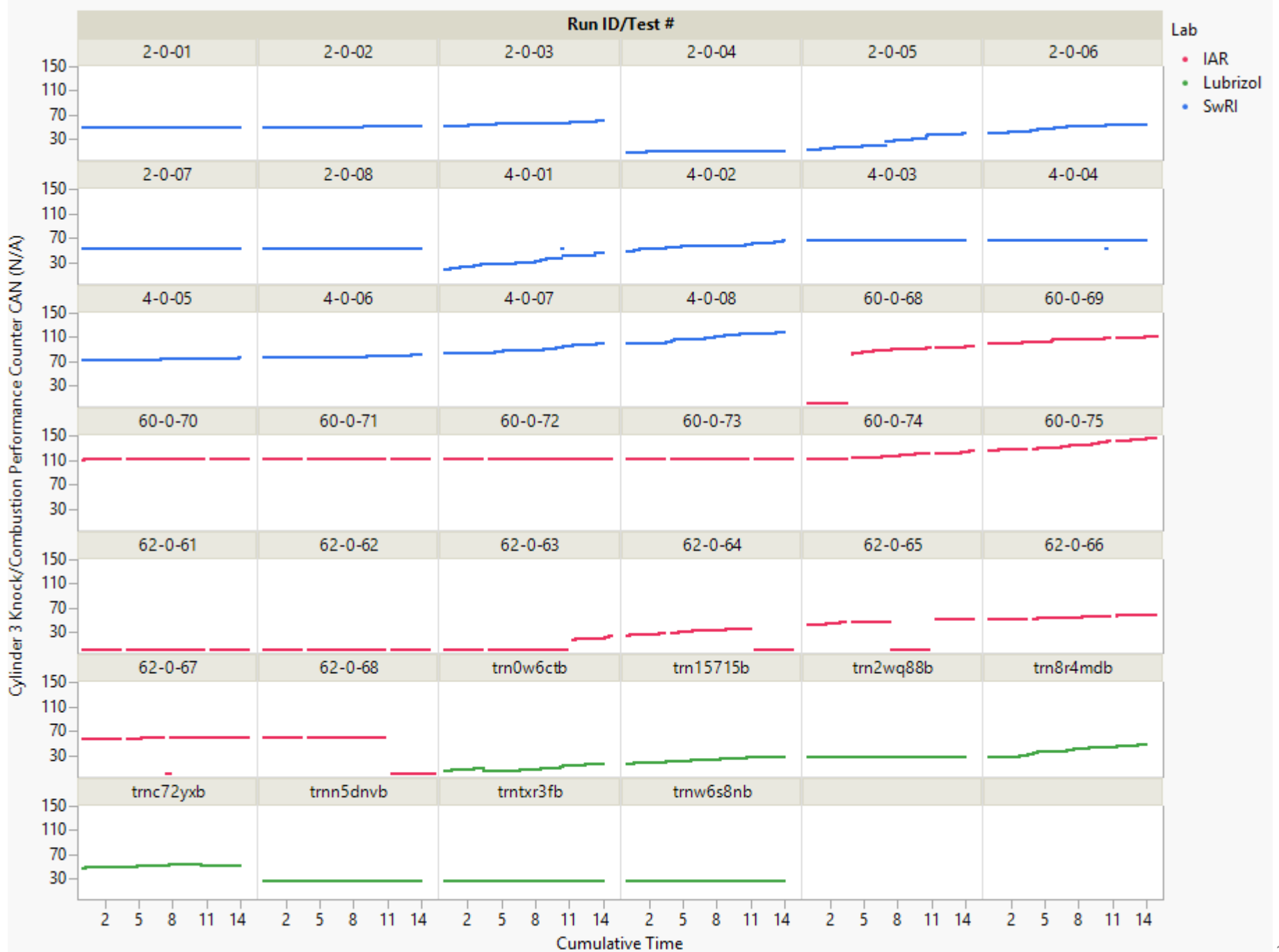
Low Event Oil



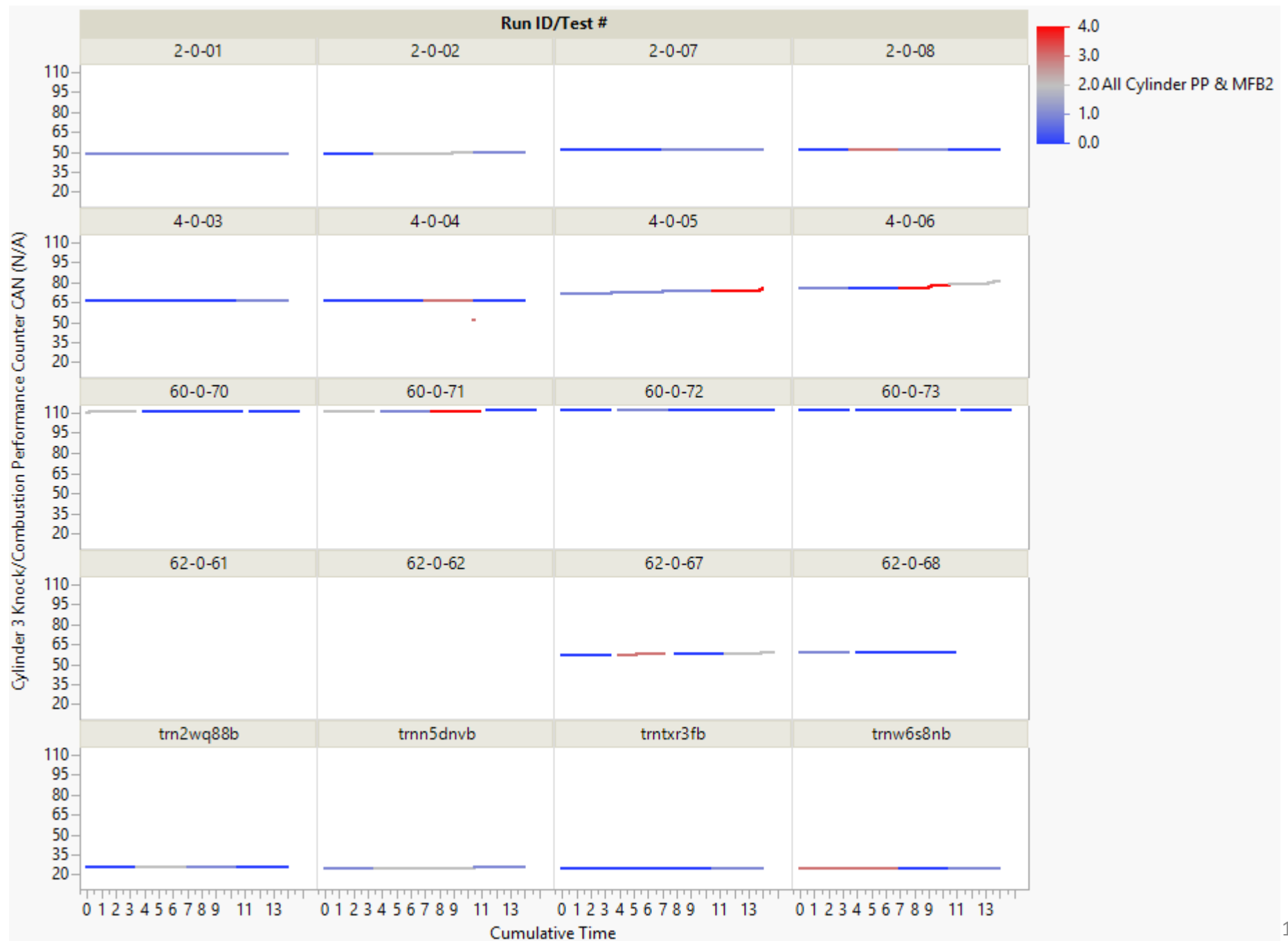
High Event Oil



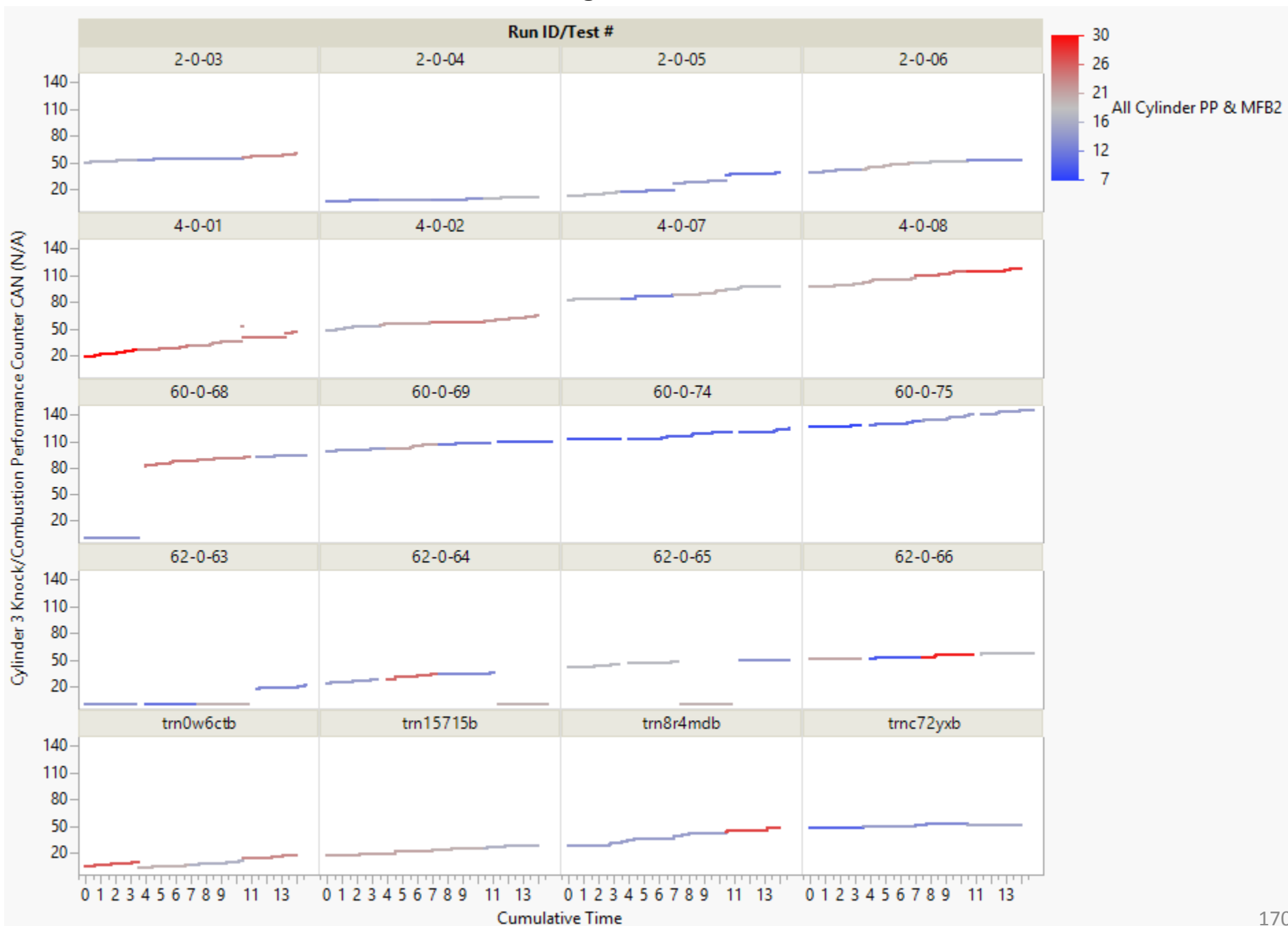
Cylinder 3 Knock/Combustion Performance Counter CAN



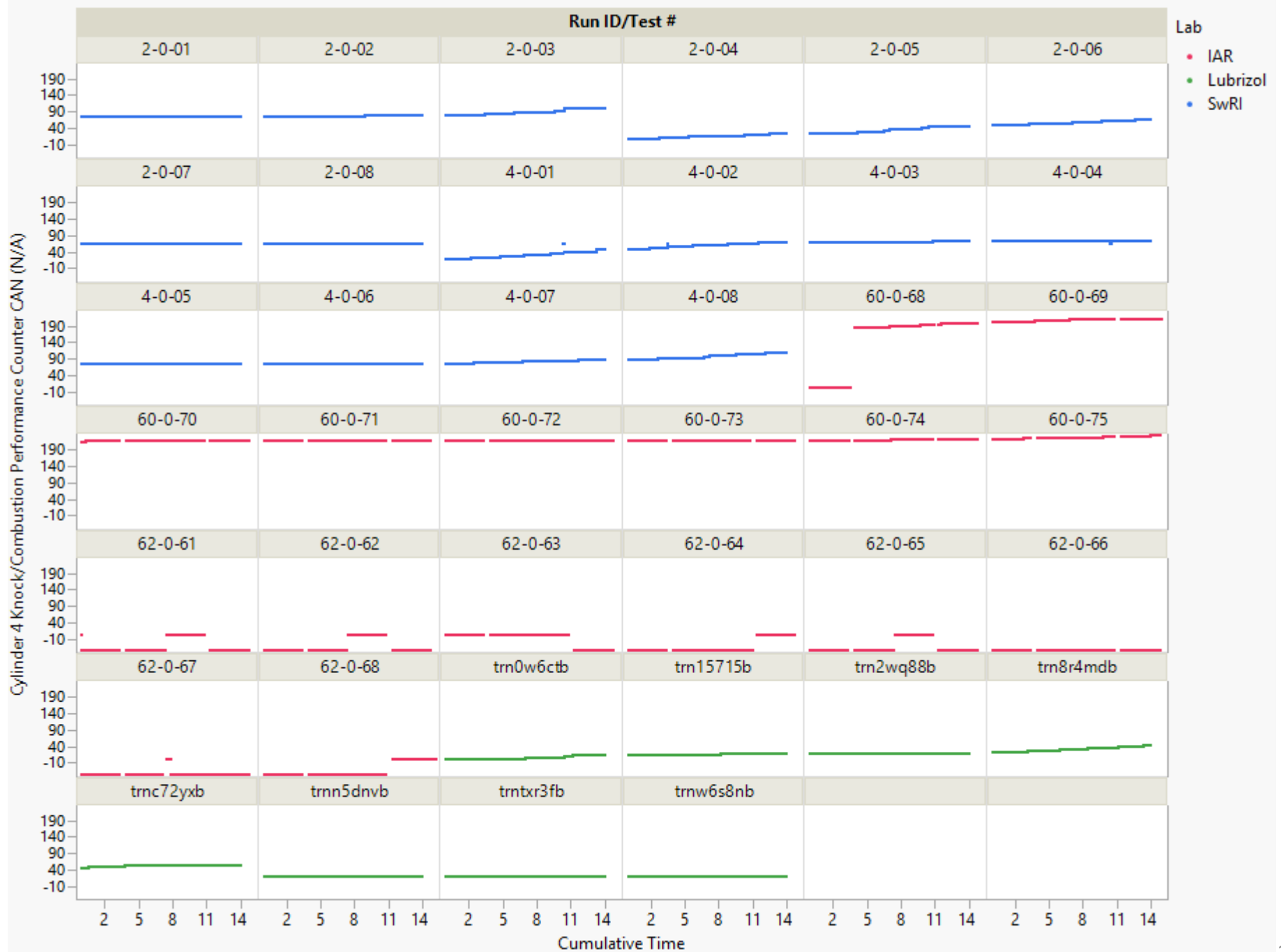
Low Event Oil



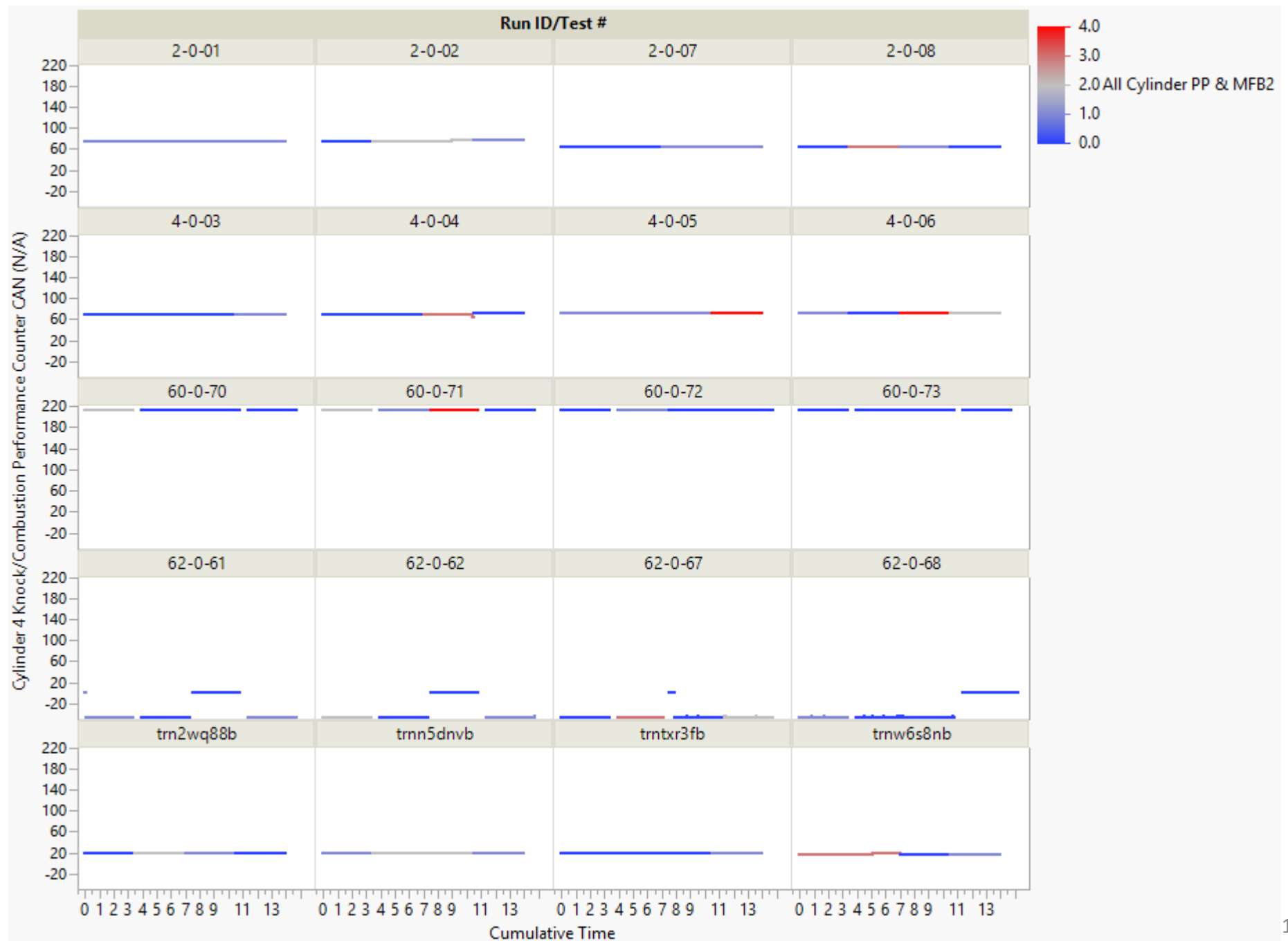
High Event Oil



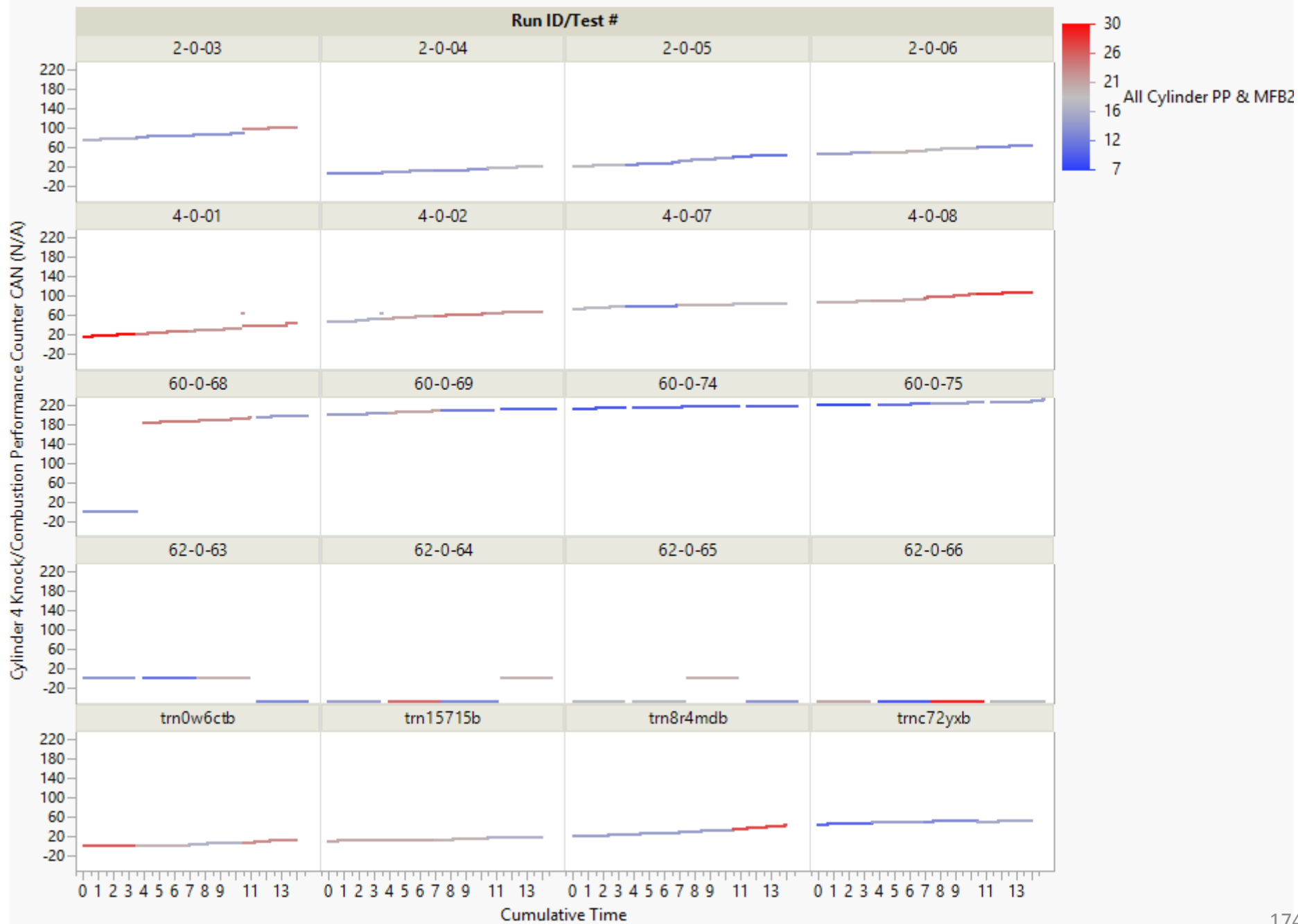
Cylinder 4
Knock/Combustion
Performance
Counter CAN



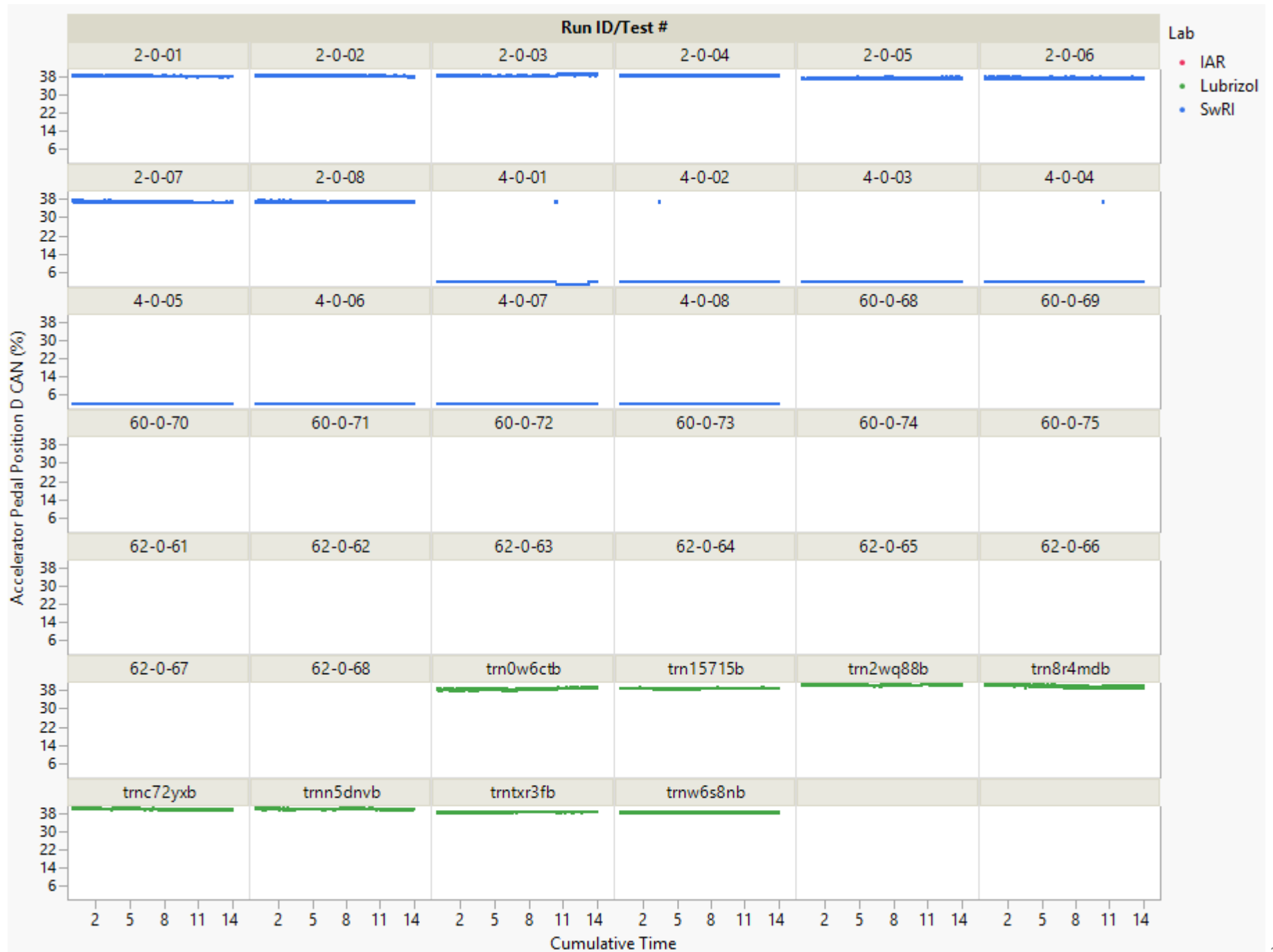
Low Event Oil

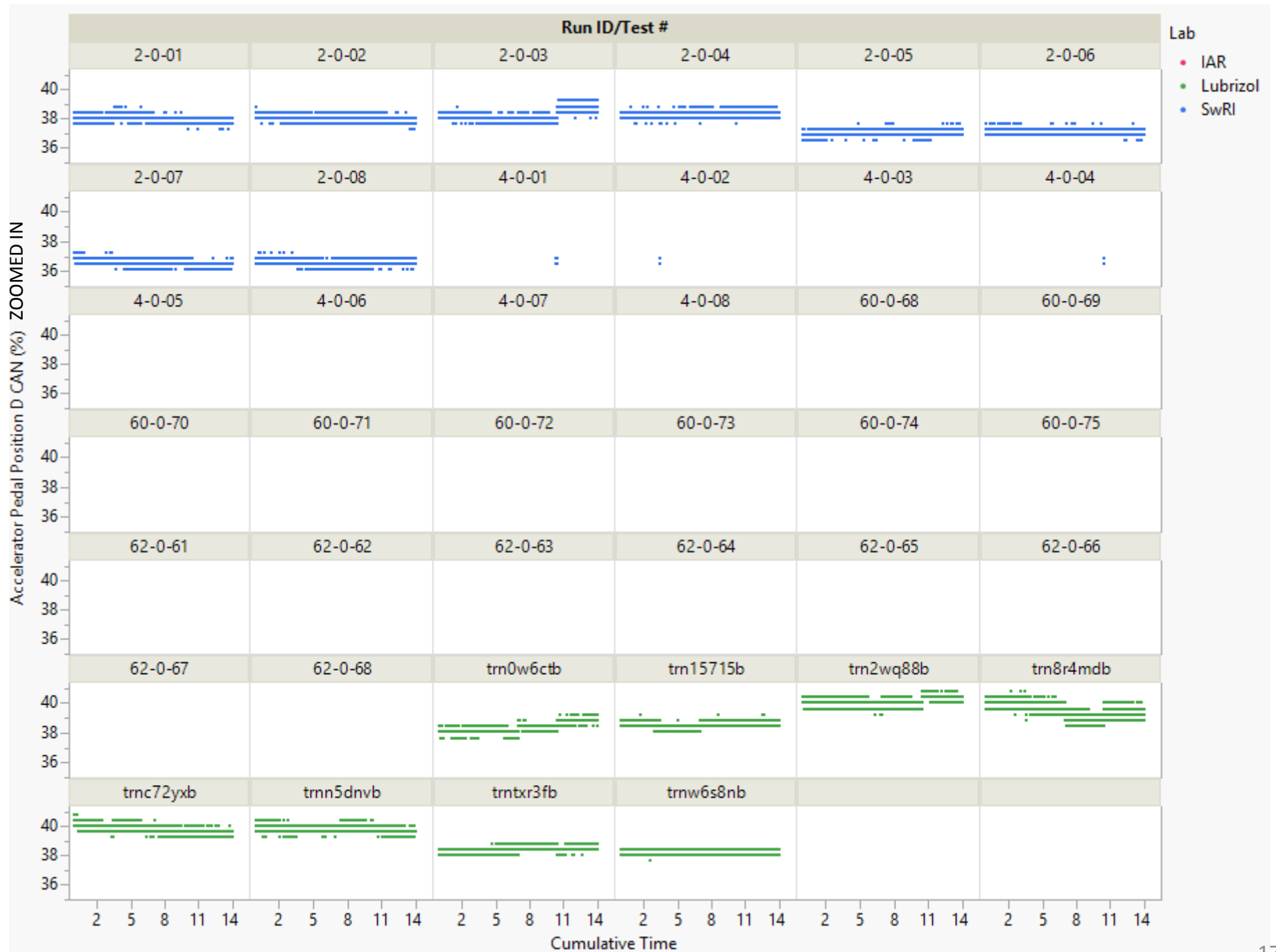


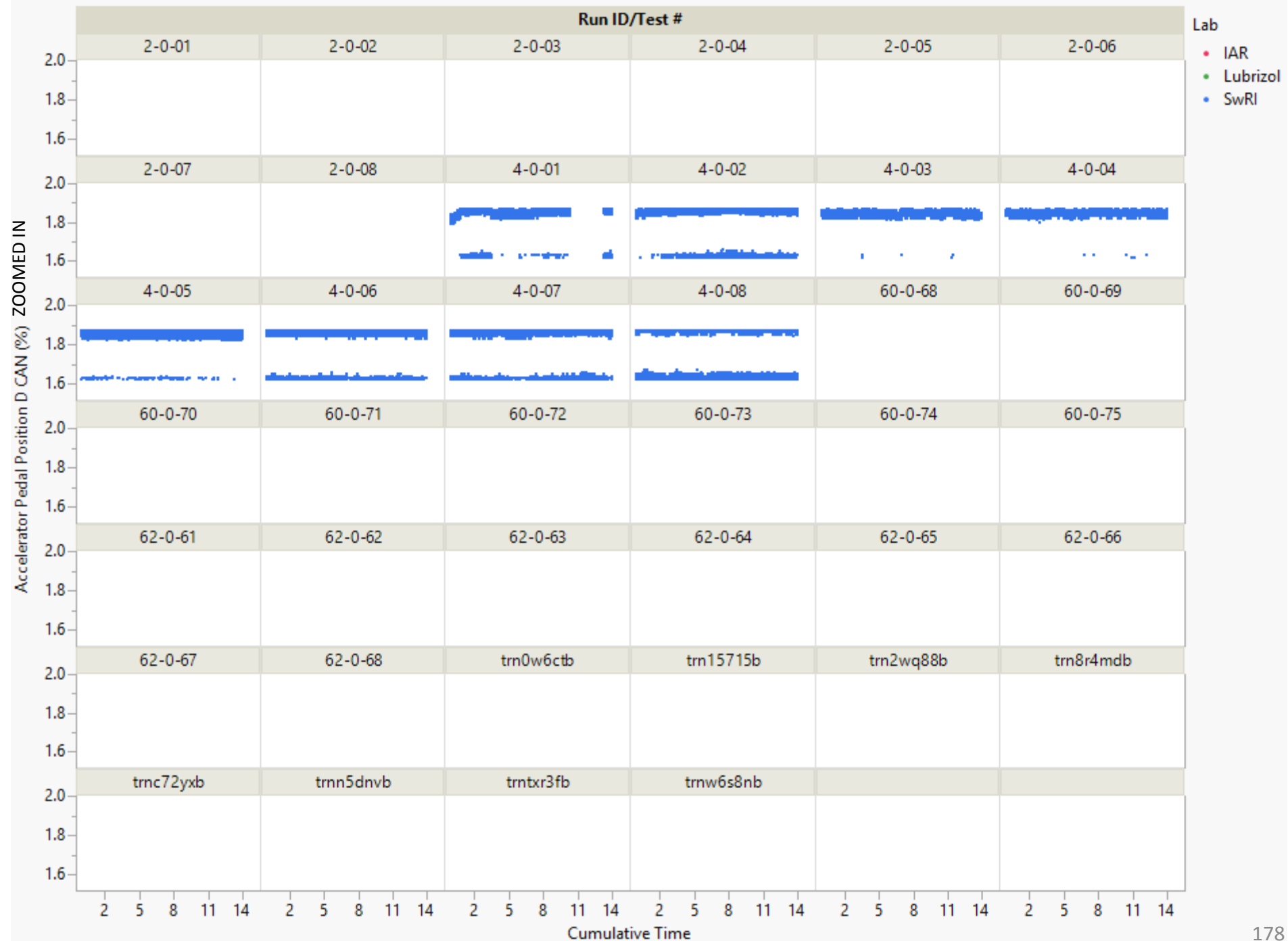
High Event Oil



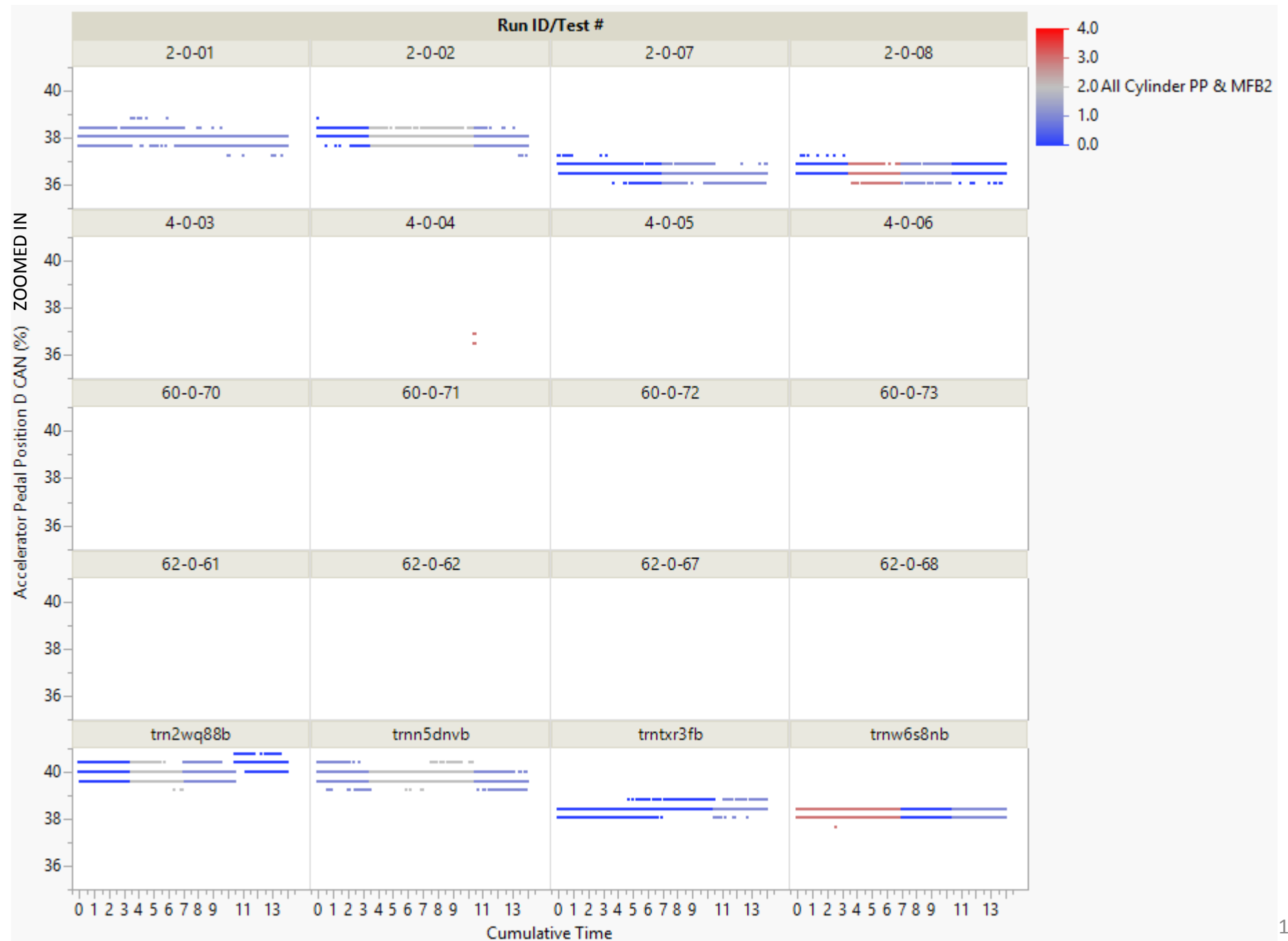
Accelerator Pedal Position D CAN



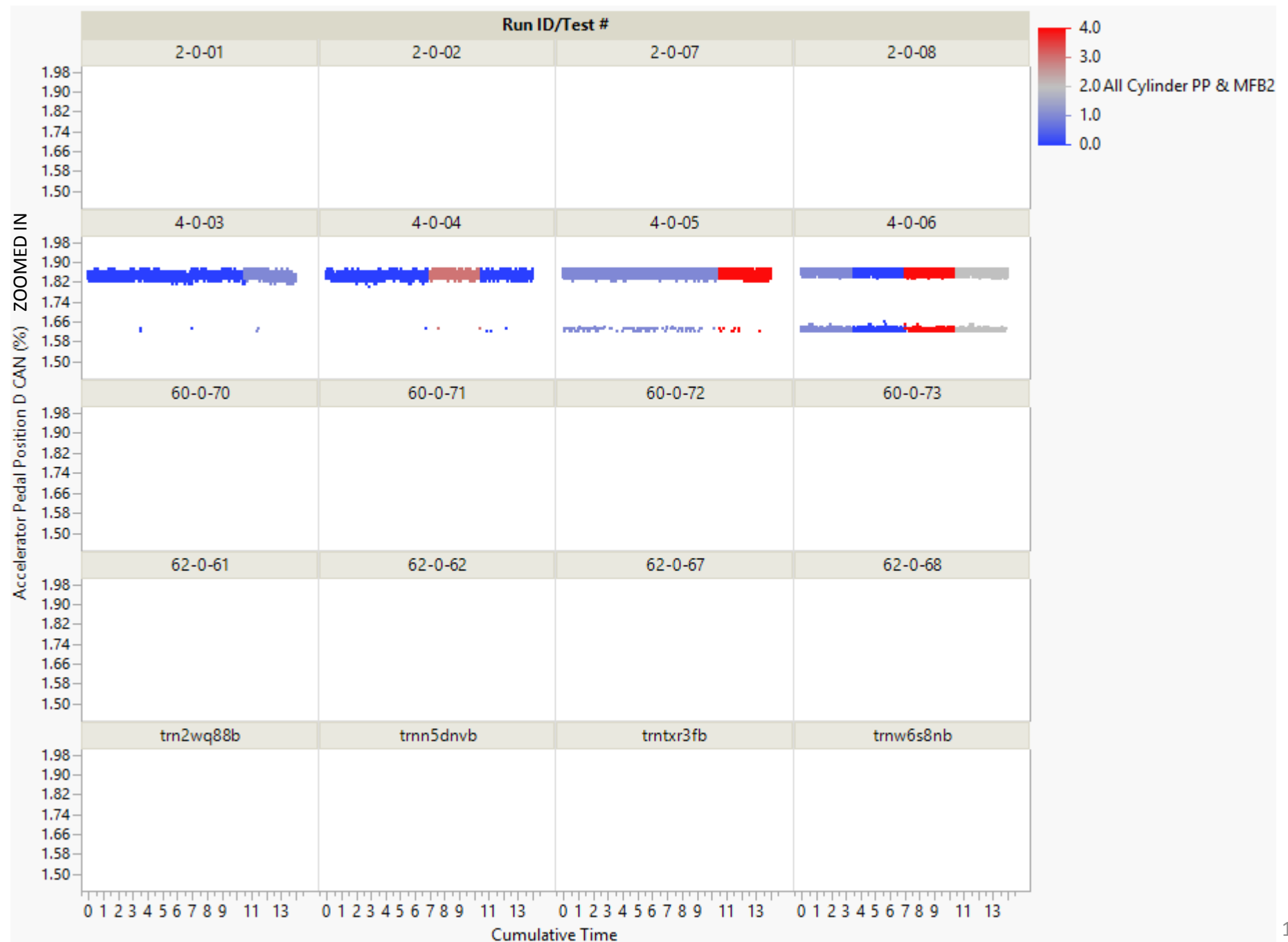




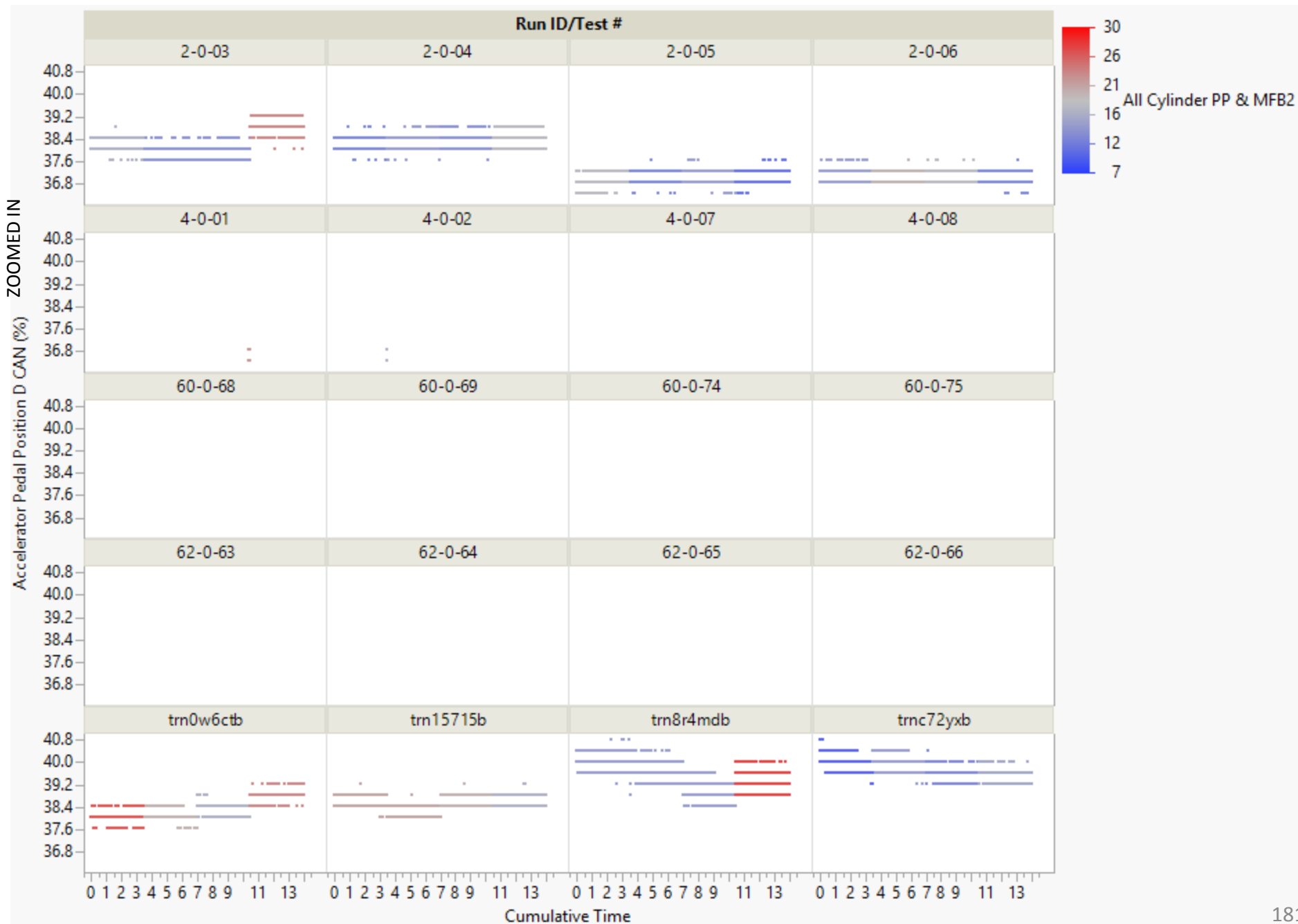
Low Event Oil



Low Event Oil



High Event Oil



High Event Oil

