Gas Field Development - Challenges and Current Best Practices to Maximise Value

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Application of Machine Learning to Predict the Time Evolution of Condensate to Gas Ratio (CGR) for Planning and Management of Gas – Condensate Fields

Son K. Hoang

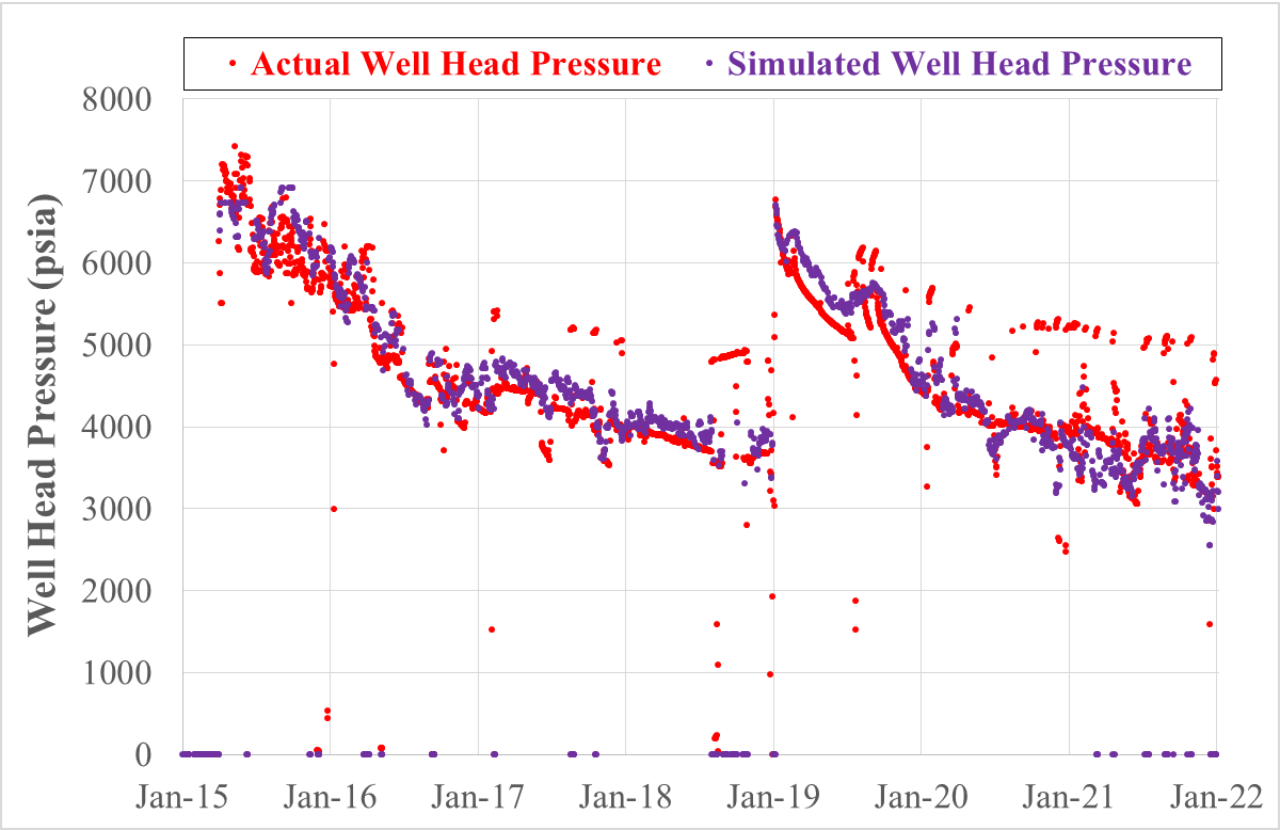
Bien Dong Petroleum Operating Company (BIENDONG POC)

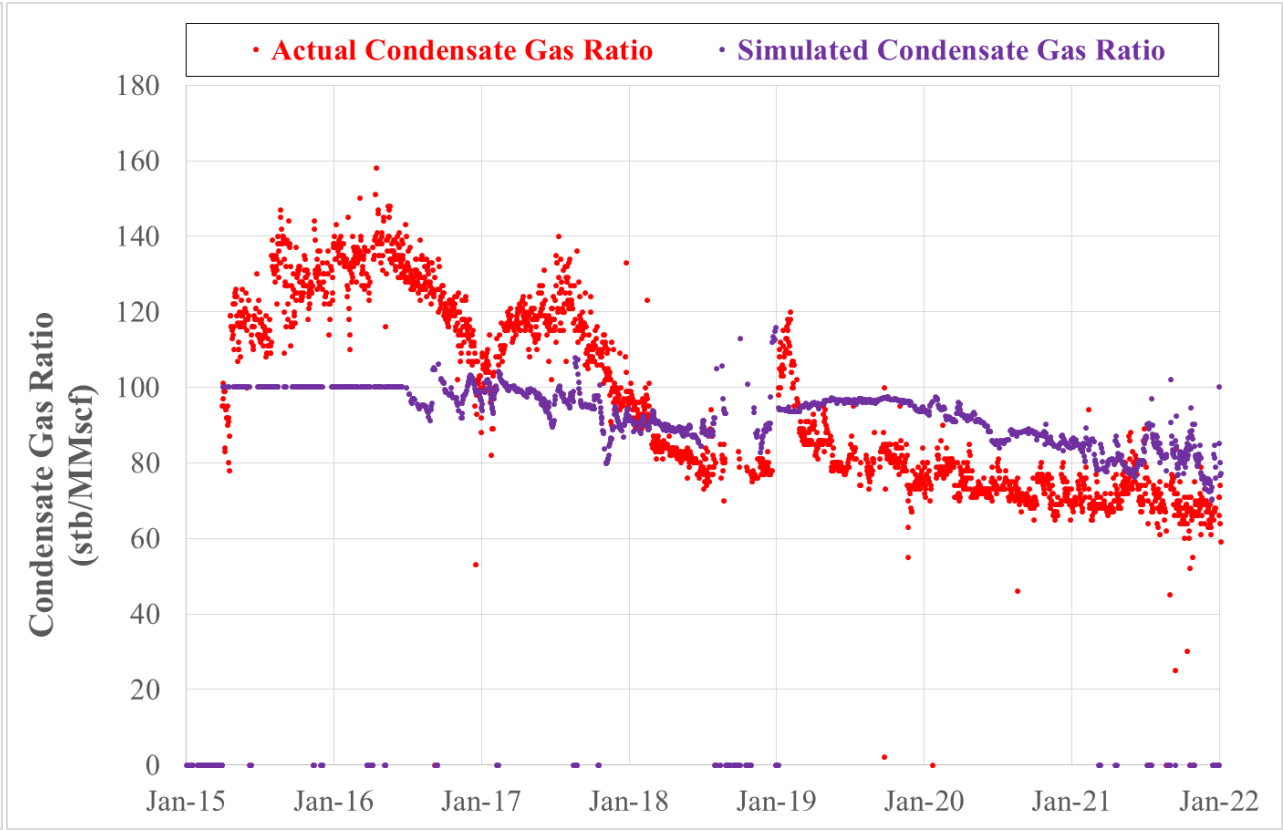
Motivation

- CGR vs. Time: One of the most important parameters for the evaluation, forecast, and management of gas-condensate fields
- Traditional approach
  - Lab experiments on gas and condensate samples: At the beginning and periodically after
    - Time and effort
    - Costs
  - Dynamic models
    - Could include many uncertainties
- Application of machine learning to predict the evolution of CGR vs. Time could be a new and effective approach to supplement conventional methods

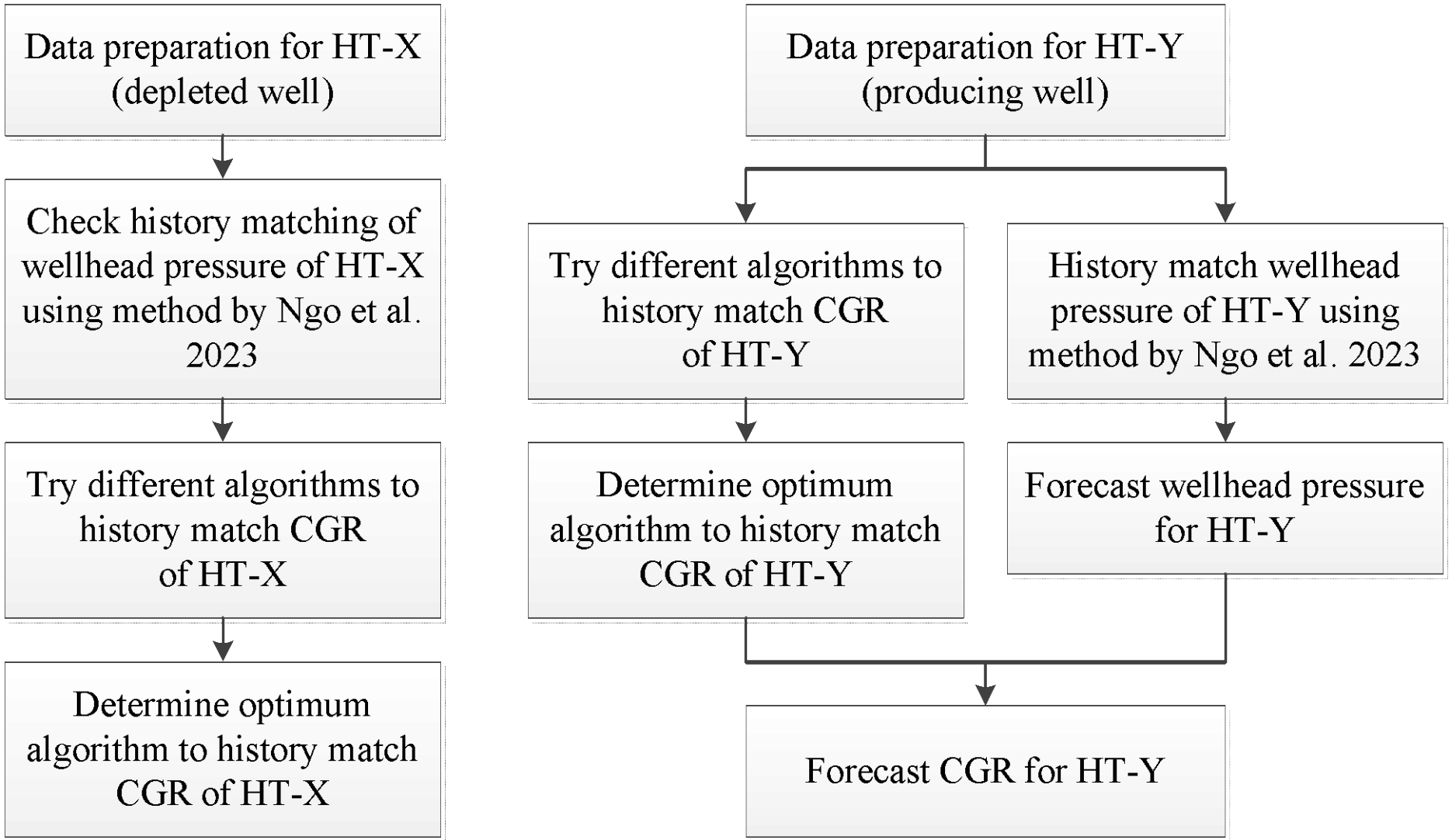
Introduction

- History Matching (HM) between actual and simulated values for Wellhead Pressure (WHP) is acceptable, but HM for CGR is very difficult
- Need an alternative method

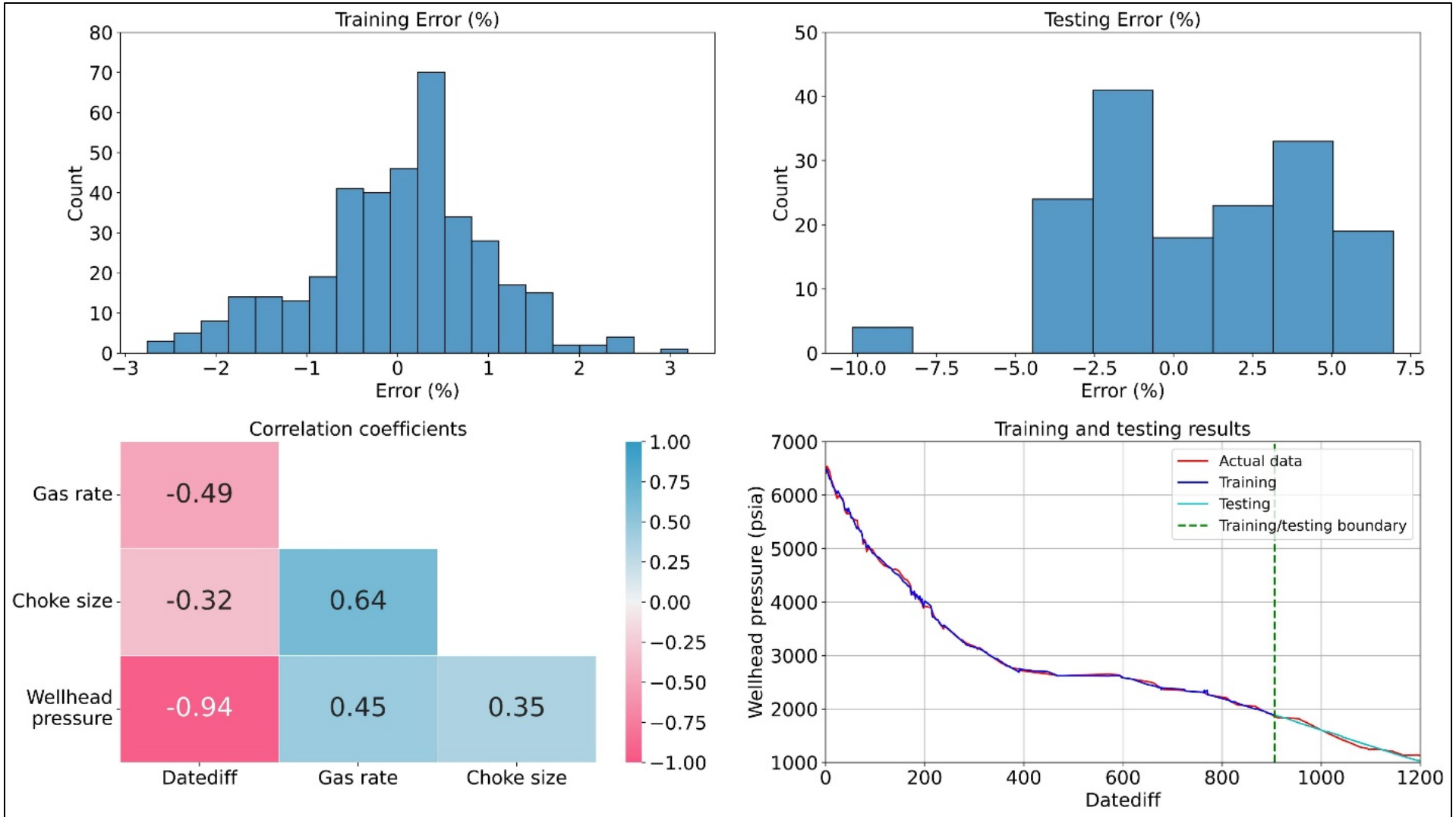




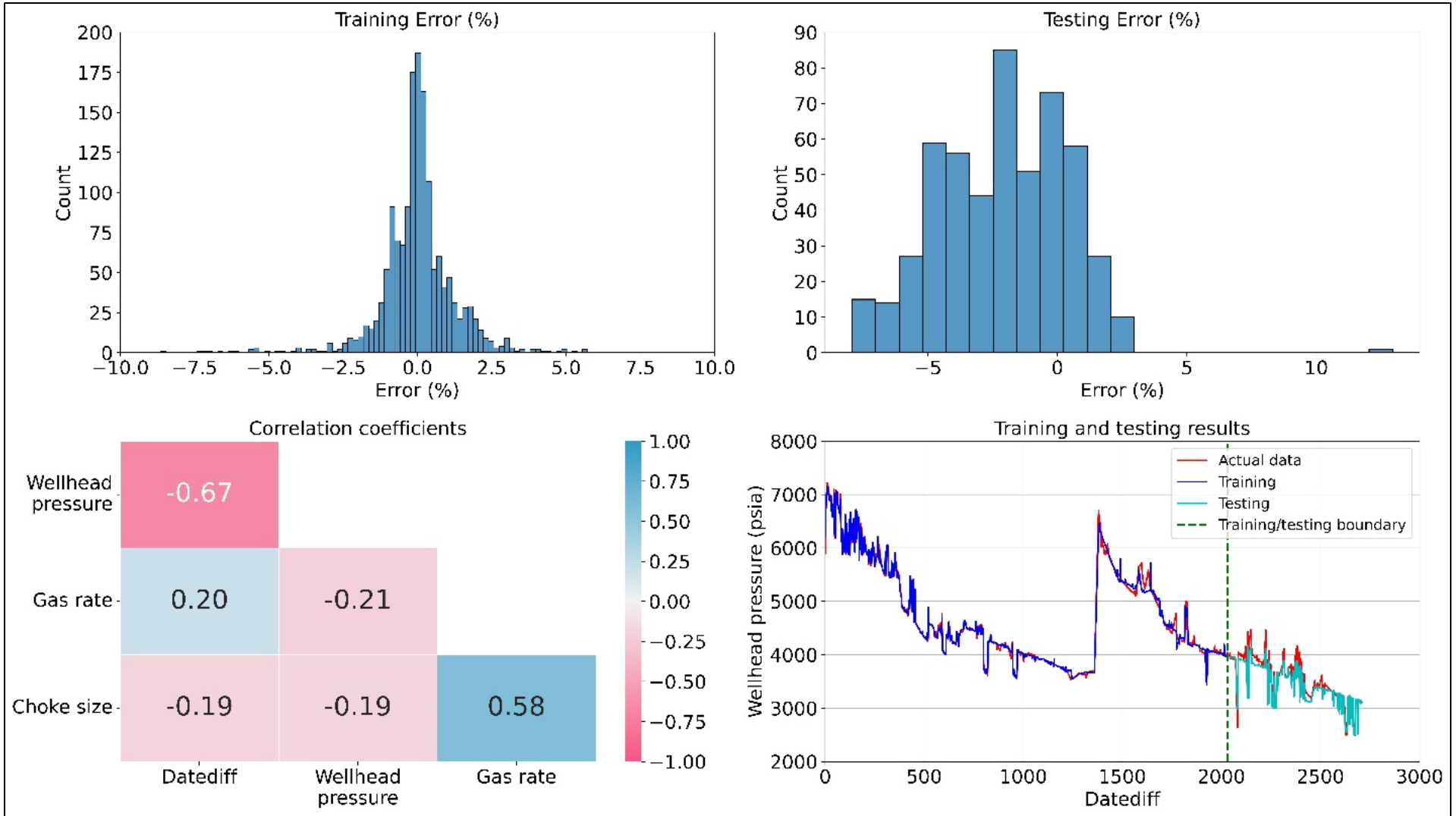
Methodology



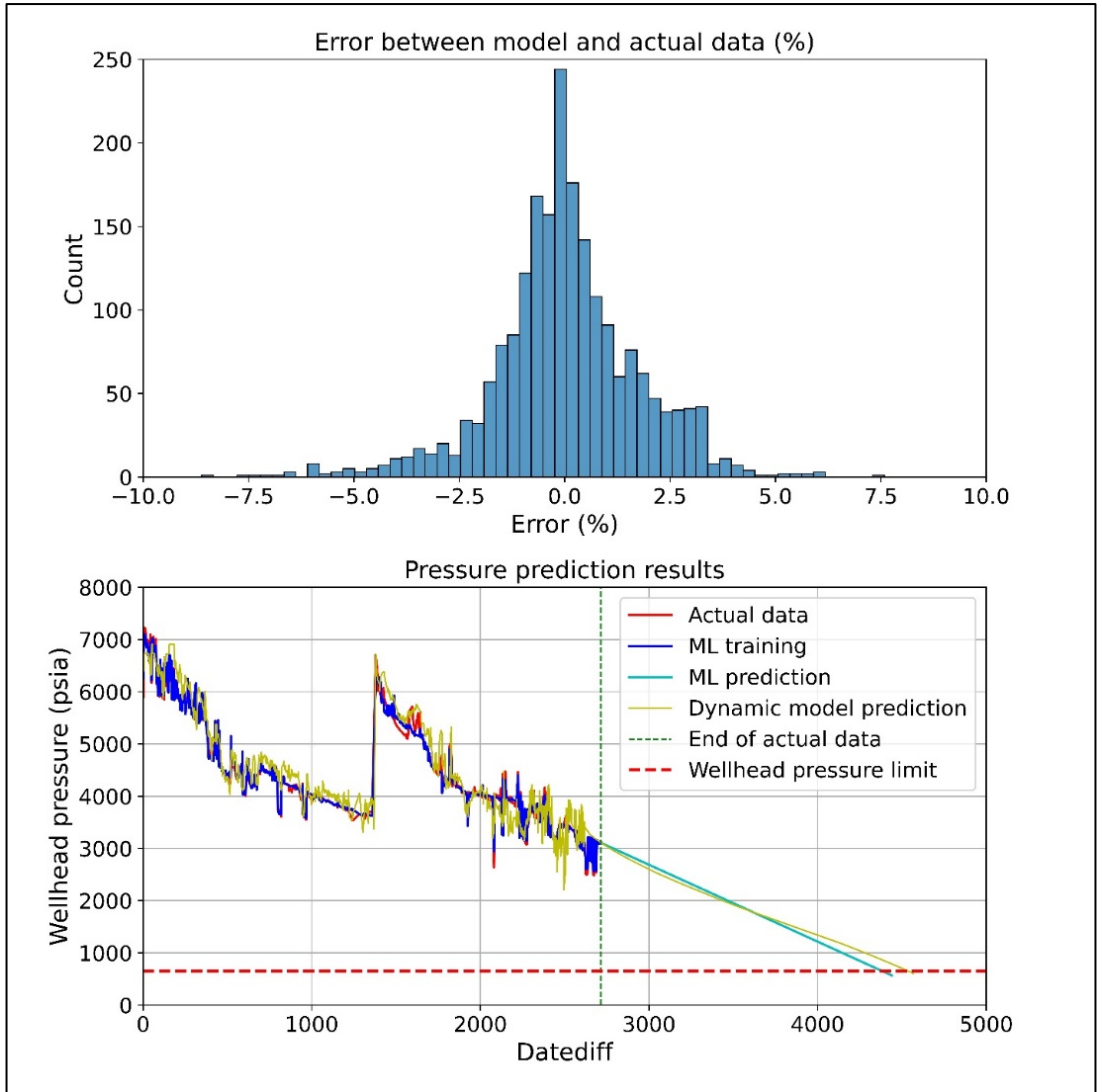
Results – Machine Learning Model for HT-X WHP



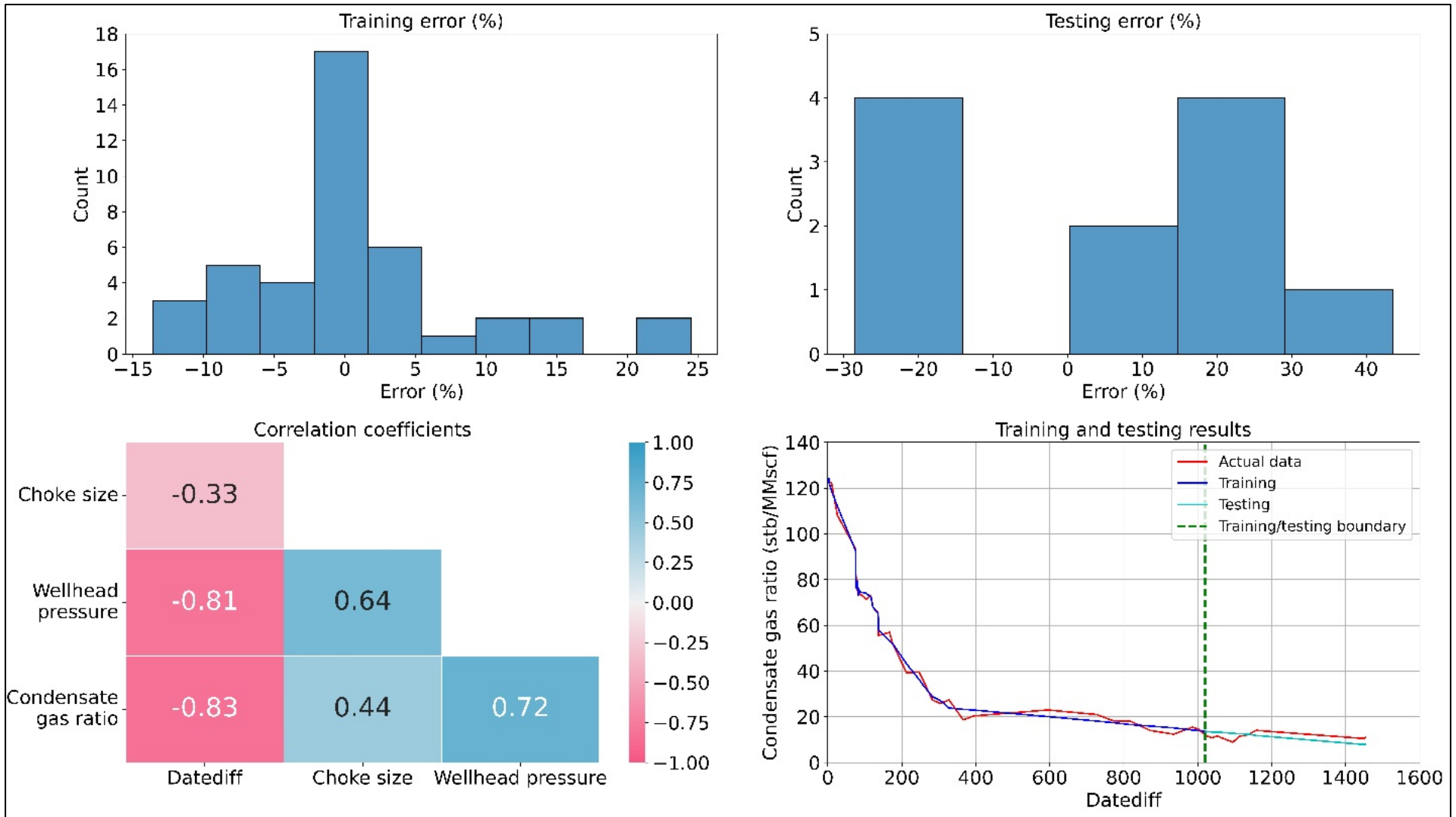
Results – Machine Learning Model for HT-Y WHP



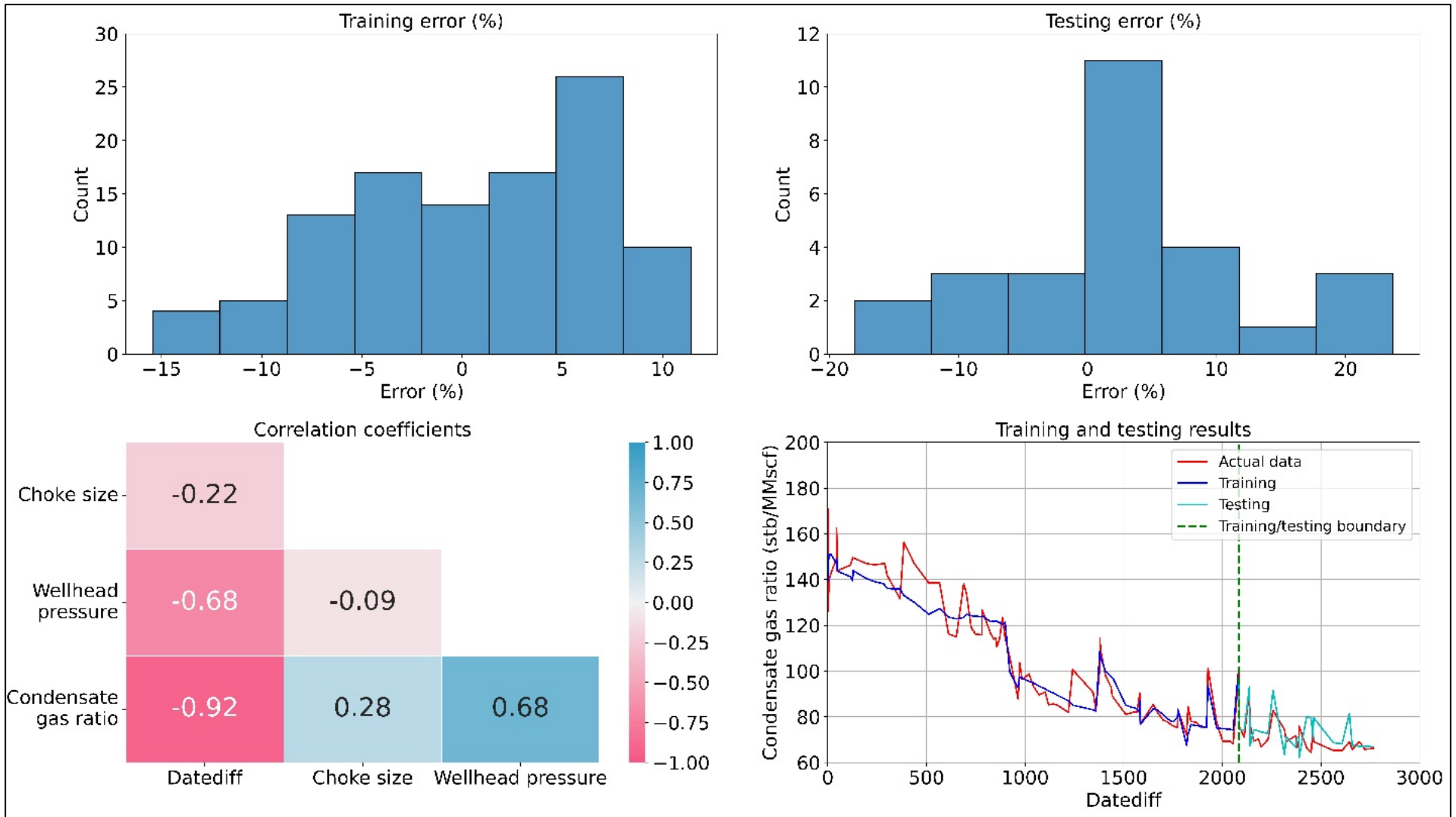
Results – HT-Y WHP Prediction vs. Dynamic Model



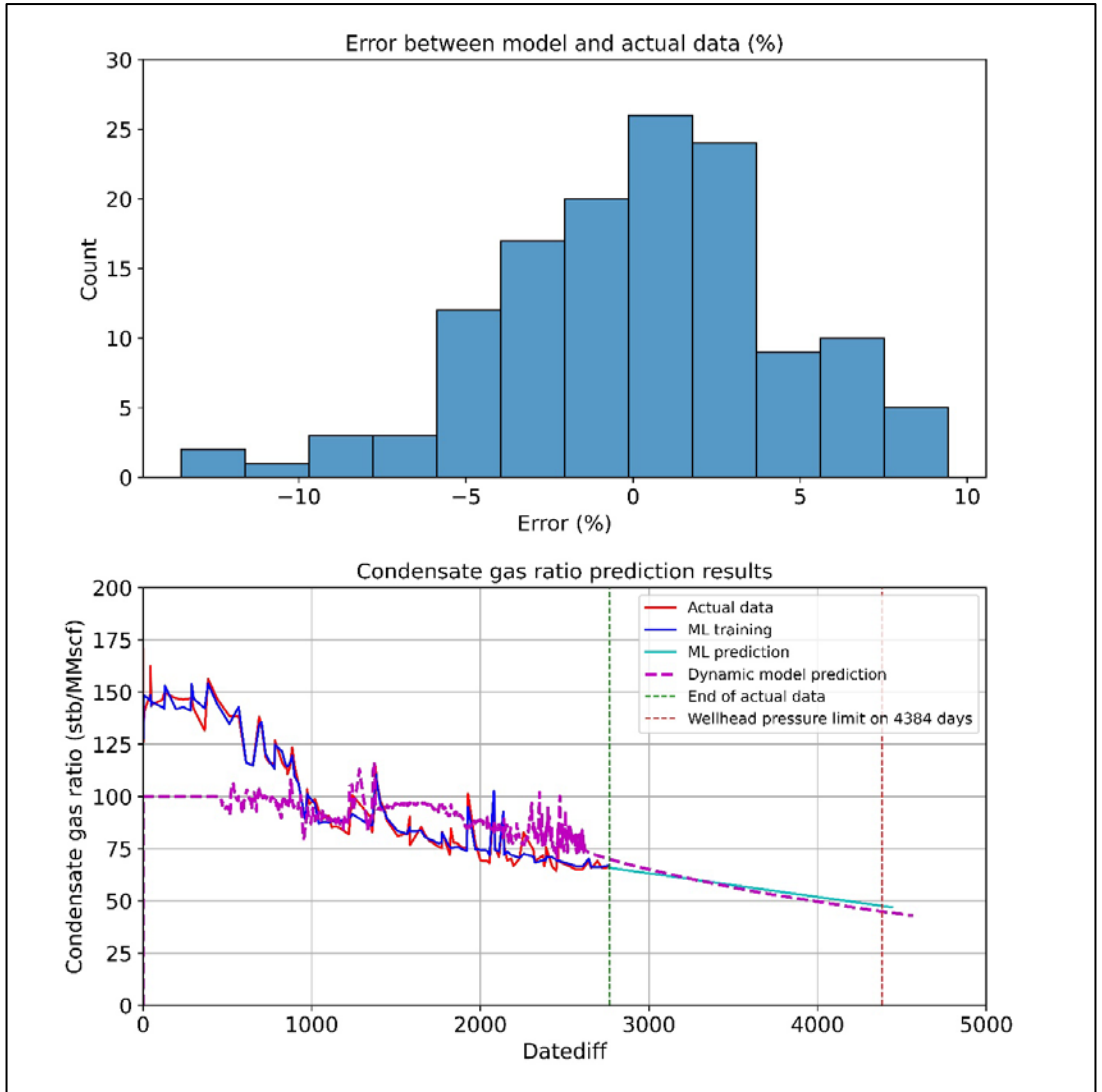
Results – Machine Learning Model for HT-X CGR



Results – Machine Learning Model for HT-Y CGR



Results – HT-Y CGR Prediction vs. Dynamic Model



Conclusions

- Machine learning was applied successfully to predict CGR vs. Time
  - One of the most important parameters for gas-condensate reservoirs
  - But very challenging to forecast using traditional methods
- Provides significant support to the prediction of condensate production
- Help to better optimize production management of gas condensate fields