Forecasting Alarms in Natural Gas Pipelines

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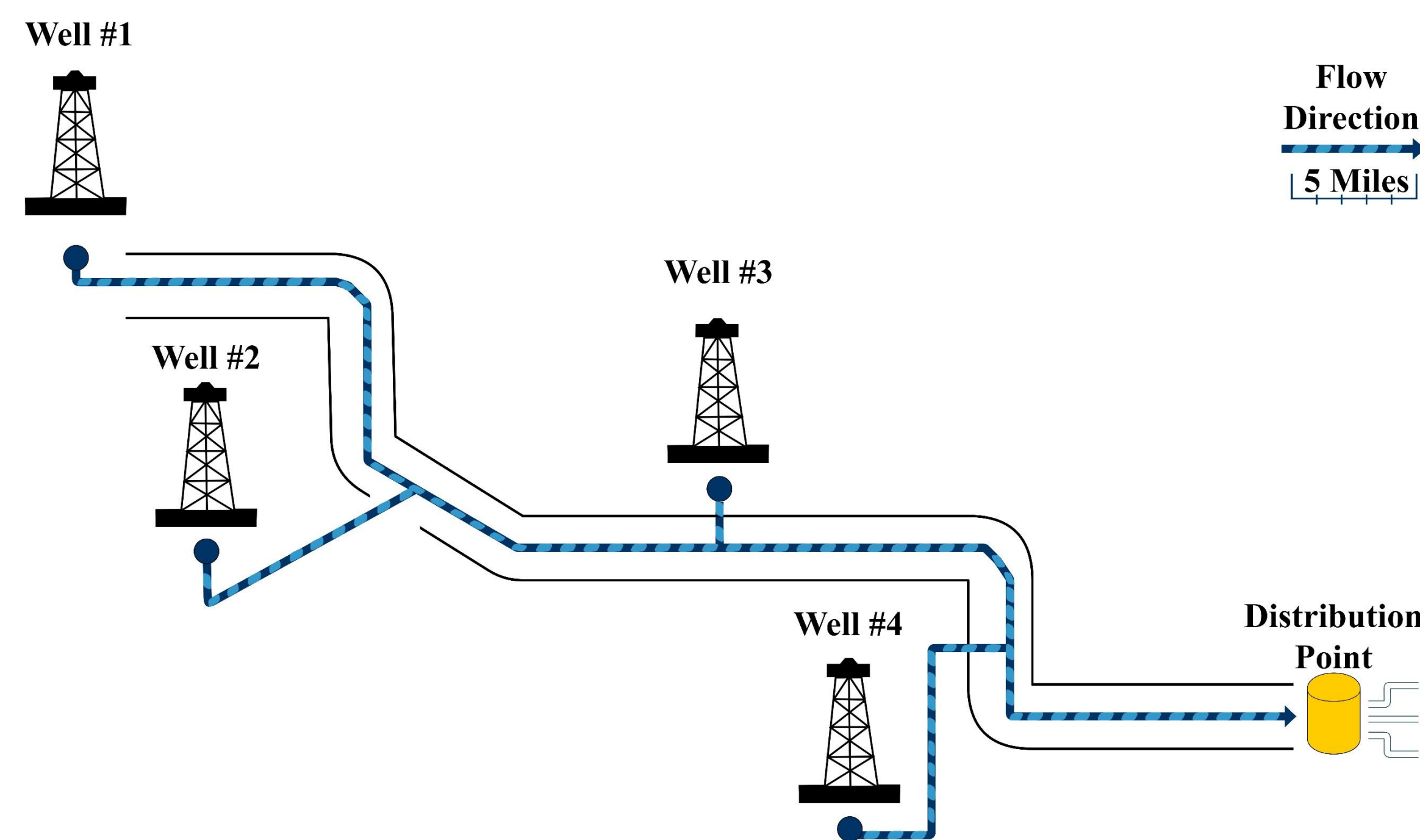MARQUETTE UNIVERSITY
BE THE DIFFERENCE.

Problem Statement

- Natural gas (NG) pipelines are vulnerable to damaging conditions that threaten flow assurance
- Alarms are used to alert pipeline controllers of imminent system failure

Well #1

Flow Direction
5 Miles

Well #3

Well #2

Well #4

Distribution Point

Step 1
Extraction

Step 2
Processing

Step 3
Transportation and Delivery

Byproducts (NGL)

Point A (Well)

Point B (Sales Point)

Natural Gas Pump

Raw Natural Gas

Pipeline Quality Natural Gas

Central Processing Factiliy

Main Pipeline

Hydrocarbon Reservoir

Relevance

- A production company operating in Texas is working with the GasDay lab to automate their SCADA-embedded alarm system
- Real world problem, data, and implementation

Pipeline Pressure Recoreded at Sales Point

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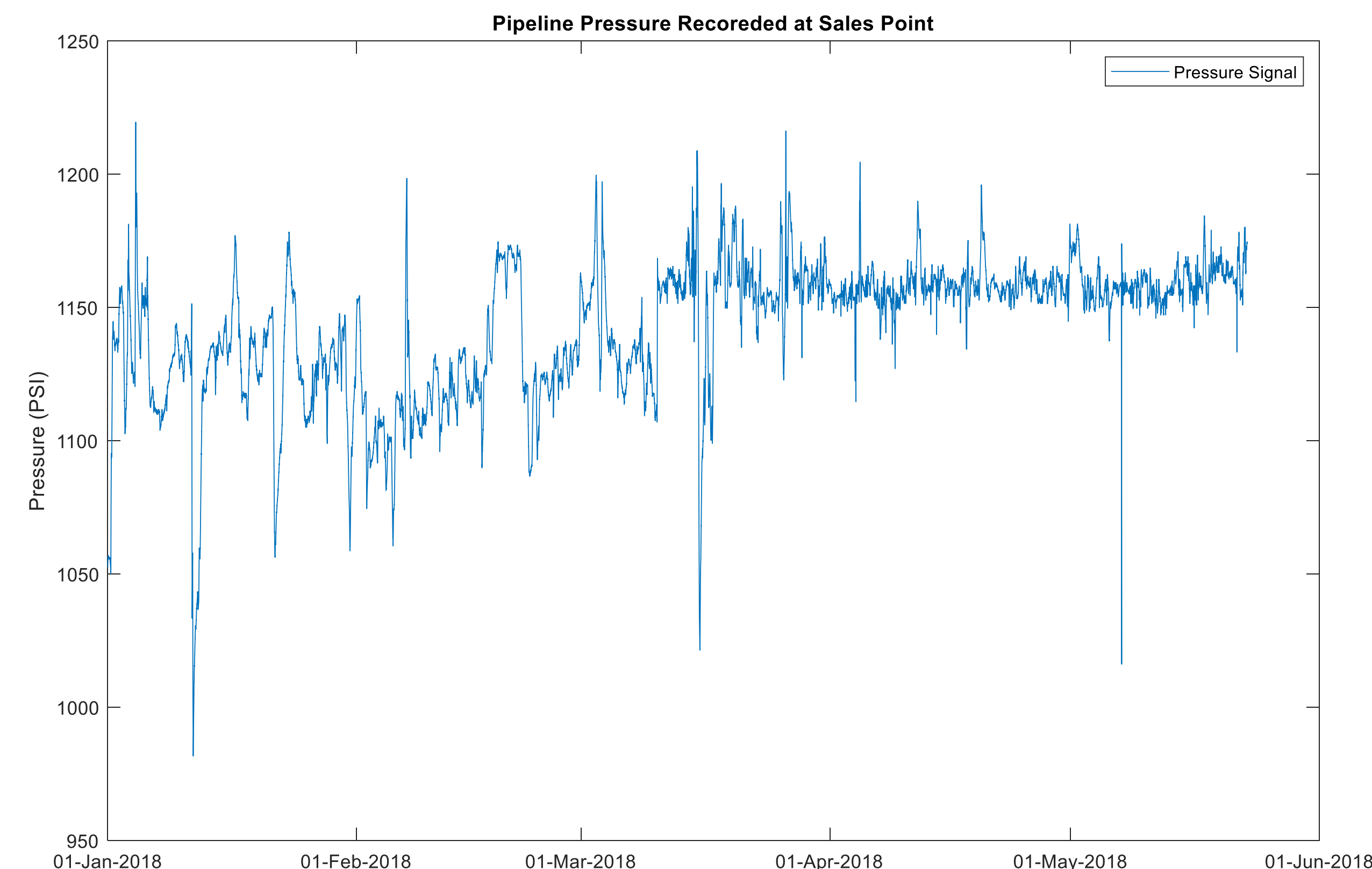
Objective

- Forecast alarms using non-stationary streaming time series data
- Give NG pipeline operators advanced warning so that they are able to carry out preventative maintenance
- Develop an algorithm to detect systematic changes from model output
- Maintain flow assurance

Value of Research

- Helps production pipelines avoid being 'shut in'
  - ~$10,000/hour
  - ~4-8 hours
- Provides real time diagnostic feedback to pipeline operators so they are able to maintain a safe and efficient production process
- Automation of the NG production process can be applied to other fields of hydrocarbon production

Forward Thinking

- Helps ensure responsible production of a natural, non-renewable resource
- Stops NG production companies from fairing 'bad gas', reducing the amount of carbon dioxide emissions released into the atmosphere
- Provides safer working environments for human operators

References

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