

Real-Time Monitoring of Water Transmission and Distribution Systems

Mr Asher Hoskins
Dr Ivan Stoianov



Background

Water pipelines are complex and hard to model accurately mathematically. Their dynamic behaviour is therefore poorly understood.

The current standard for monitoring is sampling pressure (and sometimes flow) at fifteen minute intervals. Slow speed sampling is insufficient if one wants to fully understand the activities inside the pipeline system.

What sort of pressure fluctuations are there? Do they lead to pipe stress? Can we reduce them? Will this allow us to increase asset life?

Research Objectives

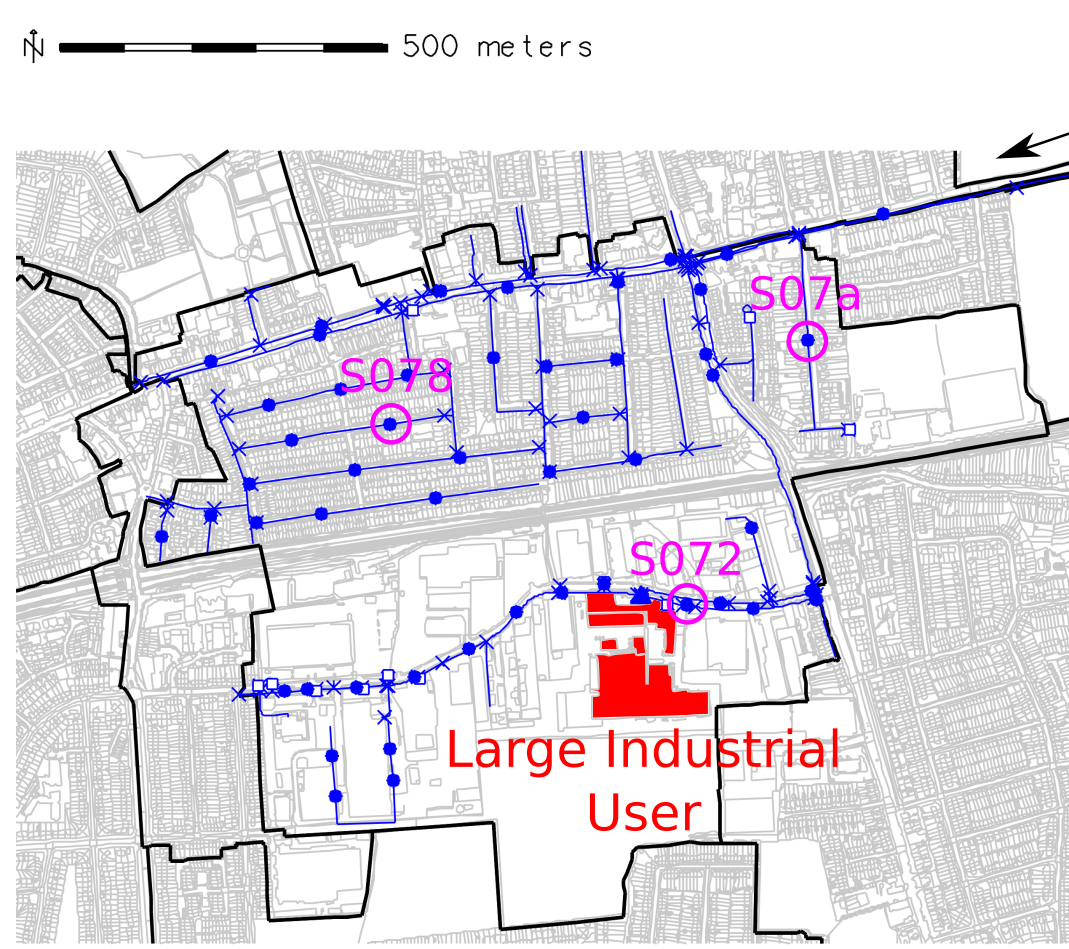
- Monitoring and understanding dynamic hydraulic conditions within a pipeline system.
- Classifying events.
- Exploring the correlation between events and pipe stress and failures.

Methodology

New high-speed data loggers were constructed in order to collect the large quantities of data required for understanding pipeline conditions. These loggers were designed to operate for long periods of time on battery power alone.

The collected data is loaded into a large (billions of rows) database server where data mining techniques are used to analyse it.

Case Study: Large Industrial User

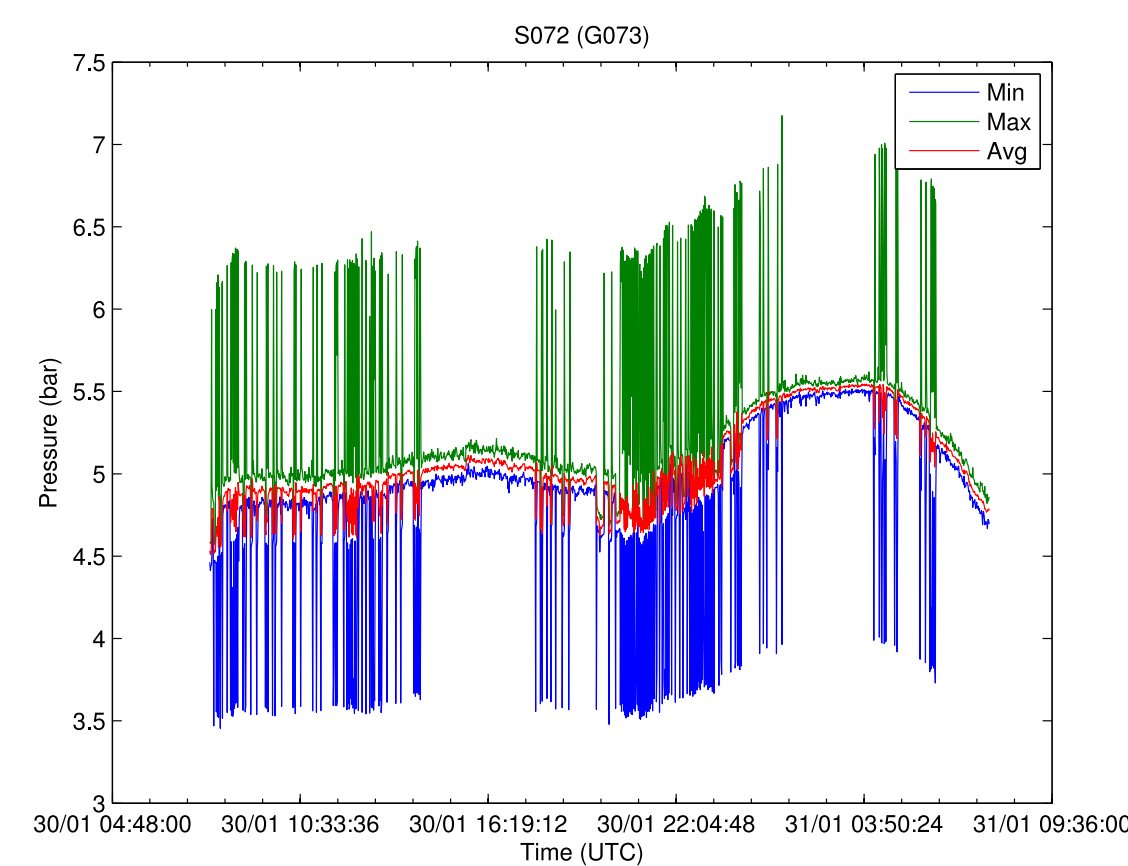
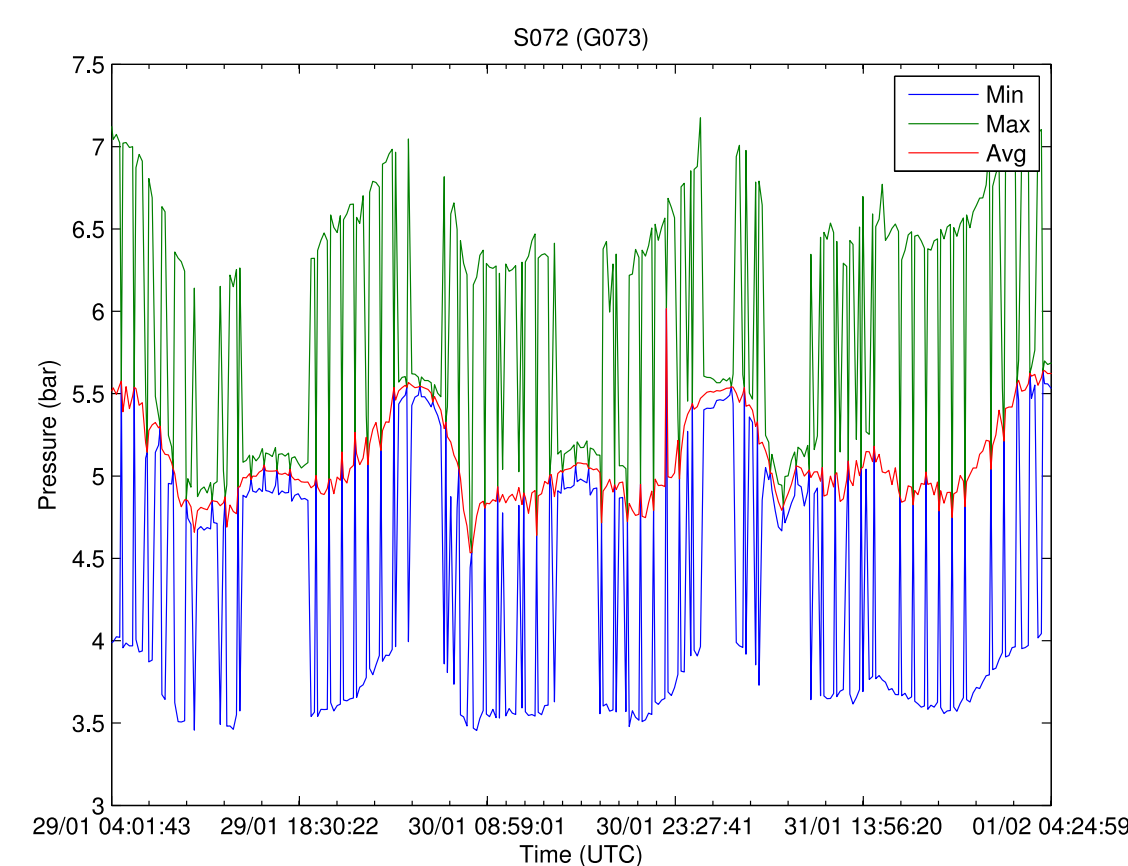


A water company had concerns that a large user of water in one of their District Metering Areas (DMA) was affecting water supplies. The standard data loggers, logging at one minute intervals, were unable to detect anything unusual.

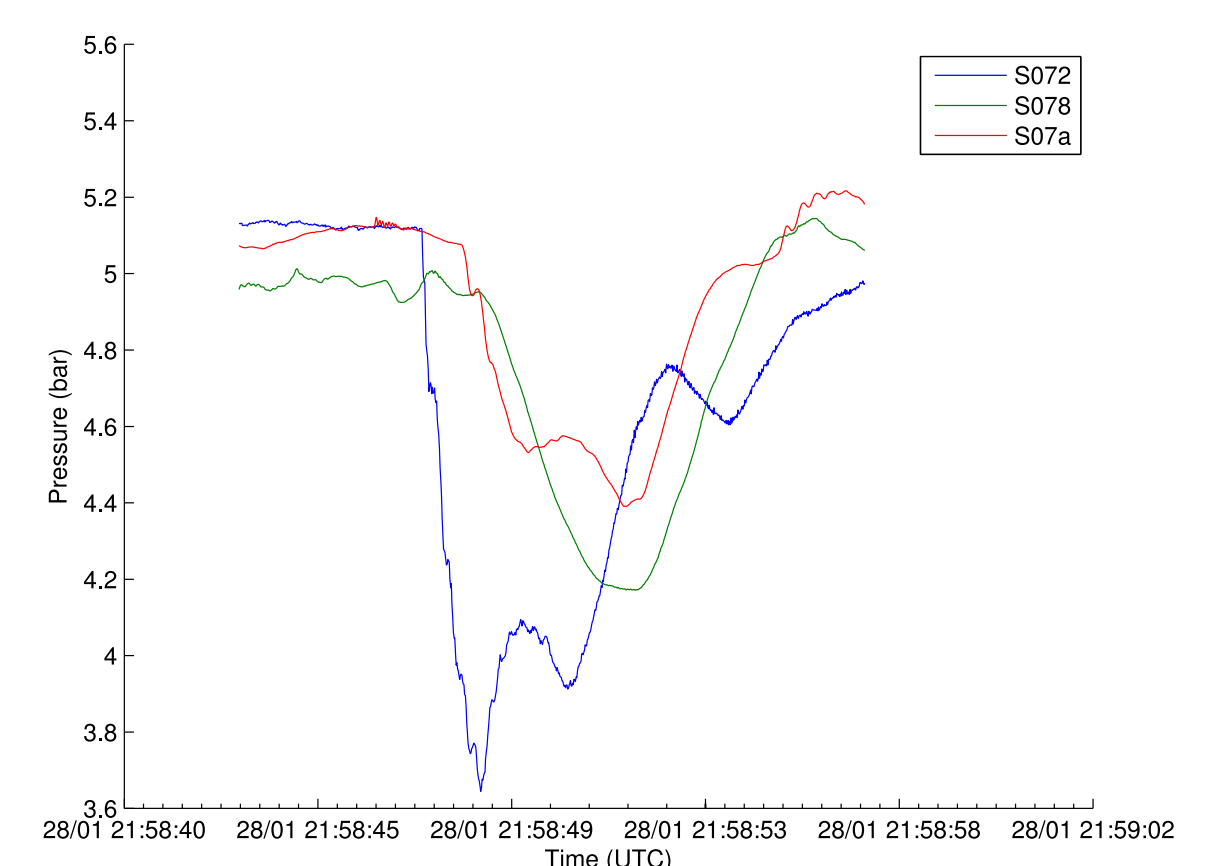
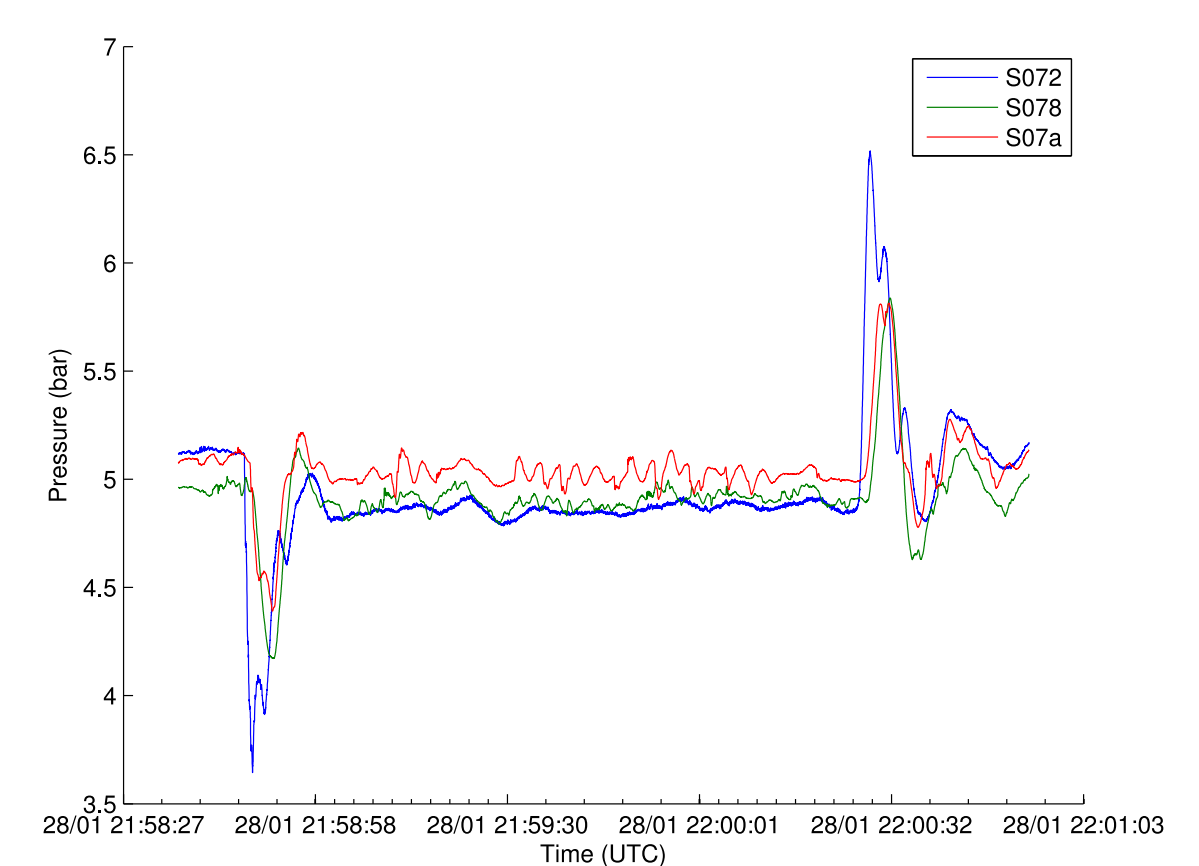
Eight high speed loggers were installed in the DMA and were able to demonstrate that potentially damaging transients were occurring and that the source of these transients was the large industrial user.

The graphs here show the output of three of the data loggers. The site names have been anonymised.

Overview Data



Detailed Transient & Propagation Data



High Speed Data Loggers

Operating since 2010.

25 loggers, 100+ installations.

24 billion samples collected.

First Generation

Two pressure channels, 64 samples/second each.

2GB memory.

GPS synchronised real time clock.

Wireless deployment setup.

Second Generation

Two pressure channels, up to 128 samples/second each.

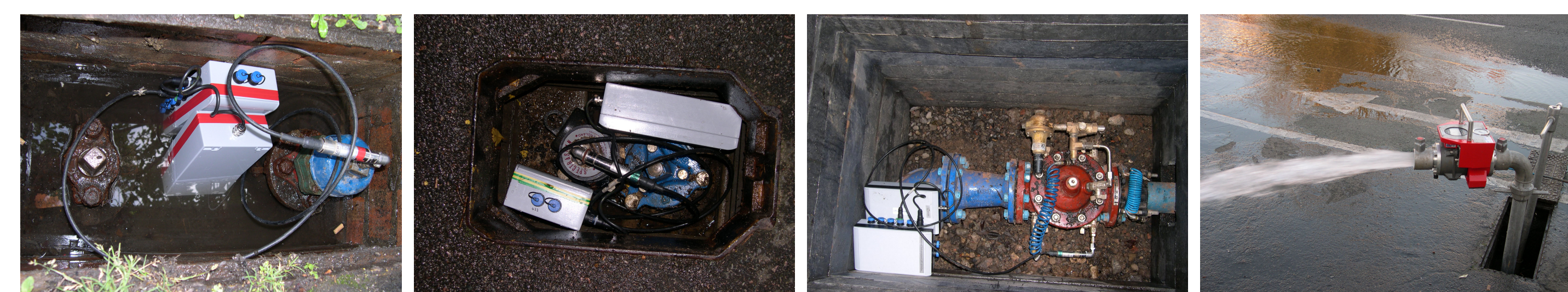
4-20mA (flow/position) channel.

2GB+ memory.

GPS synchronised real time clock.

Wireless deployment setup.

Available to buy from June 2012



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www.stream-idc.net

Department of Civil & Environmental Engineering, Skempton Building, Imperial College London, SW7 2AZ

asher@imperial.ac.uk