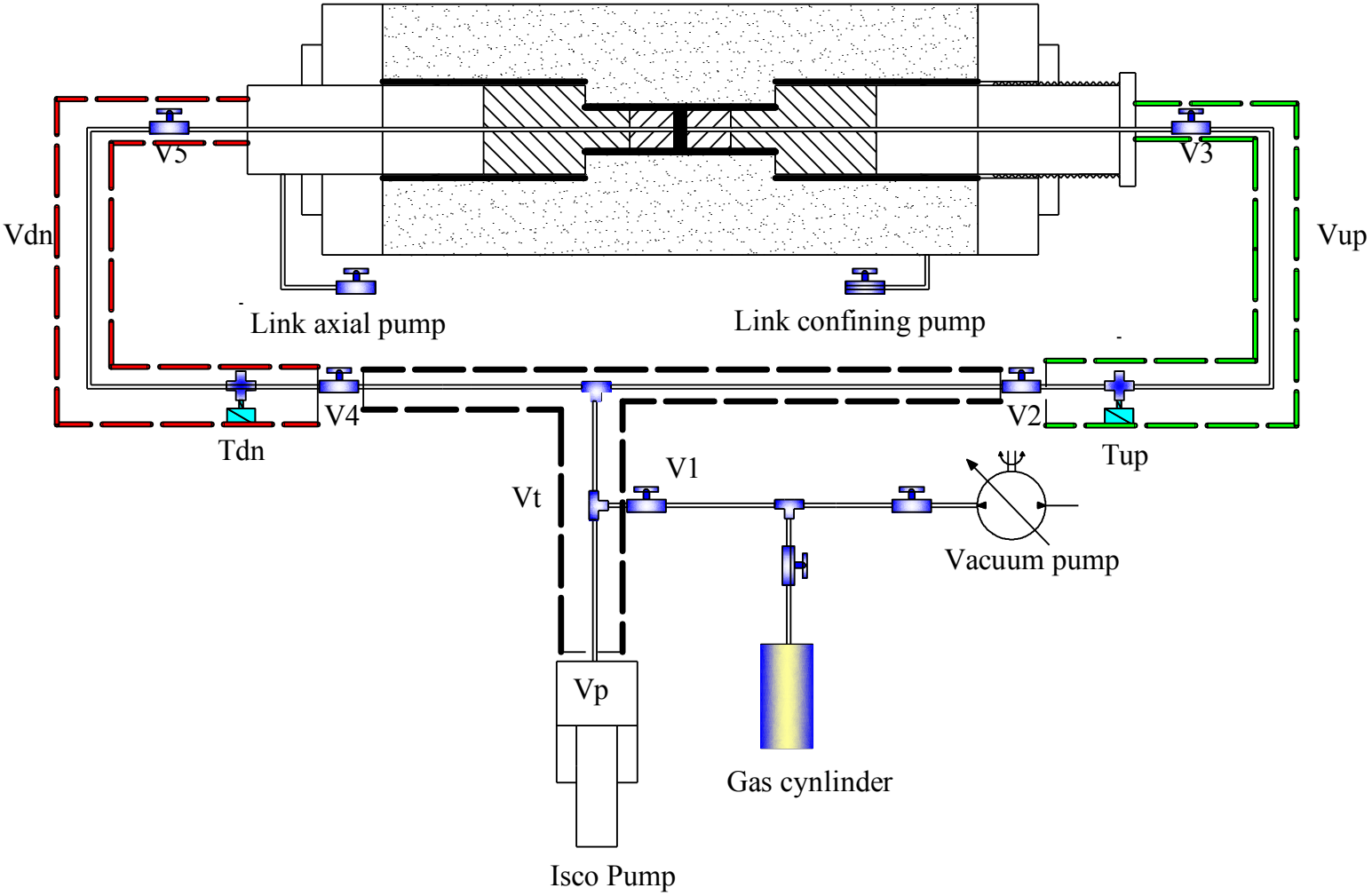
Brandon Schwartz

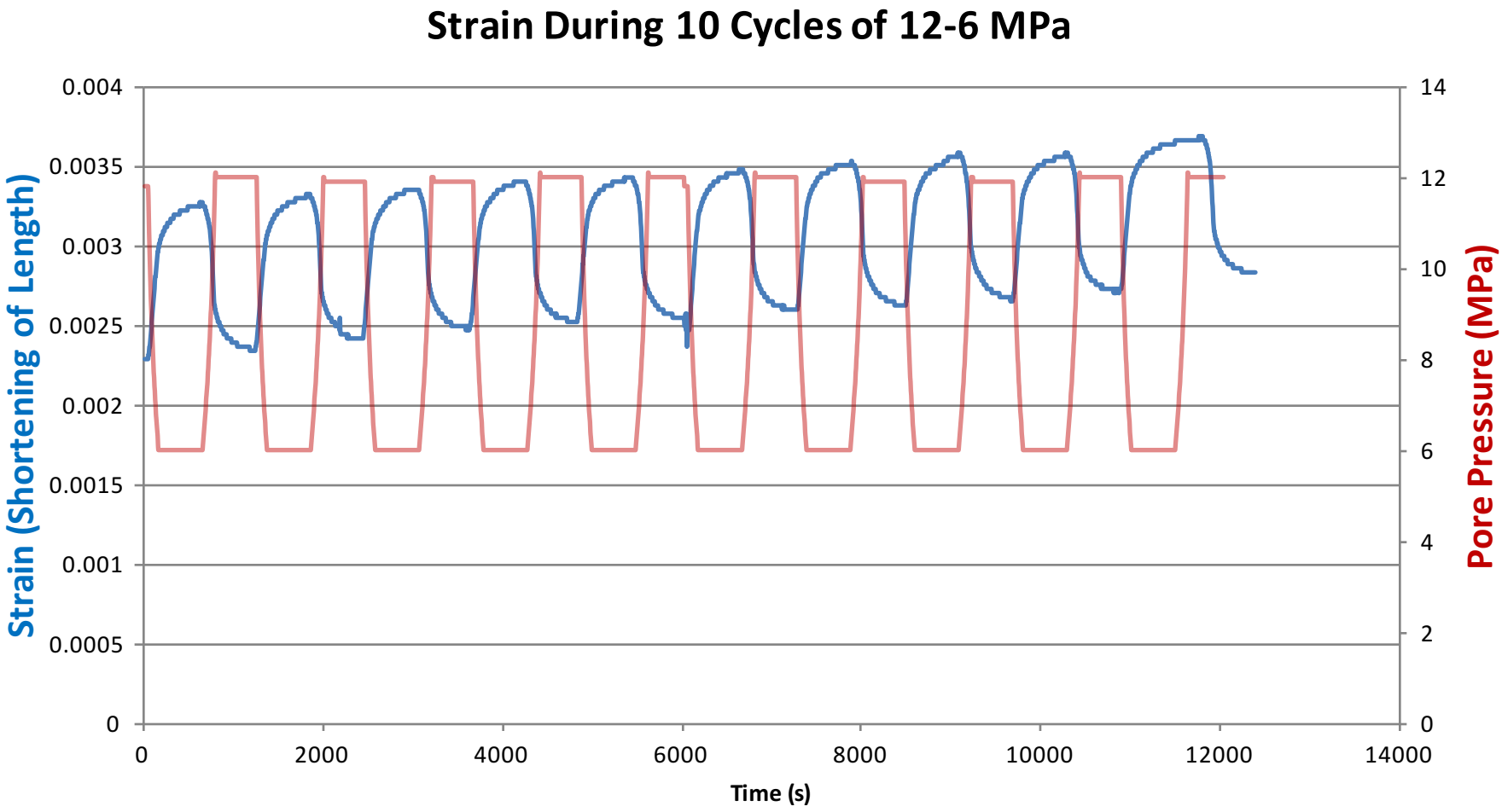
Hydraulic fracturing has facilitated the economic production of shales by creating fractures within the shale reservoir that act as high permeability pathways. However, after a short initial production period (months), production becomes flat as all of the natural gas close to the fractures are recovered and production is limited by the shale matrix permeability. If the matrix permeability could be enhanced by even 1% or 2%, the thirty year recovery could be economically increased.

To accomplish this, we are applying low frequency stimuli to shale samples and measuring transport properties including permeability. Currently, we are pressure pulsing samples that are stressed under hydrostatic pressure conditions. These pressure pulses raise the pore pressure of the sample, thereby lowering the effective pressure. Pulsing the sample repeatedly seems to cause irreversible strain. Our goal is to determine how many pulse cycles are required to reach the strain limit, and to see if additional pulsing induces micro-fractures that can enhance permeability.

Hydrostatic Stress in Triaxial Cell



Measured Strain over 10 Cycles



Pre/Post Experiment Characterization