

Overview

The mining ventilation test facility is used to evaluate the risk of storing and using hydrogen fuel cell technology in underground mining and ventilation environments. Hydrogen is released into the ventilation tunnel at different pressures, ventilation flow, different orientations and orifice (leak) diameters. Hydrogen concentration is measured in the tunnel, and the flammable regions determined

Objective

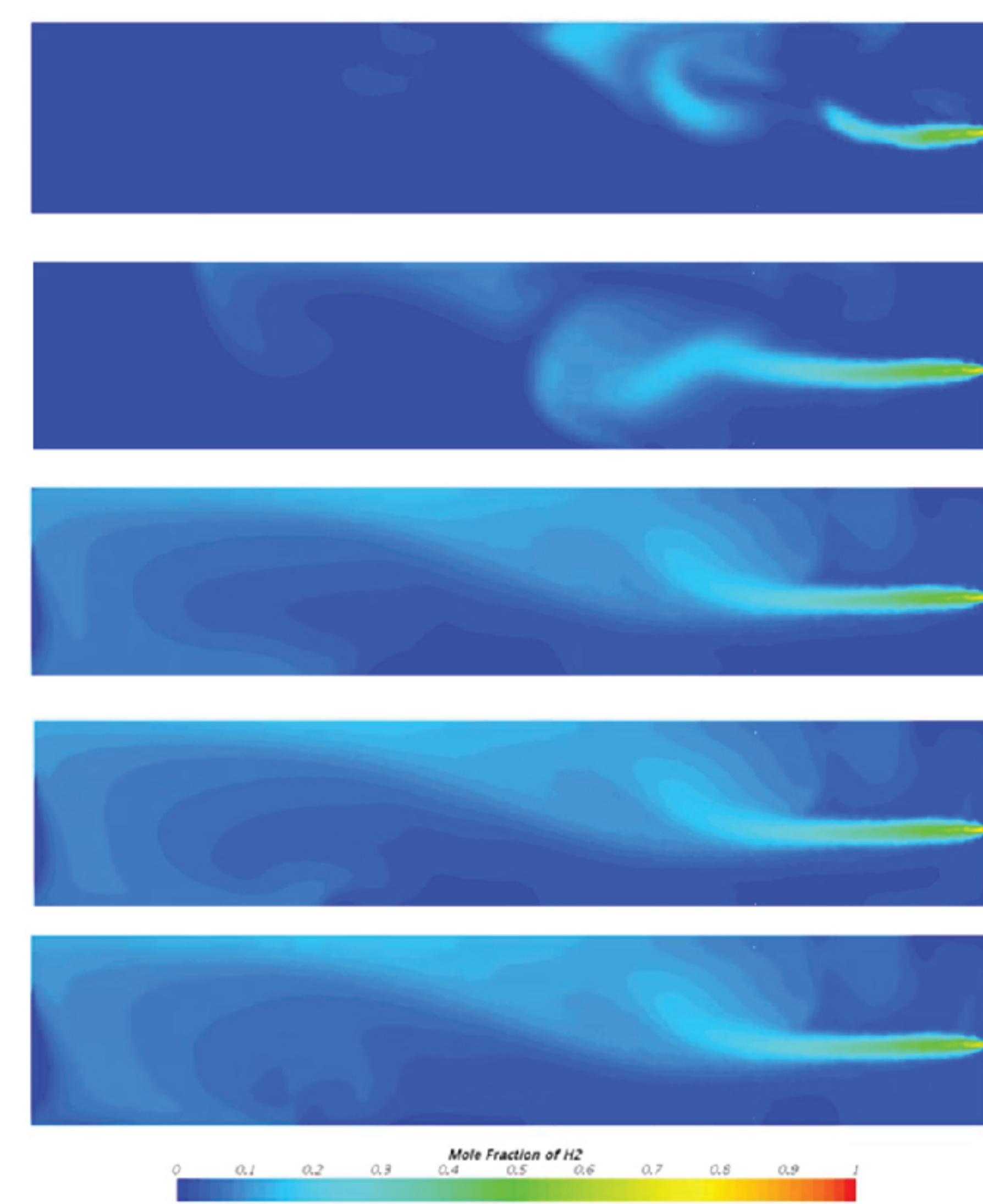
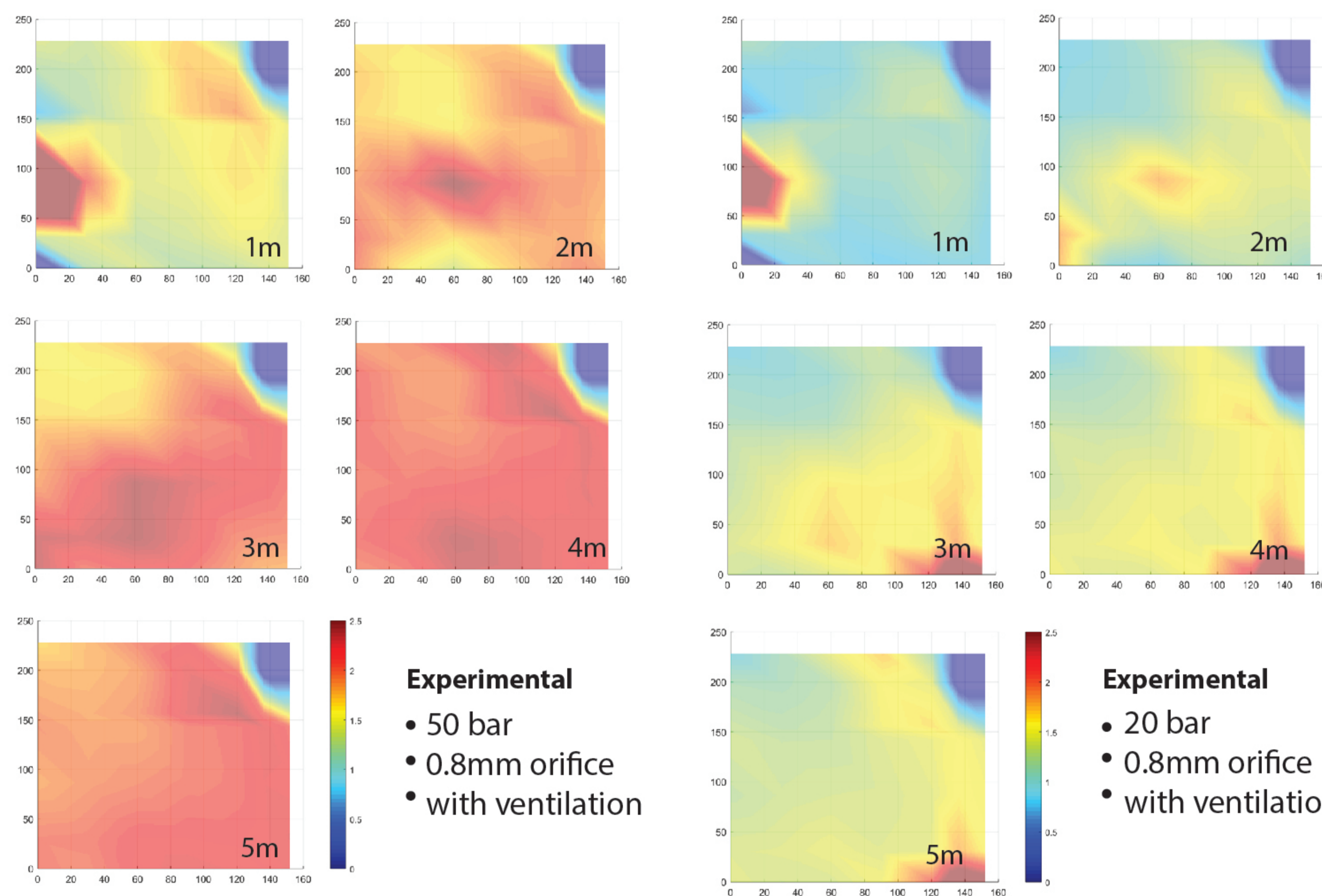
- Release hydrogen up to pressures of 350 bar and measure the flammable region (> 4%) with varying ventilation. Test proprietary devices to improve hydrogen safety in confined underground mining and tunnelling activities. Used to verify computational fluid dynamics models. Allows for the testing and evaluation of different sensors in a harsh underground mining environment where dust, high humidity and temperatures, as well as blasting gasses (CO₂, N₂, NO₂, NO and CO)

Specifications

- 5 x 3 x 50 meter ventilation tunnel
- 55kW (50m³/sec) controlled custom ventilation fan
- On-site hydrogen production and storage
- Hydrogen release lines into the tunnel @ 350 bar and 200 bar
- Hydrogen sensors
- Remote site office



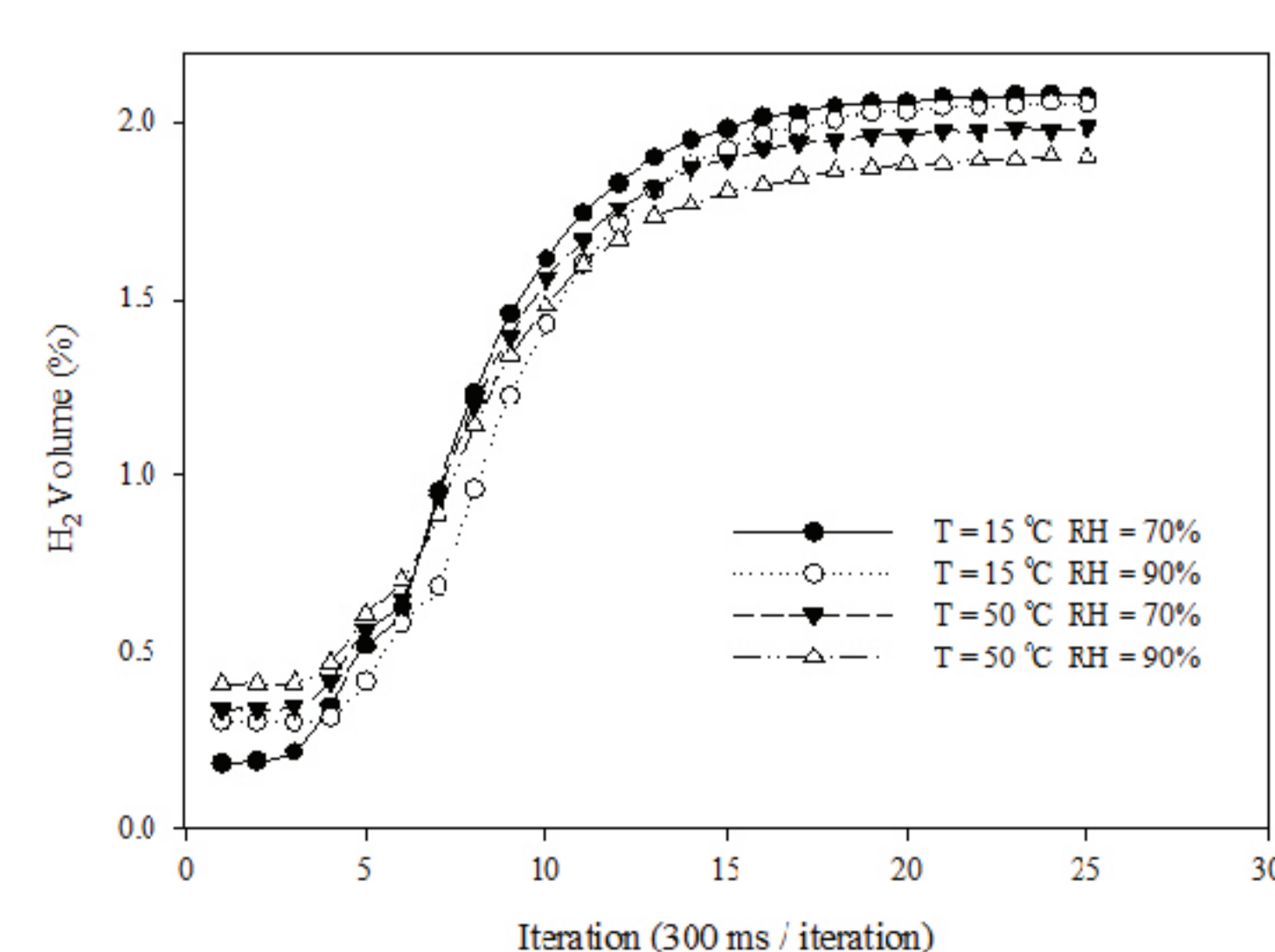
Results



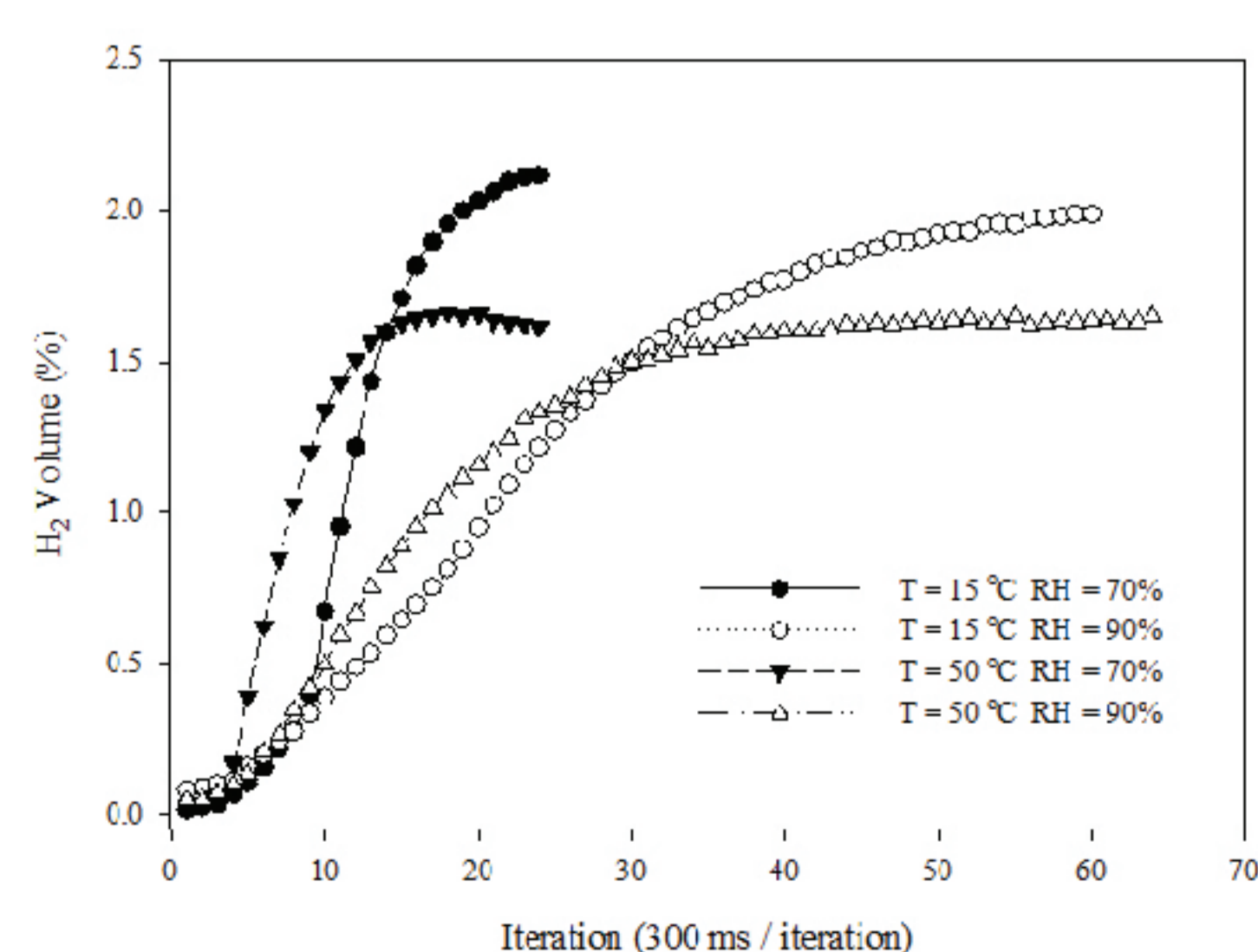
CFD • 6 bar • 20 mm orifice • 4,5 m³/s ventilation

- Both experimental results as well as computational fluid dynamic (CFD) modelling is done for comparison to determine the concentration of hydrogen from a possible leak. Pressures up to 350 bar are possible

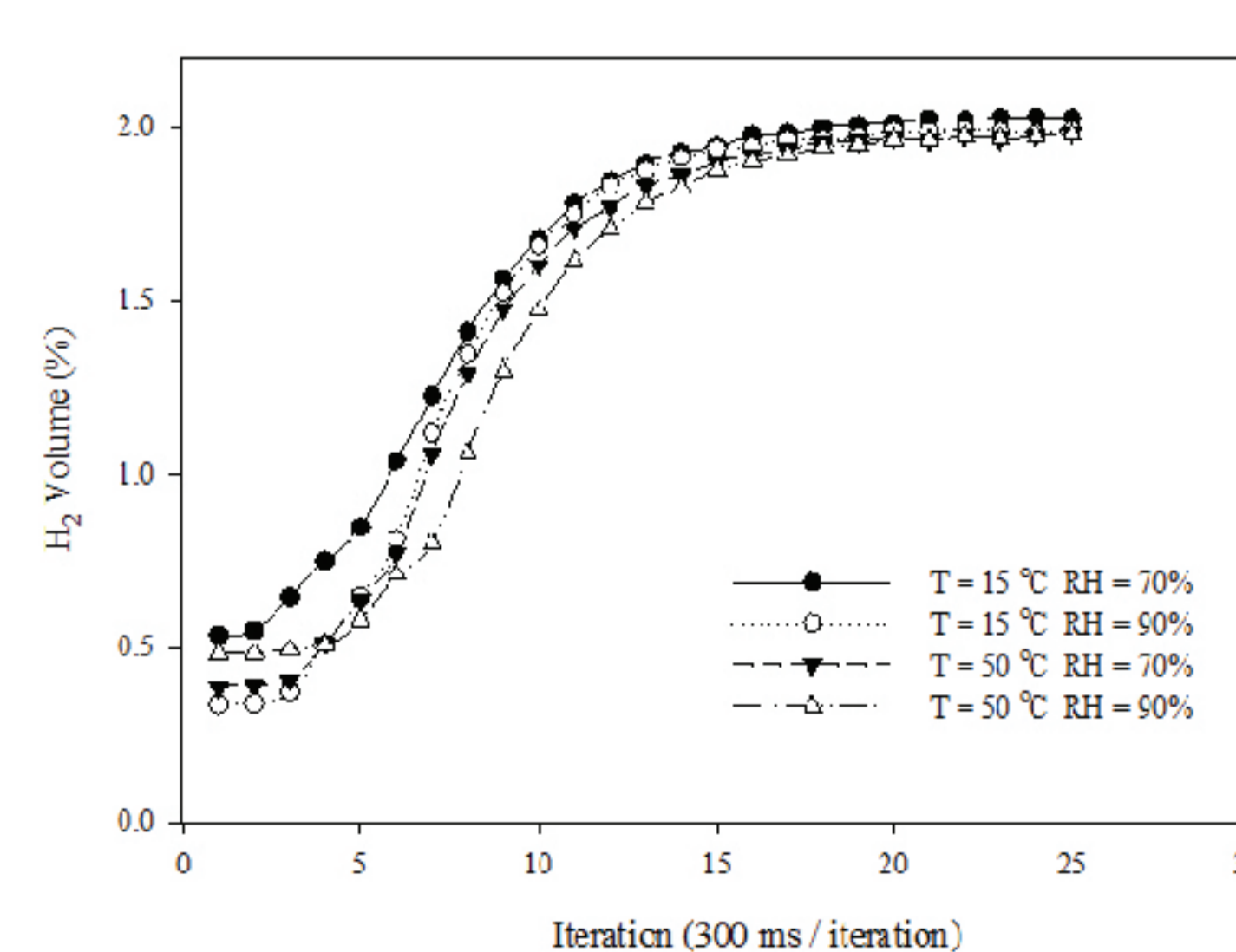
- Different commercial hydrogen detectors as well as a HySA Infrastructure Zone 0 hydrogen detector is evaluated and compared for various different environmental conditions.



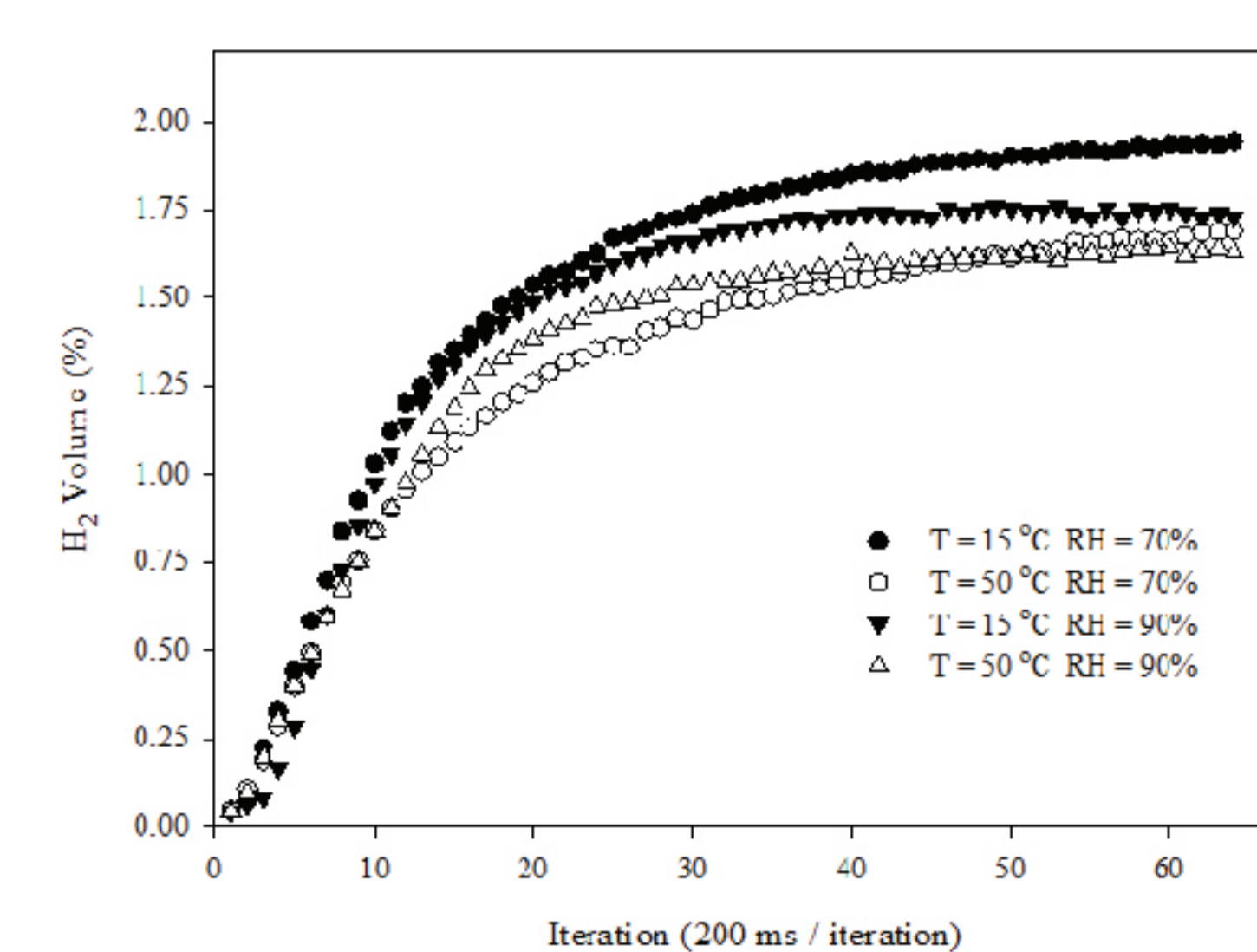
OEM sensor 1



OEM sensor 2



OEM sensor 3



HySA Infrastructure Fast Response Zone 0 H₂ Sensor