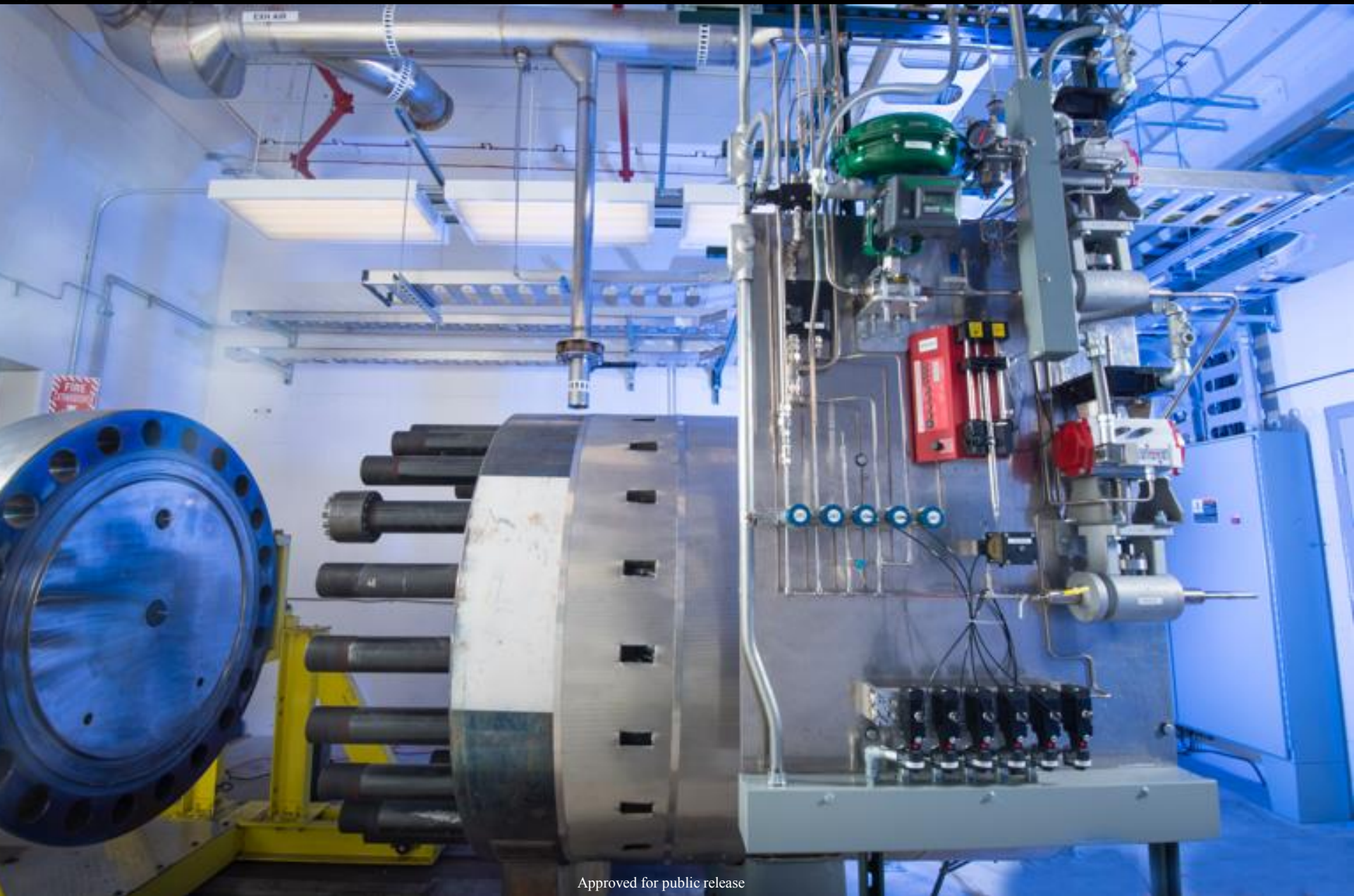
GEER Status Update

Tibor Kremic, Leah Nakley, Dan Vento, NASA Glenn Research Center



Glenn Extreme Environment Rig (GEER)

Reminder - GEER simulates atmospheres

Current capability

- Temperature: ambient to 500 degree C
- Pressure: .001 to 100 bar
- Virtually any chemistry – accurately
- Indefinite duration
- In process of tapping smaller vessels into system infrastructure (mini GEERs)

Science, technology and/or mission applications

Venus (environment and chemistry – surface to above clouds)

Venus Flagship STDT Report

Saturn, Jupiter, Uranus, moons (chemistry and temp / pressure within rig limits)

NRC 2013 Planetary Decadal Survey

Exoplanets – Chemistry for science and model inputs

Super-Earth exoplanet GJ 1214b (Image from ESA VLT)

Direct applications for science, instrument and technology development, and mission support (like Venera-D)

GEER Basics

Major subsystems include: pressure vessel, gas containment, gas mixing, programmable control systems, pumping station, temperature control, analytics, operation stations all in a specially designed facility. Smaller vessels being incorporated.

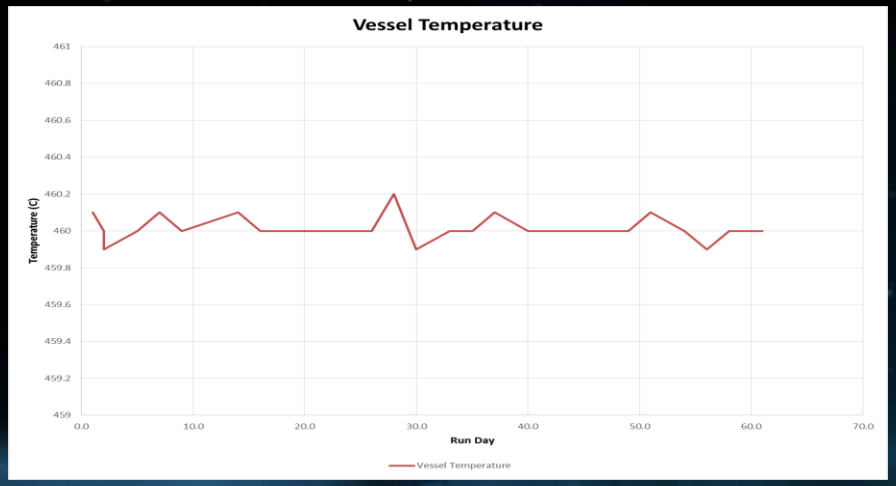
GEER gets guidance on anticipated needs and future capability from the Science Advisory Council (SAC), NASA HQ, and direct inquiries and demand.

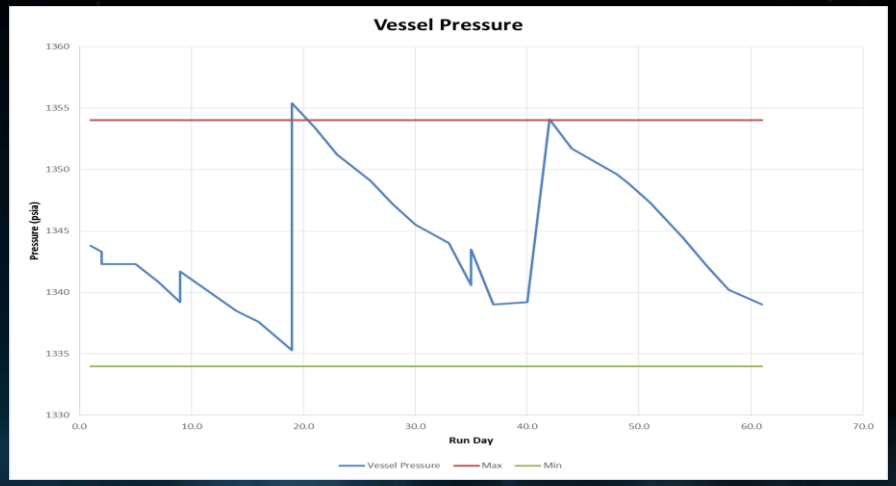
Current SAC members: Martha Gilmore – Wesleyan University, Katharina Lodders – Washington University, Ralph Harvey – Case Western Reserve University, William Moore – Hampton University, Paul Steffes – Georgia Tech University, GRC liaison: Jeffrey Balcerski

Latest Activities

- GEER is operating very well and busy implementing science experiments and technology development tests
  - Recently finished 60 day test at Venus surface conditions
    - High temp sensors, electronics, propagation, exposure of materials,…

- Integrating smaller mini-GEERs that will utilize existing complex chemistry generation and control system, and local analytics
  - Allows for: parallel tests, quicker turn around, less consumables and wear on GEER when larger volume not needed





Basic measurements over time - during latest test

Glenn Extreme Environment Rig (GEER)

- GEER will be supporting future work for HotTech and Solar System Workings awards, LLISSE, and other tests for science as well as some commercial users

Take-away though - GEER is still available for users

- If such interest exists – please contact me (Tibor.Kremic@nasa.gov) to discuss needs and schedule

- **Website: https://geer.nasa.gov**