

EXPERIMENTAL SIMULATION PERFORMANCE OF THE GLENN EXTREME ENVIRONMENT RIG

Jeffrey Balcerski¹

Tibor Kremic²

Ike Chi²

¹Ohio Aerospace Institute ²NASA Glenn Research Center

VENUS IN A BOTTLE

GEER is designed to replicate, as closely as is currently known, the temperature, pressure, and reactive gas chemistry of the Venus atmosphere at the surface.

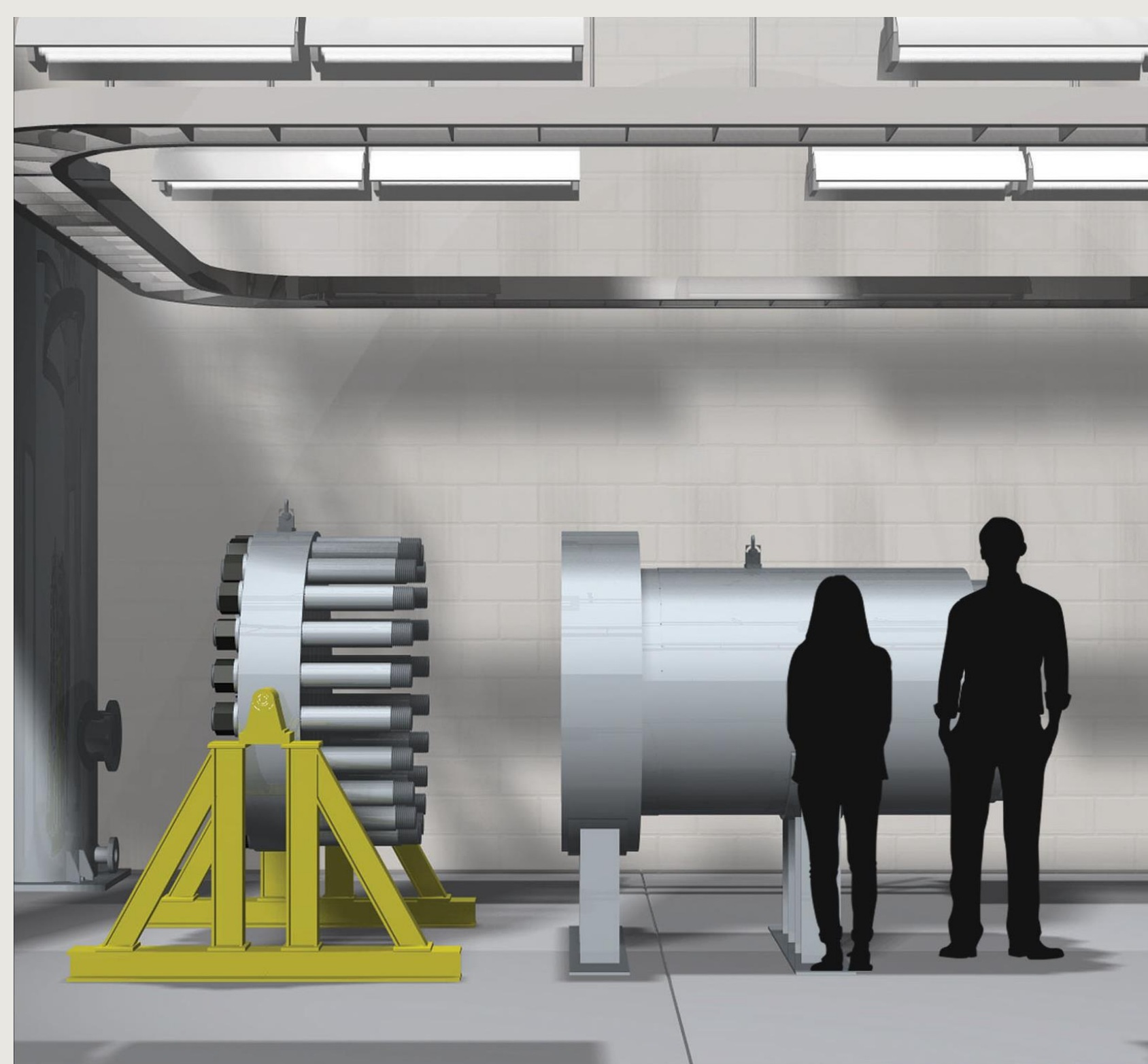
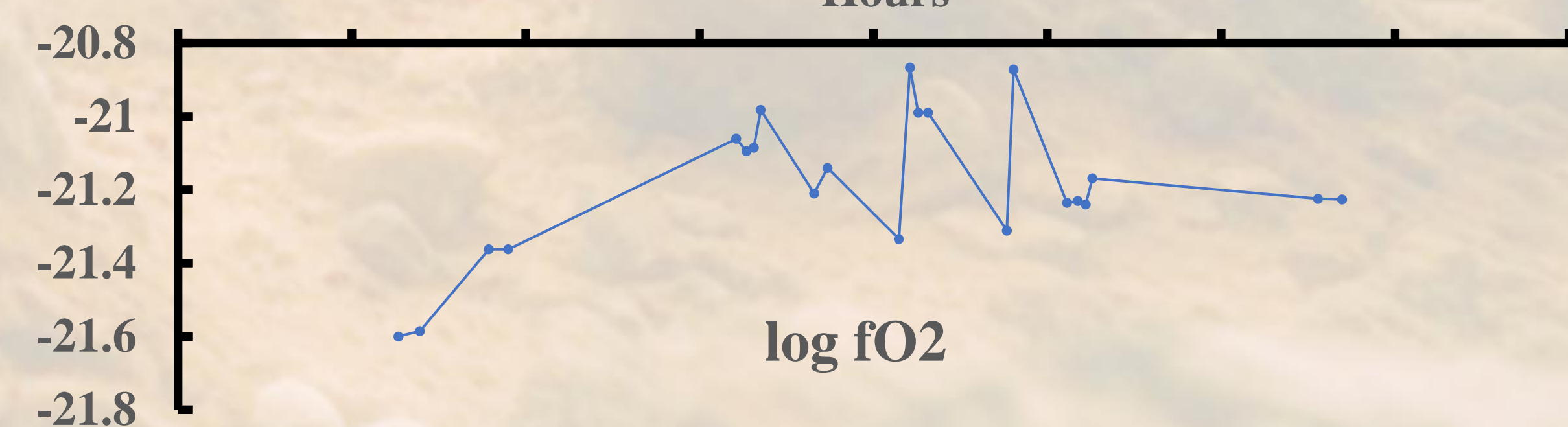
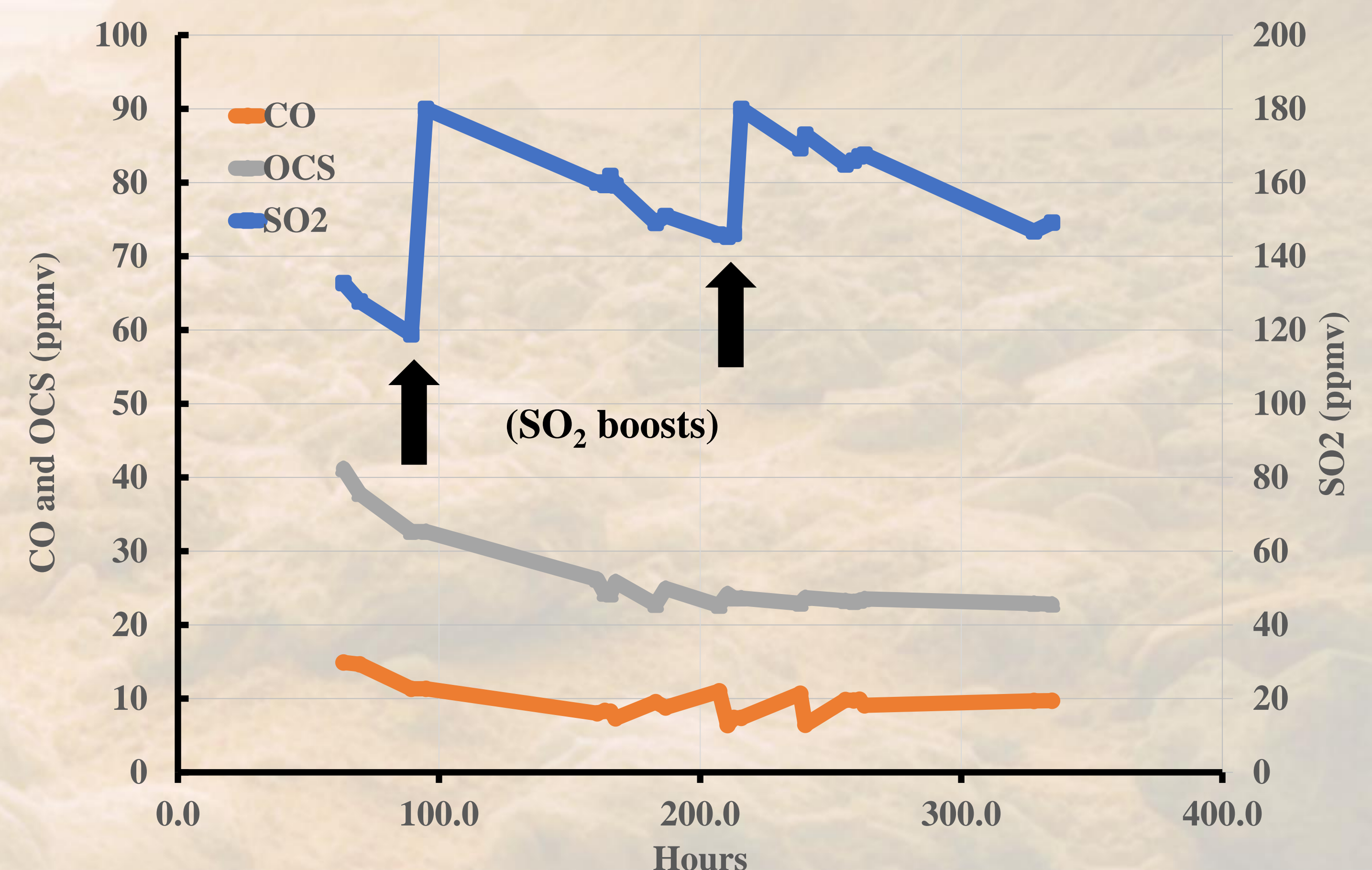
This allows for the maturation of spacecraft components and provides a proxy for scientific experimentation, in preparation for the next generation of Venus exploration.



PROBLEM STATEMENT

- Most metals are expected to react with the hot (470 °C) Venus gases... this includes the 304SS of the GEER vessel.
- GEER resists corrosion very well, but we need to quantify and mitigate chemistry changes in the test environment

EXPERIMENT: Determine SO₂ consumption by empty vessel (minimal support hardware, no test articles.)



800 L volume provides:

- Accommodation for powered spacecraft hardware/components
- Space for dozens (or hundreds!) of samples for passive exposure
- Resilience to gas chemistry fluctuations

USE OF GEER

GEER is available for use by science and technology researchers for either short- or long-duration testing. Custom test hardware can be created and installed by the facility engineering staff. Can potentially support other (non-Venus) atmospheres. For Use Info, Contact: Ike Chi (su.c.chi@nasa.gov)

RESULTS

- Tracking the CO₂/CO ratio implies an oxygen fugacity (log(fO₂)) of -21.6 to -20.9. This is in the range expected for the surface of Venus.
- Unique GEER capability allows boosting of target gases to maintain test integrity.
- Vessel is homogeneously mixed within < 5 minutes after gas boosting.