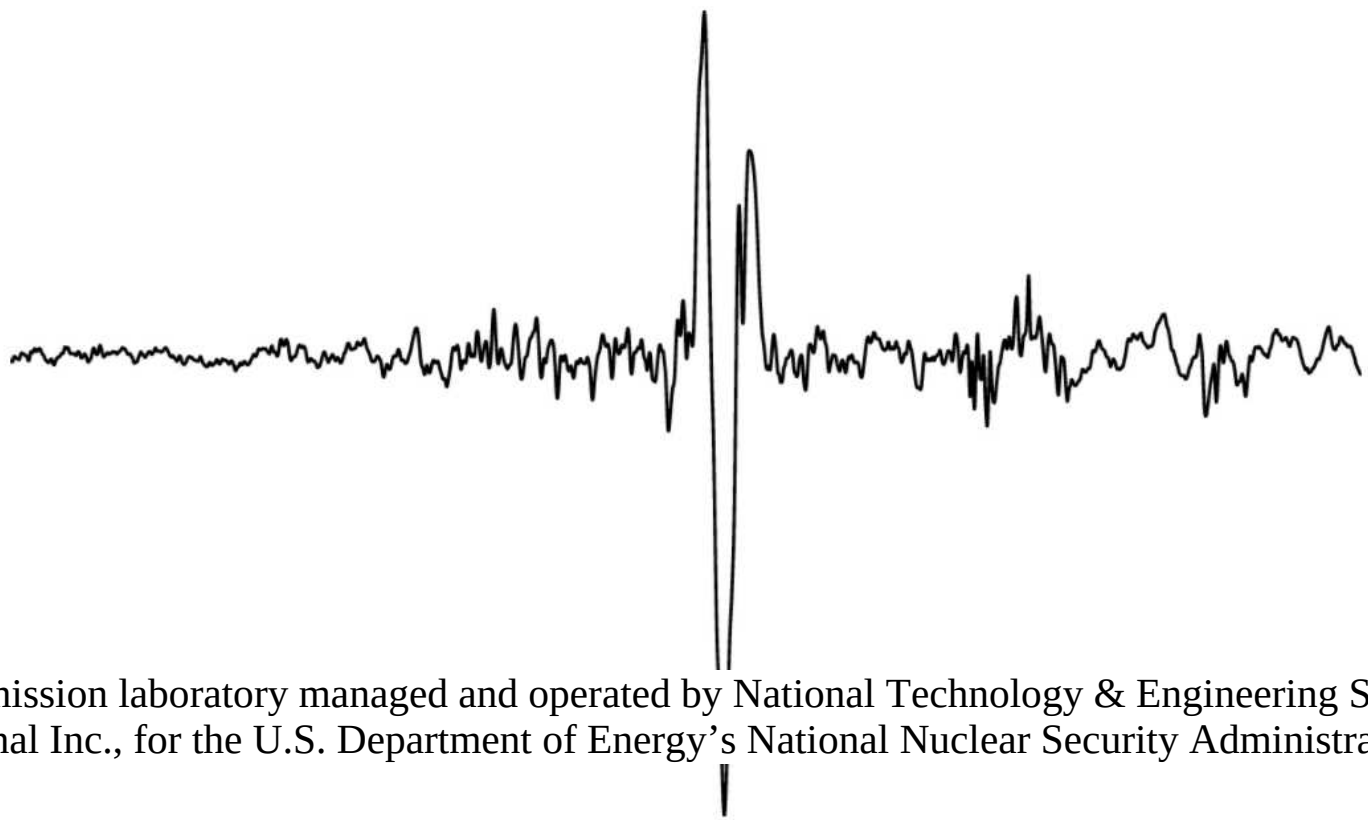
SAND2020-1799C

Daniel C. Bowman

Sandia National Laboratories

January 28, 2020



oratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia,
neywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract

Sandia's Goals in High Altitude Acoustics

Develop and test innovative sensor systems

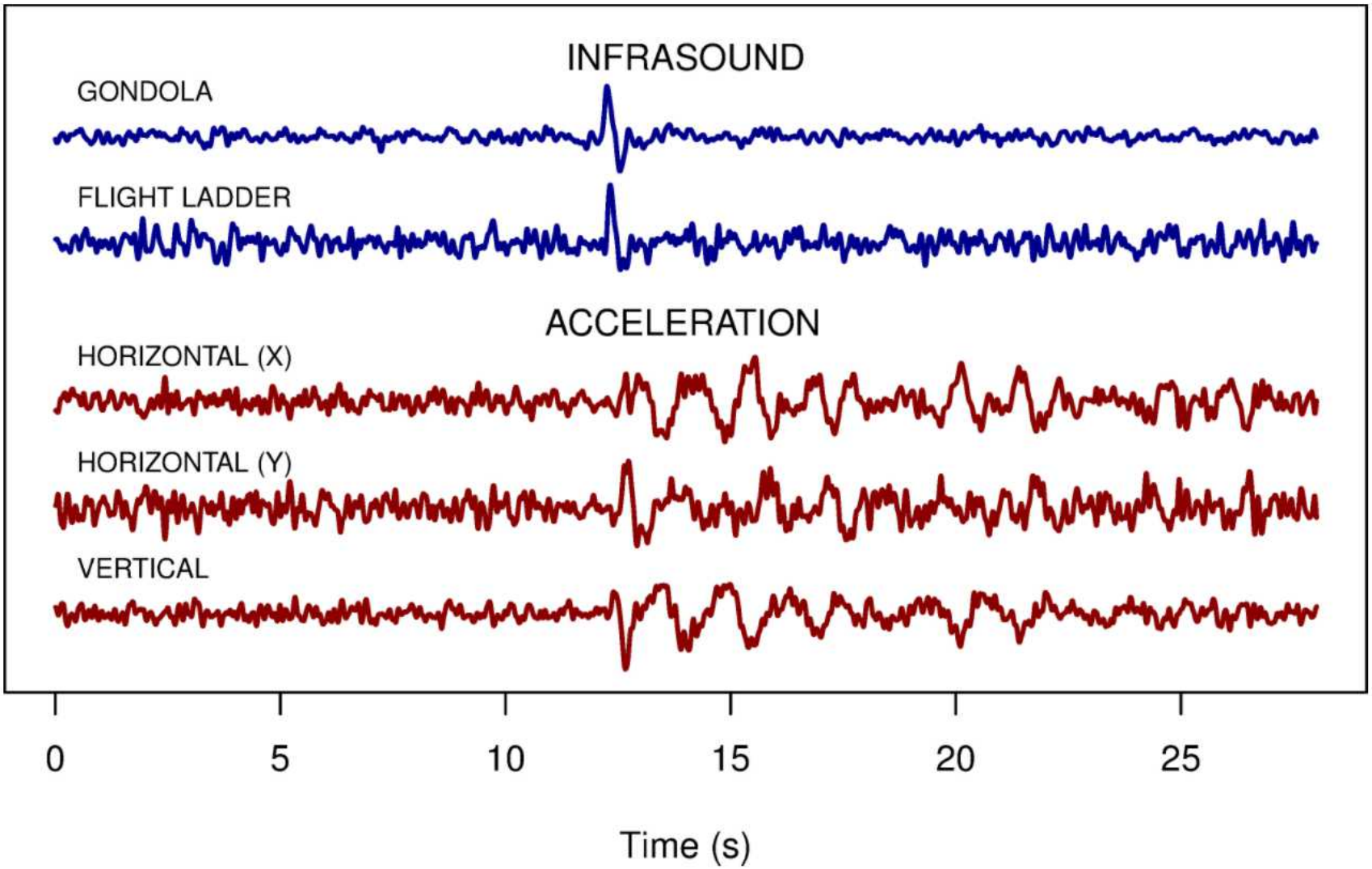
Pursue long duration flight opportunities

Optimize Heliotrope flight system

Develop joint SNL/JPL planetary acoustics vision

Investigate bolide detection prospects

The Aeroseismometer: Motivation



A single event of unknown origin on the HASP 2016

Concept and Recent Progress

Mark Boslough first articulated the idea of a "balloon aeroseismometer"

The HASP 2016 flight showed it works, in principle

JPL experiments proved geolocation on tethered balloons

Upcoming NASA FOP aimed at demonstrating geolocation on free-flying balloons

This novel concept could be a game changer.

Vertical sensor arrays

Multiple distributed sensors on one balloon can

1. assist with event detection
2. determine nature of background noise
3. allow geolocation

The HASP 2016 and one of JPL's balloons had this setup. **Both of them detected events.**

Stay tuned for the 2020 ESRANGE campaign!

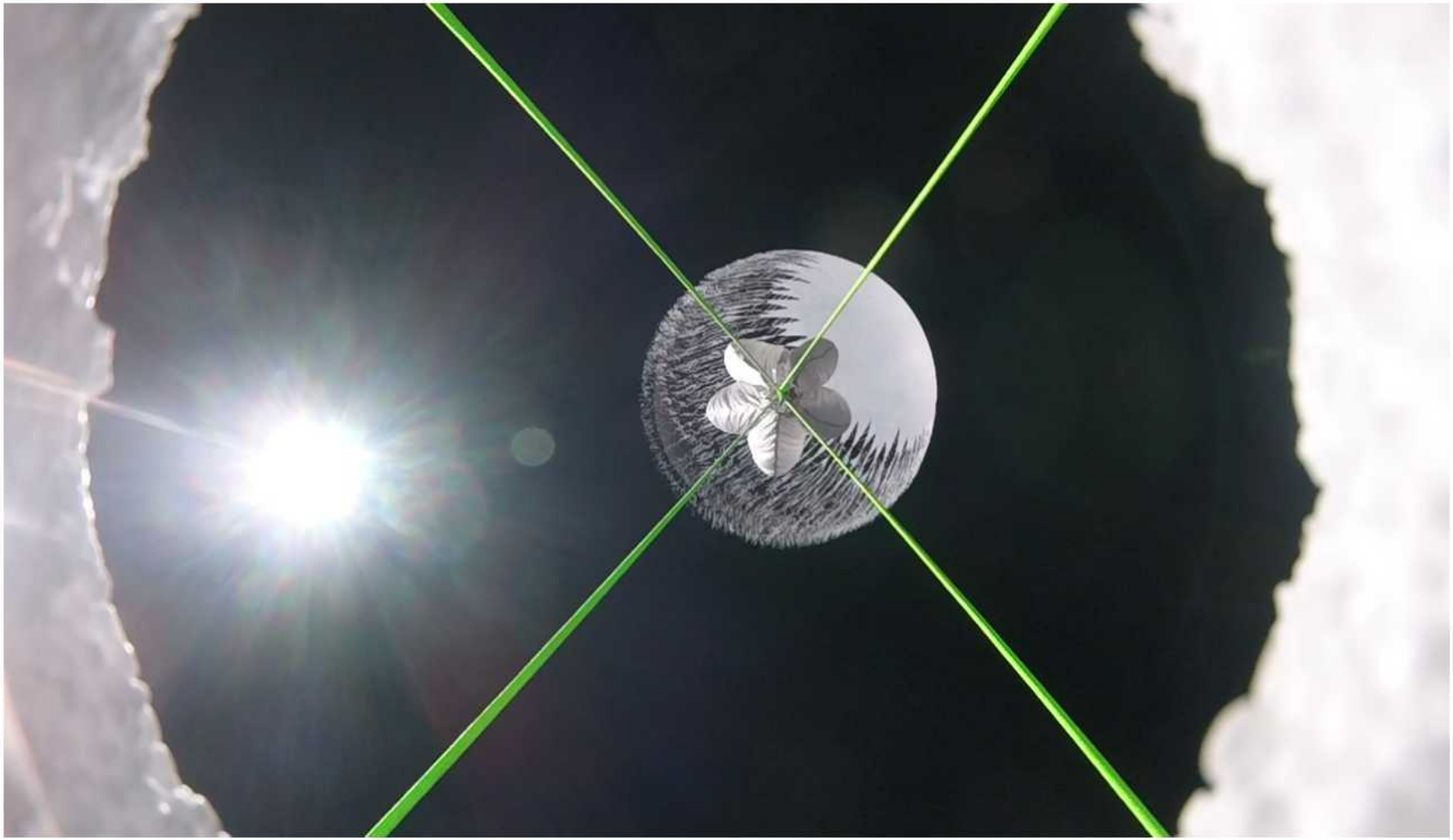
Long flights

Long duration (multi day) flights are **critical**.

The 2016 ULDB flight has yielded two published papers, one under review, and one in preparation.

The 2018 PMC-Turbo flight resulted in the confirmation of a new ocean infrasound source and the first observation of auroral sound from a balloon.

Heliotrope R & D



Continue leveraging the Heliotrope to permit R & D and rapid response for infrasound and other missions.

JPL & SNL

Development of the high altitude acoustics field benefits both terrestrial and planetary missions.

Sandia looks forward to continued collaboration with Jet Propulsion Laboratory on topics of mutual interest.

Bolides

Bolides are a natural equivalent of an atmospheric nuclear explosion.

They also pose a danger in and of themselves.

A study using balloon-borne acoustic sensors should be considered.

Acknowledgments

Sandia National Laboratories is a multimission laboratory managed and operated by National Technology and Engineering Solutions of Sandia, LLC., a wholly owned subsidiary of Honeywell International, Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.