

Hypersonic Inflatable
Aerodynamic Decelerator

National Aeronautics and
Space Administration



HIAD Payload Return Solution for SmallSats

Small Satellite Conference 2026

Presenters

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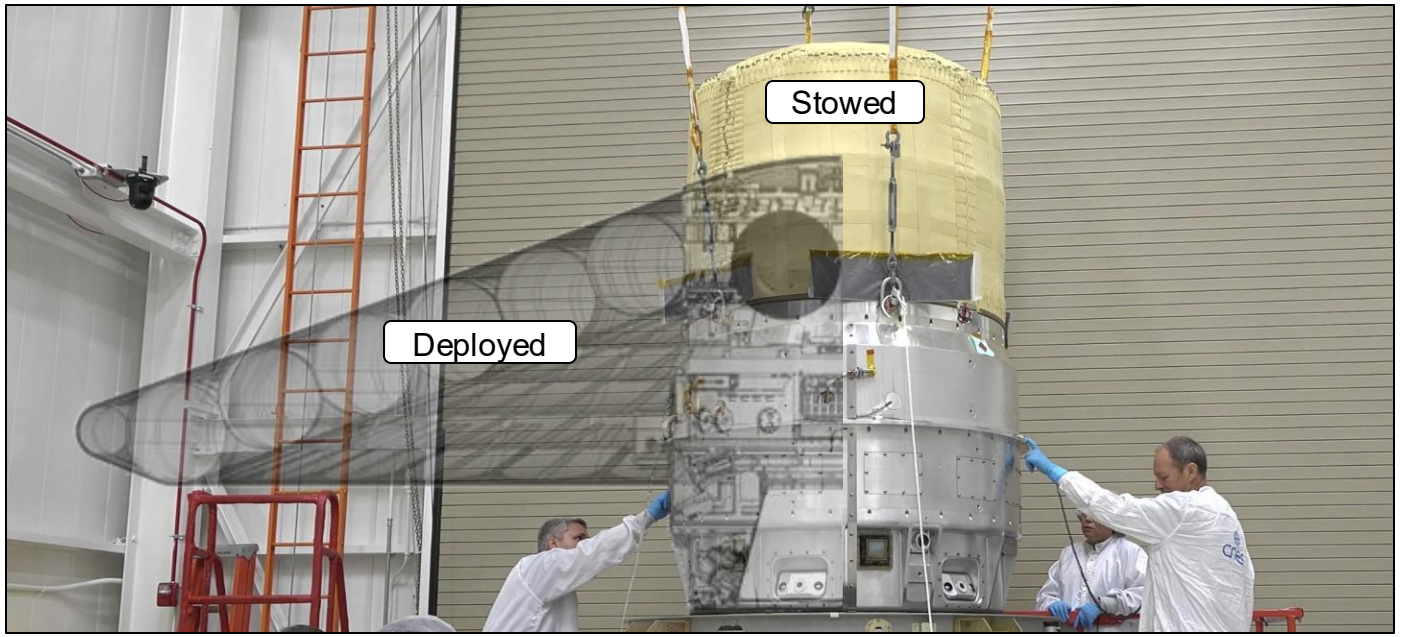
22-26 August 2026



HYPERSONIC INFLATABLE AERODYNAMIC DECELERATORS (HIAD)

Hypersonic Inflatable Aerodynamic Decelerator (HIAD) is a deployable aeroshell technology consisting of two main constituents that can be hard-packed into a small volume:

- **Inflatable Structure** that is heat resistant and sufficiently rigid to maintain shape against aerodynamic forces
- **Flexible Thermal Protection System (FTPS)** that shields the Inflatable Structure and payload from the shear and extreme heating of atmospheric entry



FLIGHT PROVEN HIAD AEROSHELL

Entry Mass (lbm)	< 1,500 lbm	< 3,500 lbm
Entry Mass (kg)	< 700 kg	< 1,600 kg
Diameter (m)	3m	6 m
IRVE-II – 2009 IRVE-3 – 2012 LOFTID – 2022	 IRVE II & 3	 LOFTID

- ❑ World leaders in HIAD technology
- ❑ Comprehensive mission core competencies:
  - Flight Mechanics and Trajectories
  - Aerodynamics and Aeroheating
  - Structural and Thermal Analysis
  - Mechanical Systems, Fluid Systems, and Instrumentation
- ❑ Unique HIAD materials data, analytical tools, and testing methods
- ❑ The aeroshell module will bring your payloads back through earth's atmosphere safely

Commercialization: HIAD LEO SmallSat Module

- **NASA is adapting the HIAD to support smaller companies who want reentry capability**
- **The intent is to develop a single simple design that fits a wide range of SmallSat needs**
  - Simple bolt-on interface with one electrical connector
  - Withstand a range of LEO entry velocities, FPAs, and masses
- **NASA will absorb the upfront costs that can be prohibitive for small companies**
  - Non-recurring engineering "one size fits most" design, development, analysis, fabrication fixtures, test fixtures, and ground qualification testing
  - Allows companies to purchase only a module itself from industry vendors working with NASA
- **HIAD LEO Module includes the stowed/packed aeroshell, centerbody ring, nose, inflation system, minimal avionics, and minimal instrumentation**

WHY ARE WE HERE?

❑ We want industry feedback, so the HIAD LEO module fits your payload needs!

