

NASA SIERRA-B Capability Returns to Flight

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Abstract

The Sensor Integrated Evaluation Remote Research Aircraft (SIERRA-B) is a medium-class, unmanned aircraft system (UAS) that can perform remote sensing and atmospheric sampling missions in isolated and often inaccessible regions, such as over mountain ranges, the open ocean, or the Arctic. This capability developed by NASA Ames Research Center is a unique way for Scientists and Engineers to gather important Earth science data as well as perform flight research using an innovative, safe, and cost-effective aerial platform. This poster describes the aircraft system architecture, capabilities, and provides an overview of current payloads and mission concepts.

Aircraft and System Performance Specifications

Wing Span	6.1 m	20 ft
Length	3.9 m	12.9 ft
Height	1.5 m	5 ft
Max Gross Takeoff Weight (MGTOW)	217.7 Kg	480 lbs
Useful Load (fuel + payload)	74.8 Kg	165 lbs
Max Fuel Load	64.4 L	17 gal
Service Ceiling	3,962+ m	13,000+ ft
Best Cruise Speed	54 to 59 kn	
Max Operating Speed	85 kn	
Max Endurance	8.8 hrs	
Max Range	527 NM	

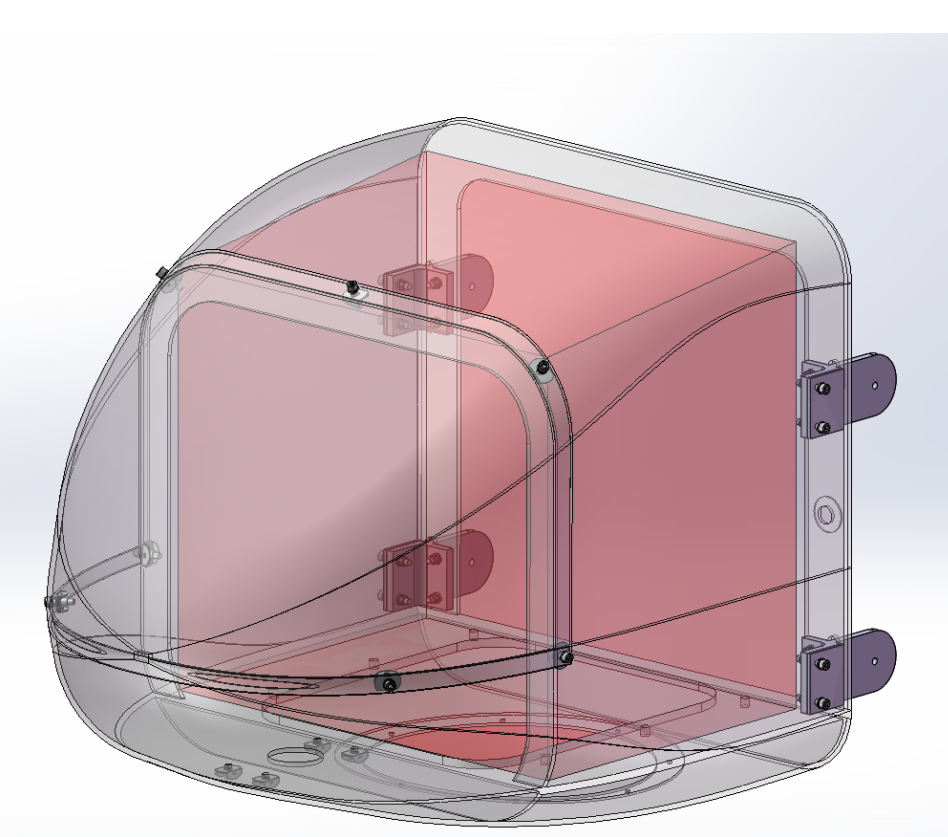
Mission Role

- Where long flight durations preclude a human pilot
- Where remote locations or harsh conditions place pilots and high-value aircraft at risk
- For investigations requiring excellent maneuverability, slow flight speed, moderate size, relatively large payload area, and/or requiring real-time data telemetry for responsive mission planning
- Ideal for many types of tropospheric chemistry sampling and remote sensing missions, including arctic ice reconnaissance, land cover mapping, ecosystem assessment, fire monitoring surveys, disaster surveillance and levee assessment

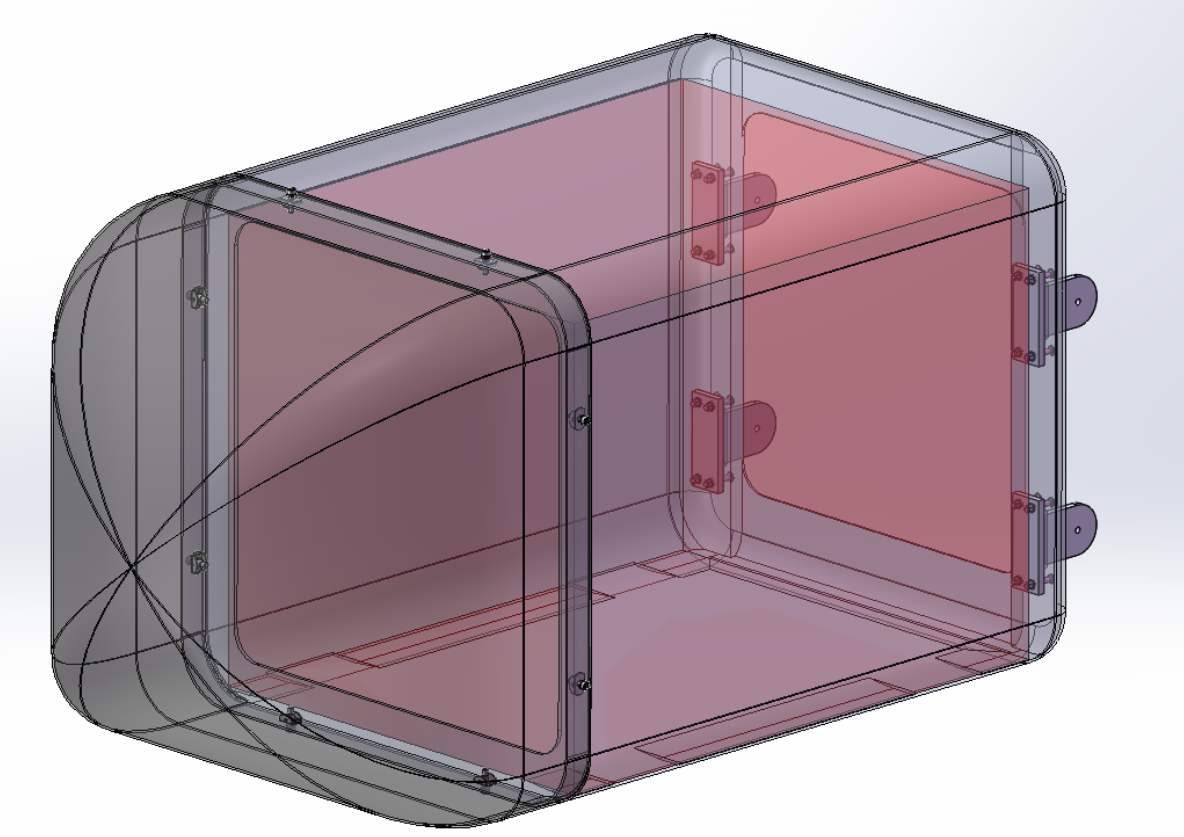
Payload Info

- Max Payload Weight at Max Fuel 28.6 Kg 63 lbs
- Max Payload Weight at Min Fuel 61.2 Kg 135 lbs
- Payload Power Provided 16 Amps, 24 VDC
- Scalable nose accommodates a wide range of instrument sizes, can be customized for irregularly shaped payloads, can be modified to facilitate inlets, antennas, access, data retrieval, are relatively inexpensive and can be made available to PI's to work with
- Payload Volume Useful Inner Dimensions

Standard (Small) Nose	28 x 33 x 28 cm	11 x 13 x 11"
Large Nose	53 x 43 x 43 cm	21 x 17 x 17"
Forward Fuselage (batteries aft)	48 x 34 x 38 cm	19 x 13 x 15"
Aft Fuselage (batteries forward)	26 x 34 x 29 cm	10 x 13 x 12"



Standard Nose



Large Nose



Forward Fuselage

Working with SIERRA-B

Find the full SIERRA-B Experimenter's Handbook and team contact info:
<https://airbornescience.nasa.gov/aircraft/sierra-ARC>



Current Customers

SMD Airborne Science Payload – SRI CubeSat Imaging for Earth Science (CRES)

- CRES payload captures Synthetic Aperture Radar (SAR)/ Interferometric Synthetic Aperture Radar (InSAR) data for imaging and high-precision ground elevation measurements
- CRES requires a moving platform at sufficient altitude capable of accurate repeat pass collections (SIERRA-B)
- The program will demonstrate and validate the instrument for future on-orbit CubeSat operations and provide a useful scientific research platform in its own right, a capability valued in the Decadal Survey

GSFC Search and Rescue Direction Finding Receiver

- Goddard Space Flight Center (GSFC) and ARC have partnered to conduct a technology demonstration mission for Search-and-Rescue applications
- The GSFC Search-and-Rescue Direction Finding Receiver payload will be integrated with the SIERRA-B UAS platform
- Flights will characterize the performance of the receiver to meet the Direction Finding (DF) and homing operational requirements for COSPAS/SARSAT Second-Generation 406-Mhz Beacons

ASI – Building Copies of SIERRA-B for Education And Commercial Use

- American Space Industries Inc (ASI) has entered into a Reimbursable Space Act Agreement (RSAA) with NASA Ames
- This Agreement will enable NASA ARC experts to provide ASI with their unique engineering expertise on the SIERRA-B UAS
- ASI will use this information and assistance to build multiple copies of the SIERRA-B UAS for educational and commercial purposes