


A large, white, multi-lobed stratospheric balloon is shown from a low-angle perspective, filling the upper portion of the frame. The balloon's surface is made of a translucent material, and its structure is supported by a network of thin lines. Below the balloon, the Earth's surface is visible, showing a vast, flat landscape with a winding river and a thin blue line representing the horizon.

**2 MILLION HOURS
IN THE STRATOSPHERE**


AEROSTAR

AEROSTAR


COMPANY OVERVIEW




>2M
Flight Hours in Stratosphere



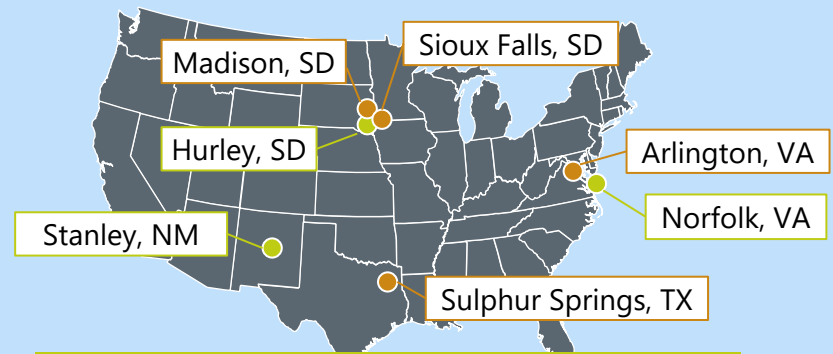
> 10,000
Operational Flights



>200
Technology Patents



>65
Years Building Balloons



We connect, protect, and save lives.




1956: Raven founded as manufacturer of high-altitude research balloons



1956: USAF projects Manhigh and Excelsior utilize balloon systems for space and high-altitude flight tests




1986: Aerostar International is founded as a subsidiary of Raven



2010: Hi Sentinel successful sustained, powered stratospheric airship flight



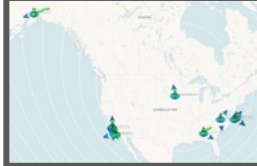
2012: Project Loon initiated with Google X to provide high-speed Internet to Rural Areas using balloons



2018: DARPA ALTA program selects Thunderhead system as sole platform



2018: Aerostar Cyclone Balloon System selected for NASA "Flight Opportunities" program



2021: Aerostar launches 18 flights across 6 sites for 5 programs in 2 wks

2022: Thunderhead system duration record with > 150 days aloft

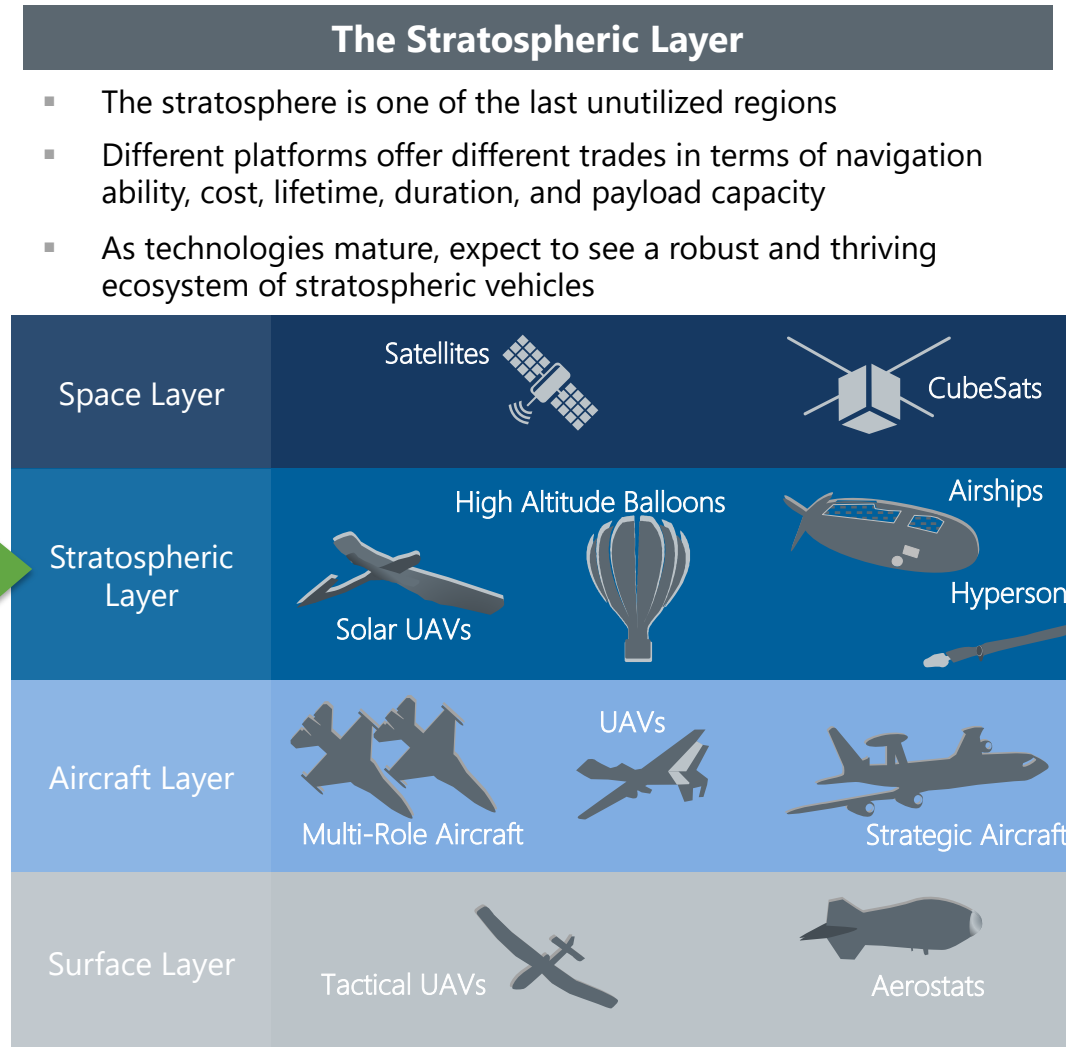
AEROSTAR

2022: Aerostar International separates from Raven, becomes stand-alone entity held by TCOM Holdings

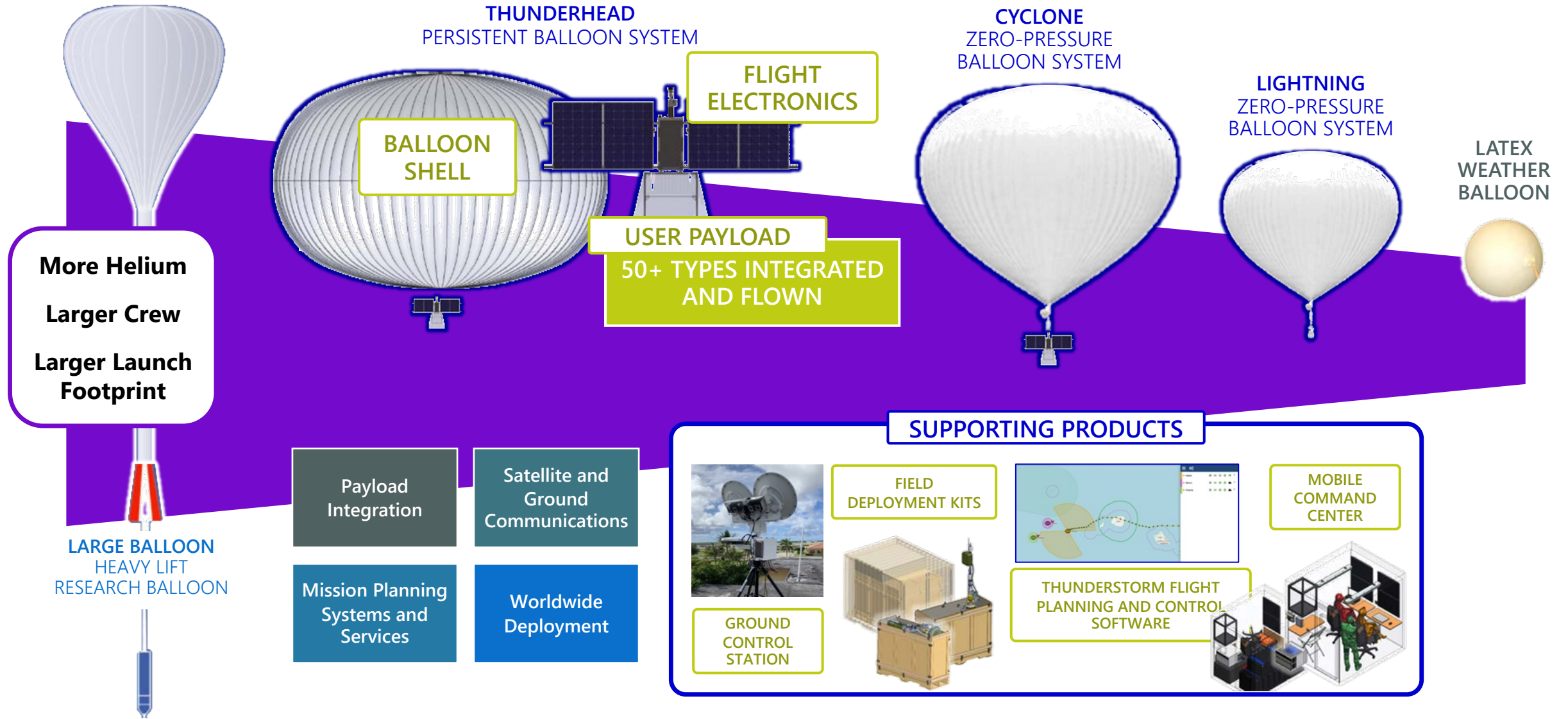


INTRODUCTION TO THE STRATOSPHERE

Current Stratospheric Platforms				
Stratospheric Product	High-Altitude Balloons	Stratospheric Airships	Stratospheric Solar UAVs	LEO CubeSats
Technical Readiness Level (TRL)	8	3	6	8
Navigation Capability	Low	Medium	High	None
Persistent Coverage	Weeks	Months	Months	Minutes
Cost per Asset	~\$50-500k	\$500k-1mm	\$3mm-30mm	~\$100-500k (x Many)
Susceptibility to Threats	Low-Medium	Low	Medium	Medium



STRATOSPHERIC BALLOON SYSTEMS



DEFENSE APPLICATIONS

A Maritime or Land Launch

- Dynamic launch capabilities allow for a broad range of coverage

B Engaging Targets of Interest

- Persistent surveillance
- Deliver effects

C Data Relay to Local Intel Teams

- Send critical information to intelligence teams on the ground

D Providing Overhead Communications

- Support data and voice comms for friendly forces

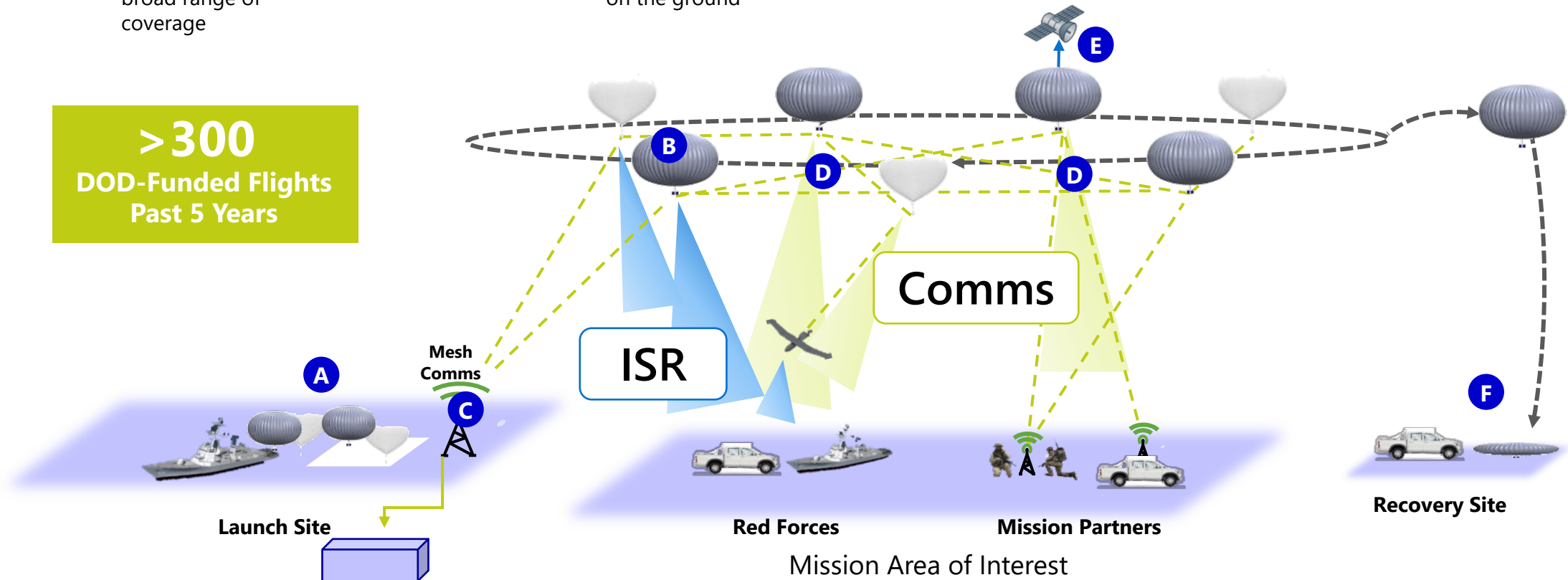
E Data Relay to Satellites

- Extract Key Data when far from ground forces

F Recovery or Disposal

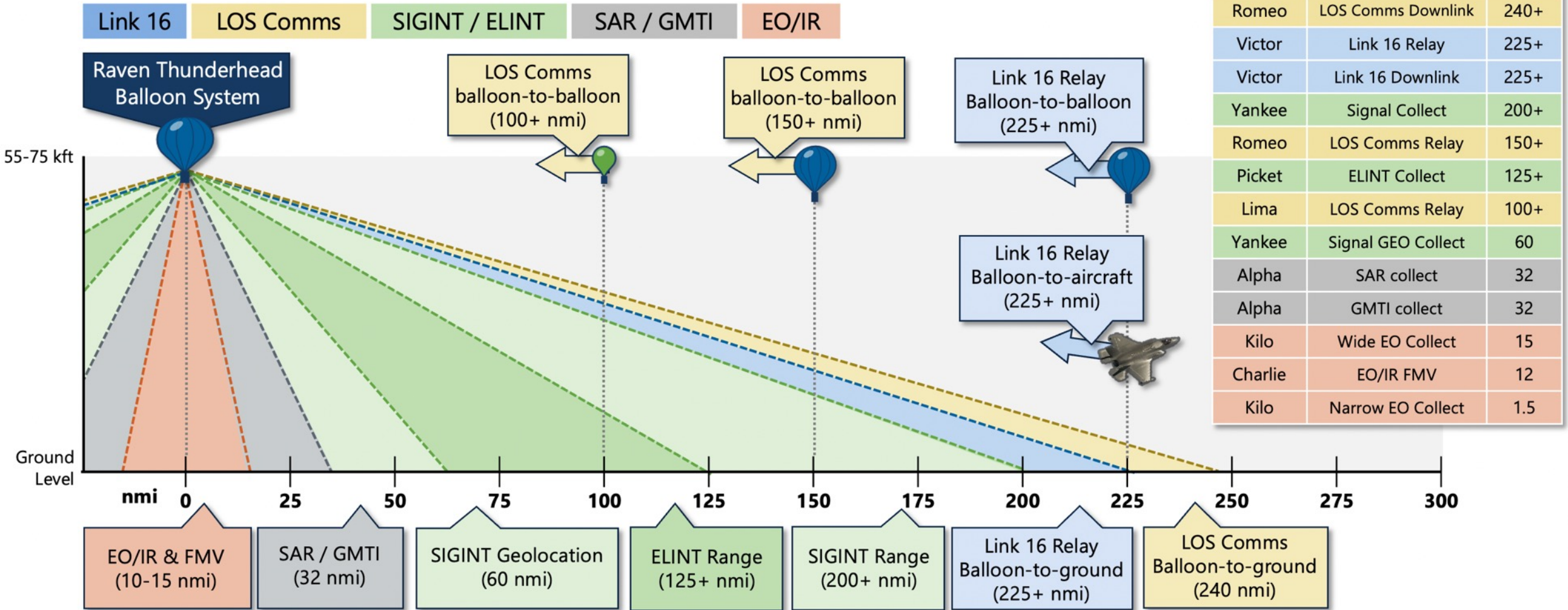
- Recover platform and sensor for reuse or disposal

> 300
DOD-Funded Flights
Past 5 Years



HIGH ALTITUDE CAPABILITIES

TESTED PAYLOADS FOR DEFENSE APPLICATIONS

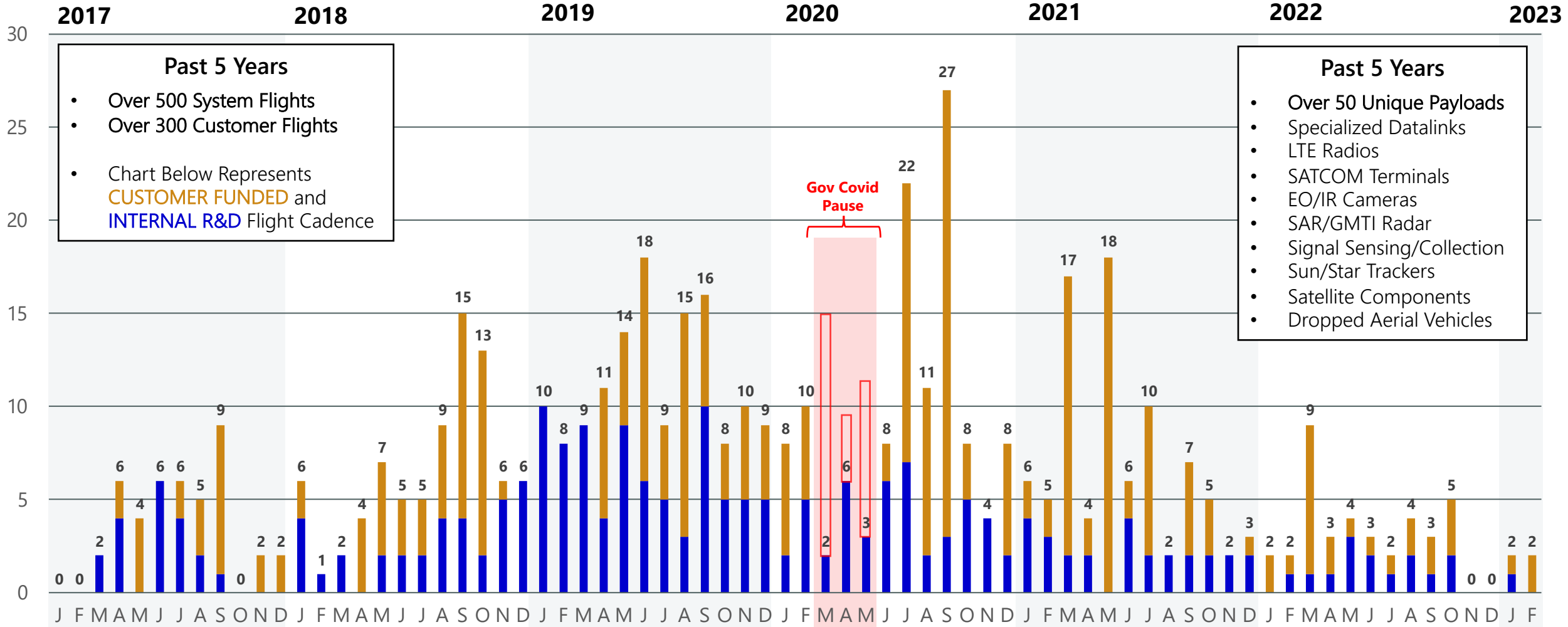


Copyright 2023 Aerostar International
May-23

AEROSTAR

AEROSTAR FULL-SYSTEM FLIGHTS

RECENT FLIGHT TEST HISTORY



THUNDERHEAD DEMONSTRATION VIDEO

Copyright 2023 Aerostar International
May-23

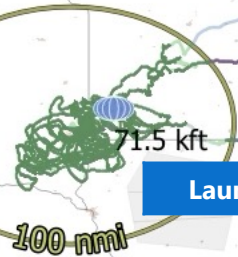


AEROSTAR

NAVIGATION EXAMPLE

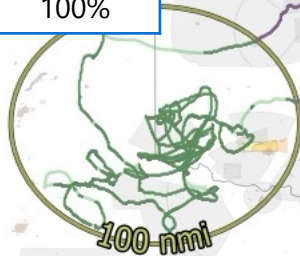
Copyright 2023 Aerostar International
May-23

Test Area #1	
Station Seeking Duration	21.0 days
Time on Station	90%



Recovery: Greencastle, IN

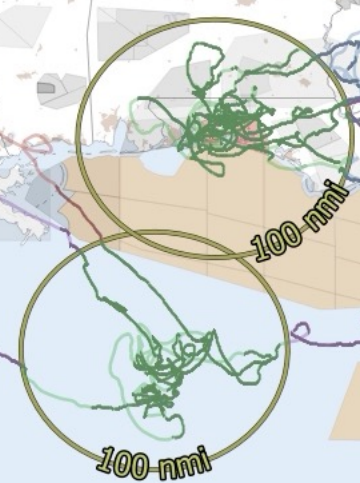
Test Area #2	
Station Seeking Duration	10.4 days
Time on Station	100%



Overall Stats	
Flight Length (To Date)	93.8 days
Time on Station	52.5 days
Time in Loopback	4.2 days
Time in Transit	37.1 days
Distance Travelled	18,550 nmi

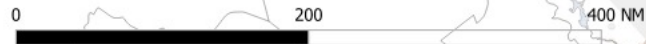
Note: Intentionally deviated off station to avoid cold clouds caused by Hurricane Eta.

Test Area #4	
Station Seeking Duration	16.8 days
Time on Station	100%*



Test Area #3	
Station Seeking Duration	15.8 days
Time on Station	87%*

Note: Several exits of the Area #3 were forced by airspace constraints.



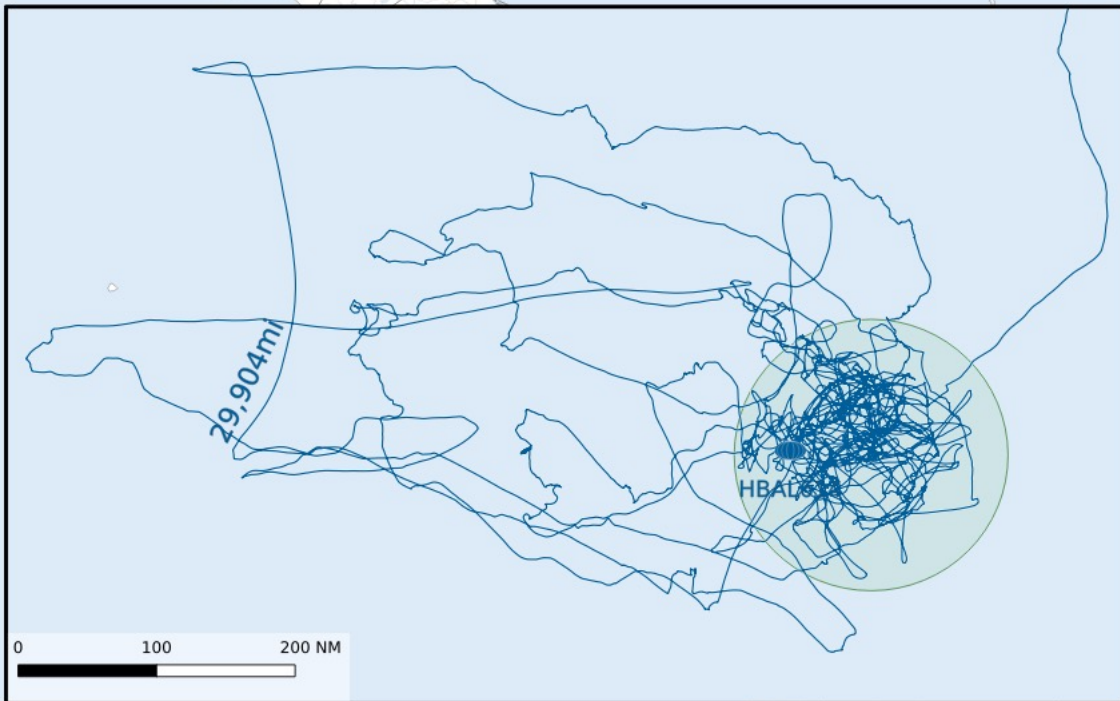
AEROSTAR

2020-09-08 01:05:14

CURRENT R&D FLIGHT

Copyright 2023 Aerostar International
May-23

Total Time Aloft: 99 Days
In Gulf of Guinea: 80 Days
Flight Path: >29,000 nmi



AEROSTAR

CONSTELLATION OPERATIONS

GROUP OF BALLOONS TO ACHIEVE DESIRED EFFECT

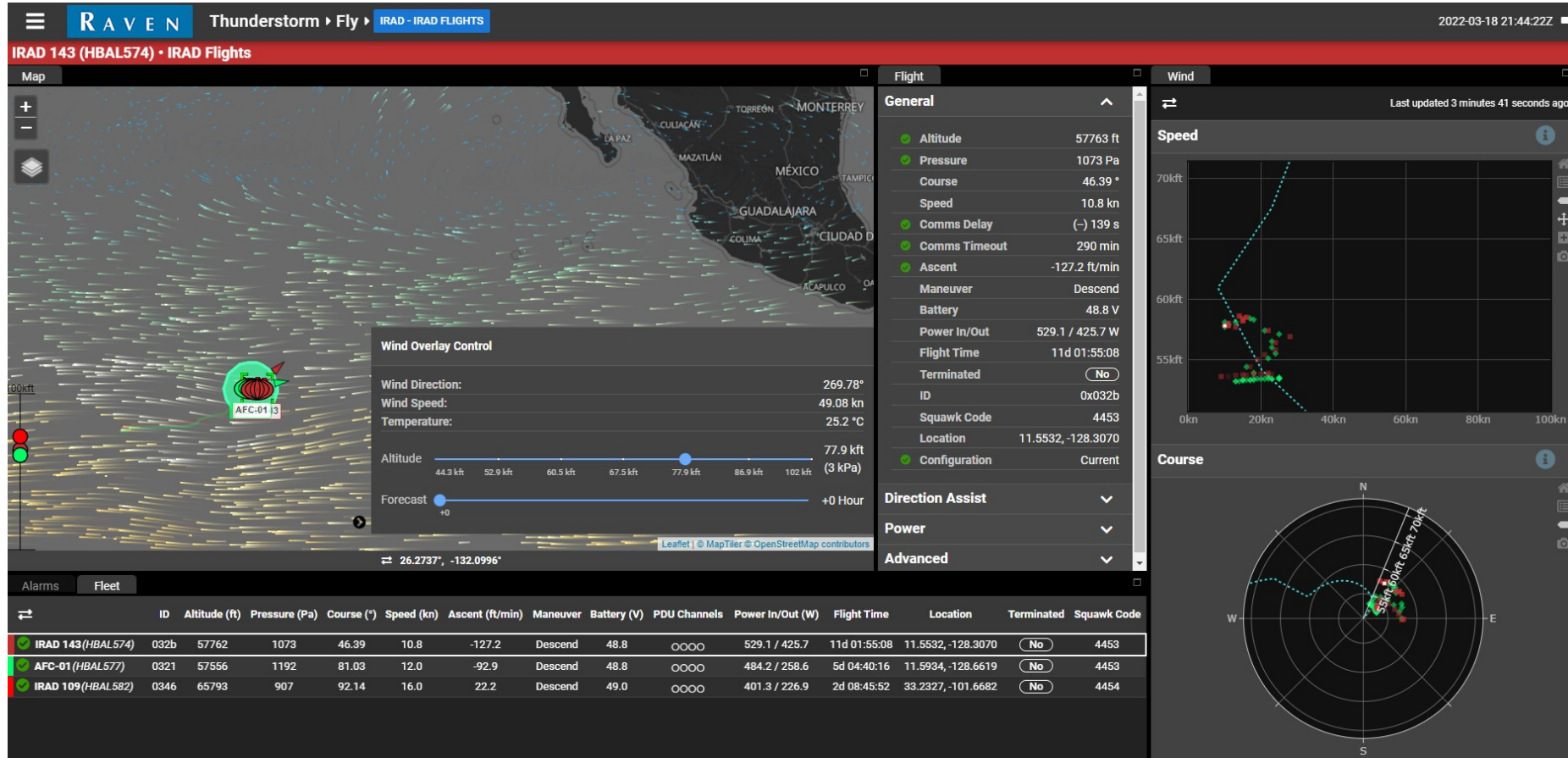
- Diversity in wind direction is not always guaranteed
- Constellation of balloons provides ability to improve coverage
 - Pre-position systems based on when wind shifts are forecasted
- Multiple systems gather more data to feed into the machine learning generated wind model
- Can include other stratospheric assets (not Aerostar balloons)



THUNDERSTORM

Flight View:

-Additional detail for one system



Map View:

- Wind overlay
- Airspace overlay
- Can upload any kml

Wind Overlay:

- Can move forward in time
- Can show different altitudes

Wind View:

- Speed
- Blue line is NOAA GFS
- Green/red points are from balloons

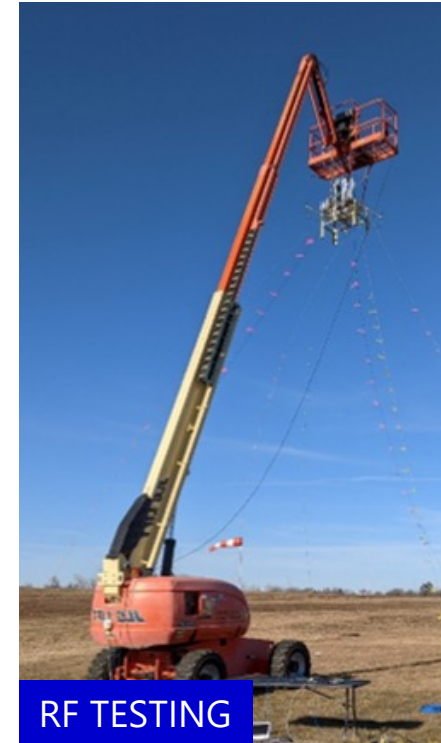
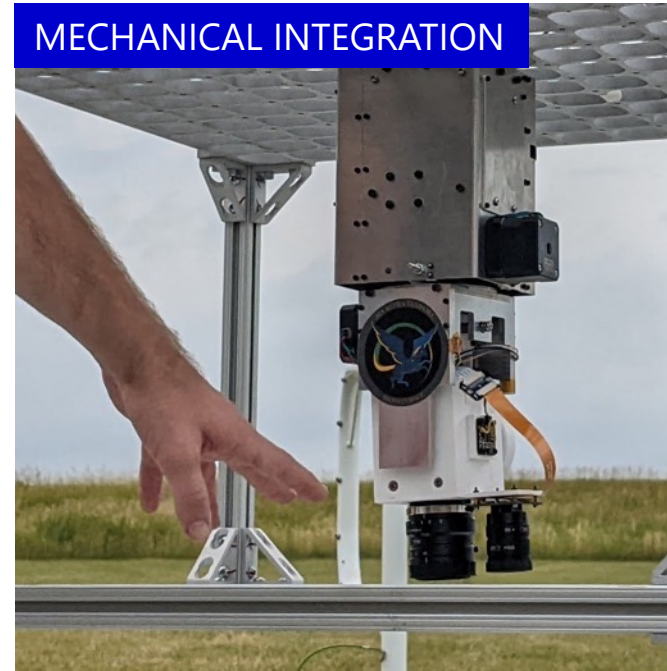
Wind View:

- Direction
- Blue line is NOAA GFS
- Green/red points are from balloons

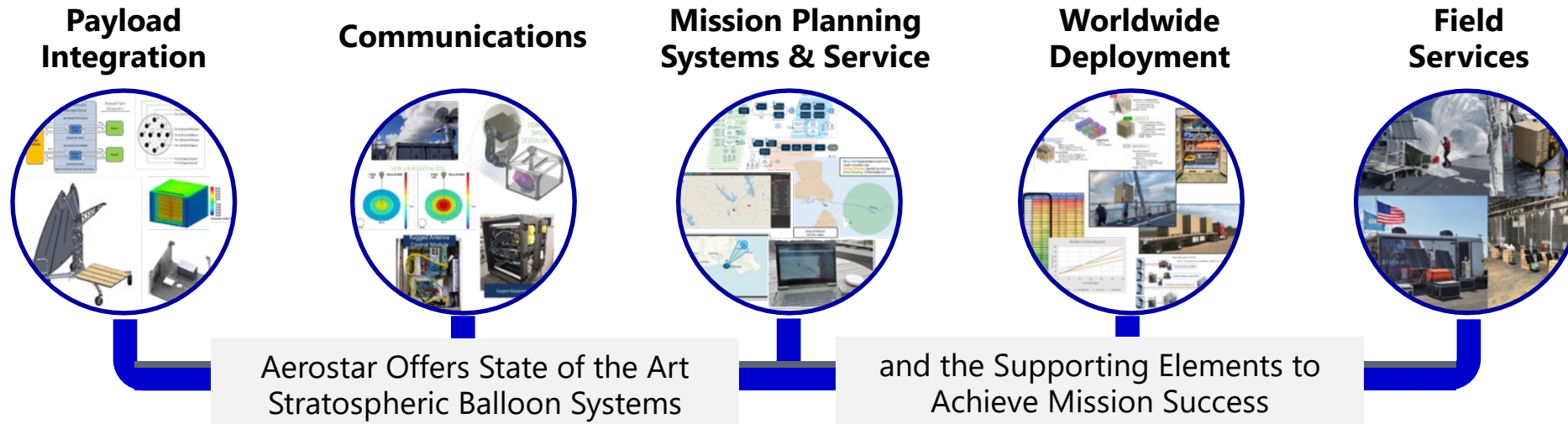
Fleet View:

-Key monitoring parameters for each system

INTEGRATION AND TEST CAPABILITIES



STRATOSPHERIC PRODUCT OFFERING



FIELD SERVICES

- Mission Planning
- Predictive Flight Modeling
- Logistics and Staging
- Launch and Recovery
- Local or Remote Piloting
- Field Training



Long-Range Ground Station



Field Deployment Kits



Thunderstorm Mission Planning Software



Mobile Command Center

SUPPORTING PRODUCT LINE

ENGINEERING SERVICES

- Payload Integration
- Sensor Engineering
- RF and Network Modeling
- Systems Engineering
- Data Processing



QUESTIONS?

AEROSTAR