

# AMATEUR RADIO BALLOONING (AND MORE!)

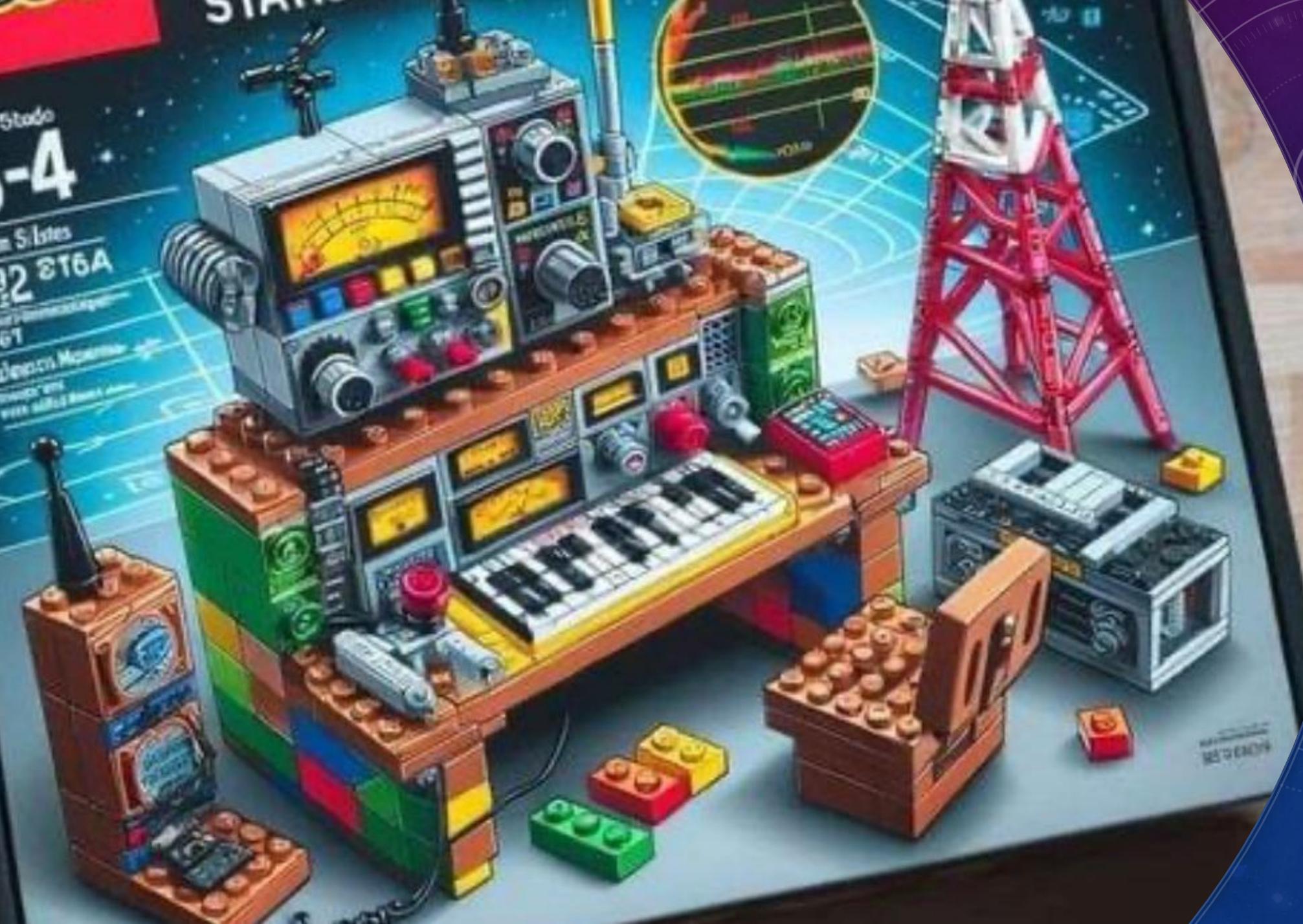
- Indian Peaks Amateur Radio Club –  
December Meeting
- December 2, 2025
- Jim Langsted KCØRPS  
Edge of Space Sciences



Edge of Space Sciences

E  SS

Radio Studio  
**6-4**  
From Series  
**602 816A**  
Lego Technic  
761  
Technic Model



# WHAT I'M GONNA TALK ABOUT

- High-Altitude Latex Balloons
- Daily NWS Weather Balloons (Radiosondes)
- Pico Balloons
- Chinese Spy Balloons



Edge of Space Sciences  
EOSS

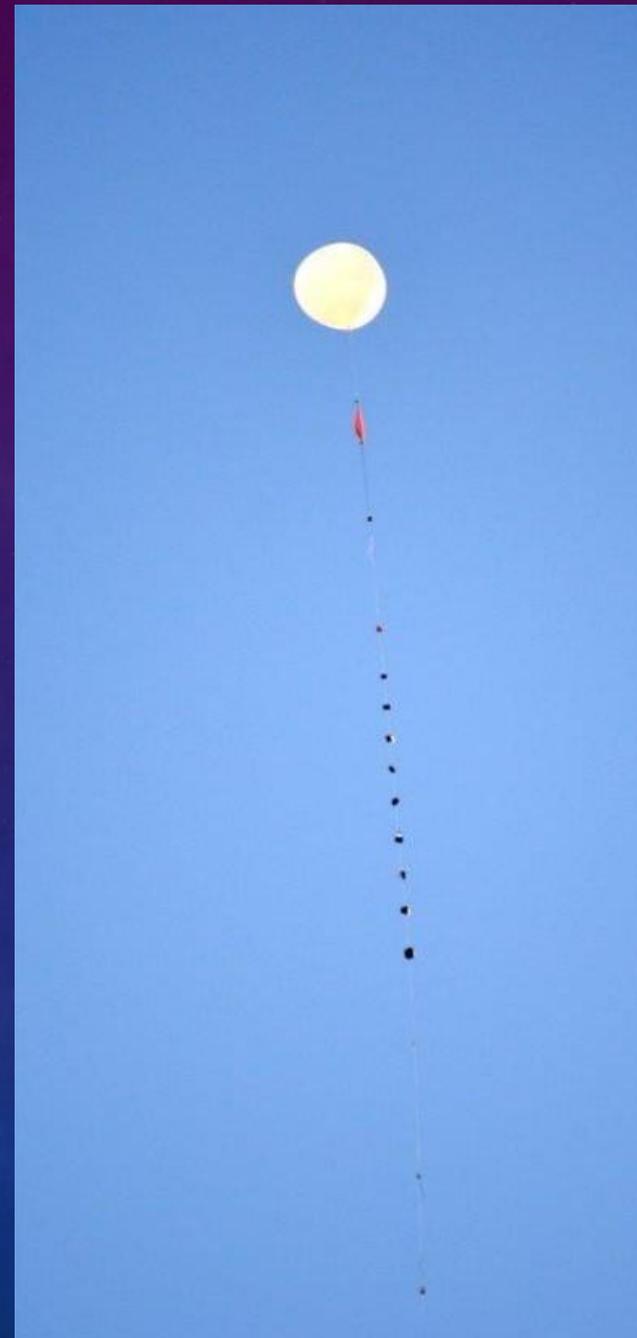
# HIGH-ALTITUDE LATEX BALLOONS

“The Poor Man's Space Program”



# QUICK OVERVIEW

- Hydrogen (or Helium)-filled latex balloon
- Controlled ascent to burst
- Parachute descent
- GPS position
- 2 meter APRS beacon(s)
- Cutdown mechanism
- Tracked & Recovered

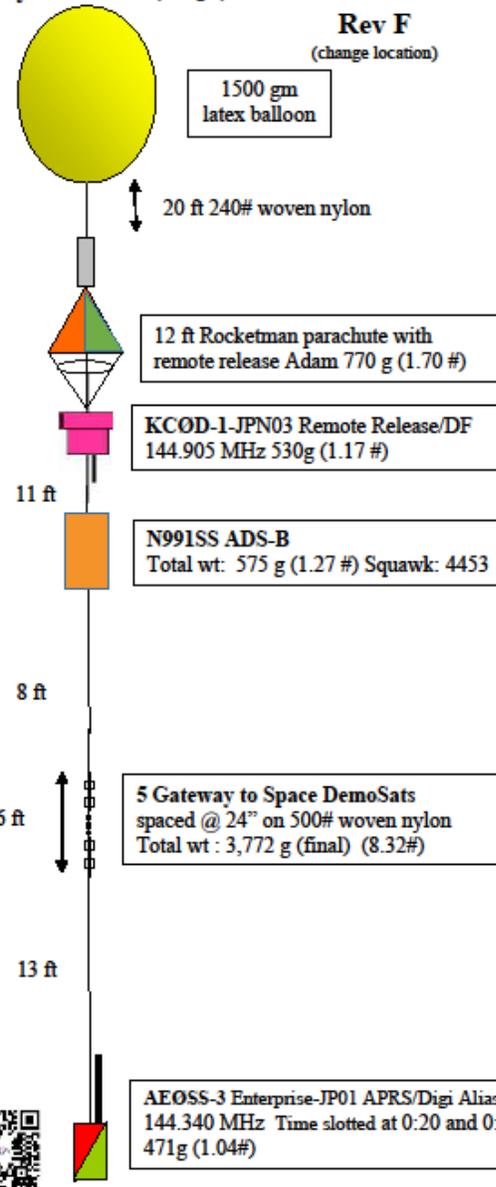


Payload Plan (string 2) EOSS-374 Lite 0800 MDT 03 May 2025

Rev F

Limon, CO

(change location)



1500 gm latex balloon

20 ft 240# woven nylon

12 ft Rocketman parachute with remote release Adam 770 g (1.70 #)

KCØD-1-JPN03 Remote Release/DF 144.905 MHz 530g (1.17 #)

11 ft

N991SS ADS-B Total wt: 575 g (1.27 #) Squawk: 4453

8 ft

6 ft

5 Gateway to Space DemoSats spaced @ 24" on 500# woven nylon Total wt : 3,772 g (final) (8.32#)

13 ft

AEØSS-3 Enterprise-JP01 APRS/Digi Alias="AEØSS" 144.340 MHz Time slotted at 0:20 and 0:50 471g (1.04#)

Item	Weight pounds	Weight kg
Student Experiments	8.32	3.772
EOSS Payloads	3.47	1.576
Parachute	1.70	0.770
Neck load	13.49	6.118
Balloon	3.31	1.500
Gross Weight	16.79	7.618
Gross Lift Factor	1.30	1.30
Neck Lift	18.53	8.402
H2 fill; scf (approx)	295	
Burst Altitude; kft km	92.3	28.1
Manual Release Altitude kft	90.3	

[www.wxqa.com/sss/balon1.cgi](http://www.wxqa.com/sss/balon1.cgi)  
KCØD-1 / EOSS-374

(lightest to heaviest)

4. Project Radiohead
3. I.J. Captain
5. Team Cooked
7. Unc & Friends
6. Freshies

[www.wxqa.com/sss/balon1.cgi](http://www.wxqa.com/sss/balon1.cgi)  
AEØSS-3 / EOSS-374



# AMATEUR BALLOON HISTORY

- German Hams - 1964
- Finland Hams - 1967
- US - Bill Brown WB8ELK, 1986
  - “Father of Amateur Radio Ballooning”
- Denver – Western Vision Network, Nov 1990
  - Became Edge of Space Sciences (EOSS)

# EQUIPMENT

- Balloon Size
  - 3000g balloon -- 9 ft → 43 ft
  - 1500g balloon -- 6 ft → 31 ft
- Tracking Beacons
- Student Payloads
- Tracking & Recovery



# PURPOSE

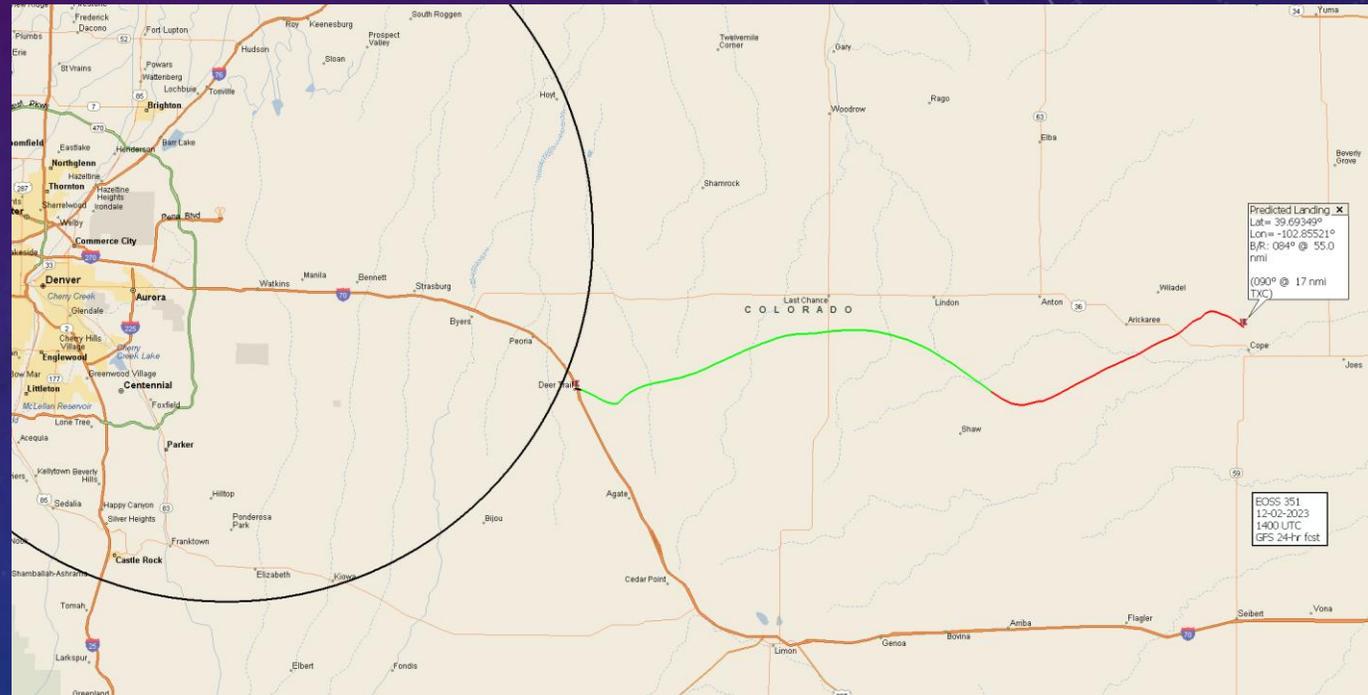
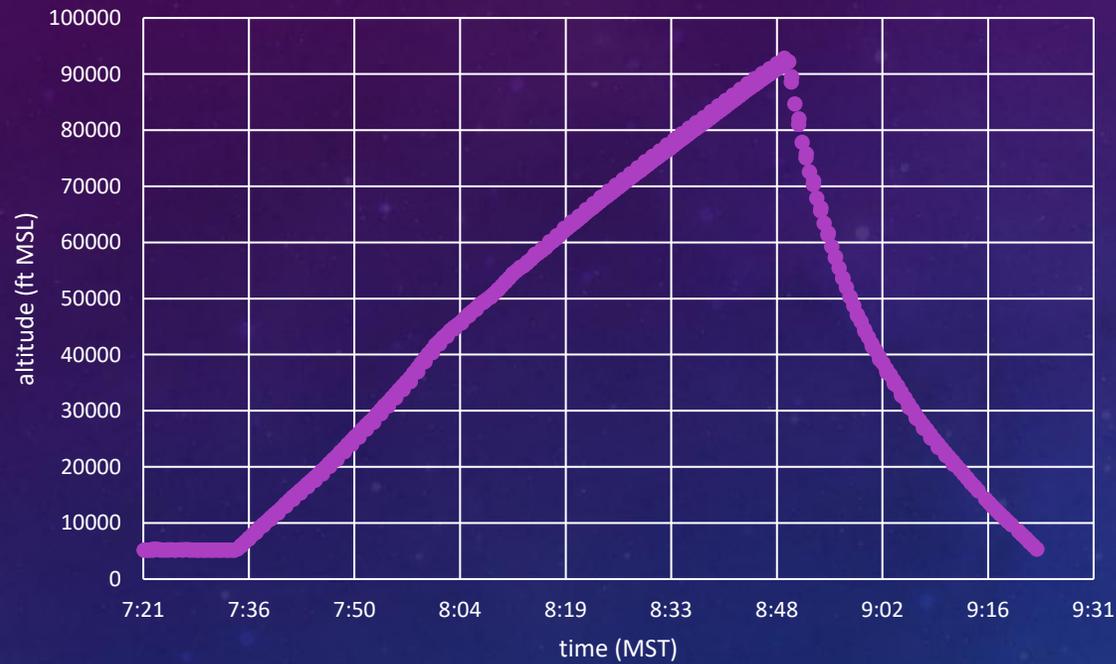


- STEM Programs
- University Aerospace
- Science Support
  - LASP
  - NOAA



# FLIGHT PROFILE

EOSS-333 KCOD-1 APRS



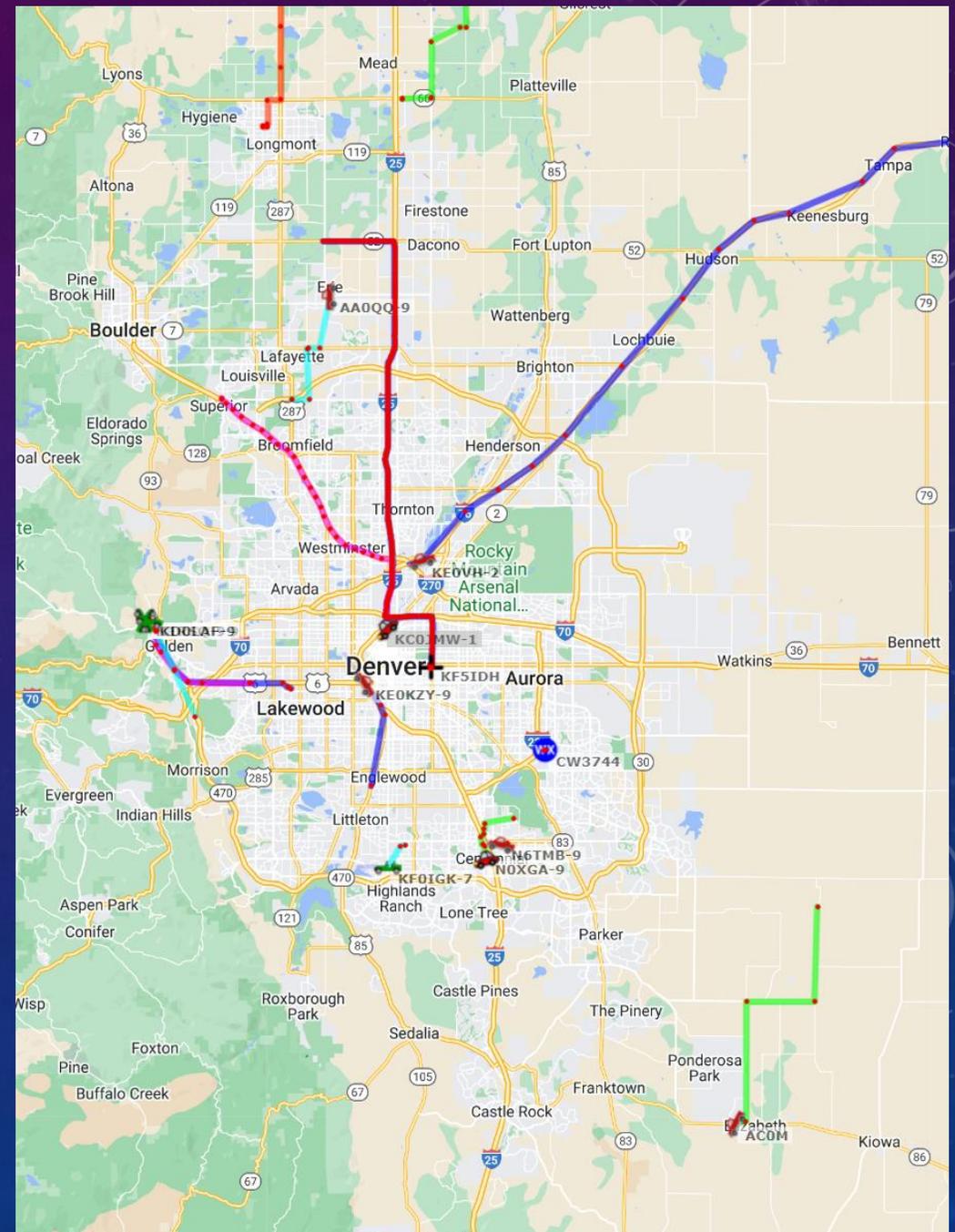
# VISUAL OBSERVATION



98,304 ft

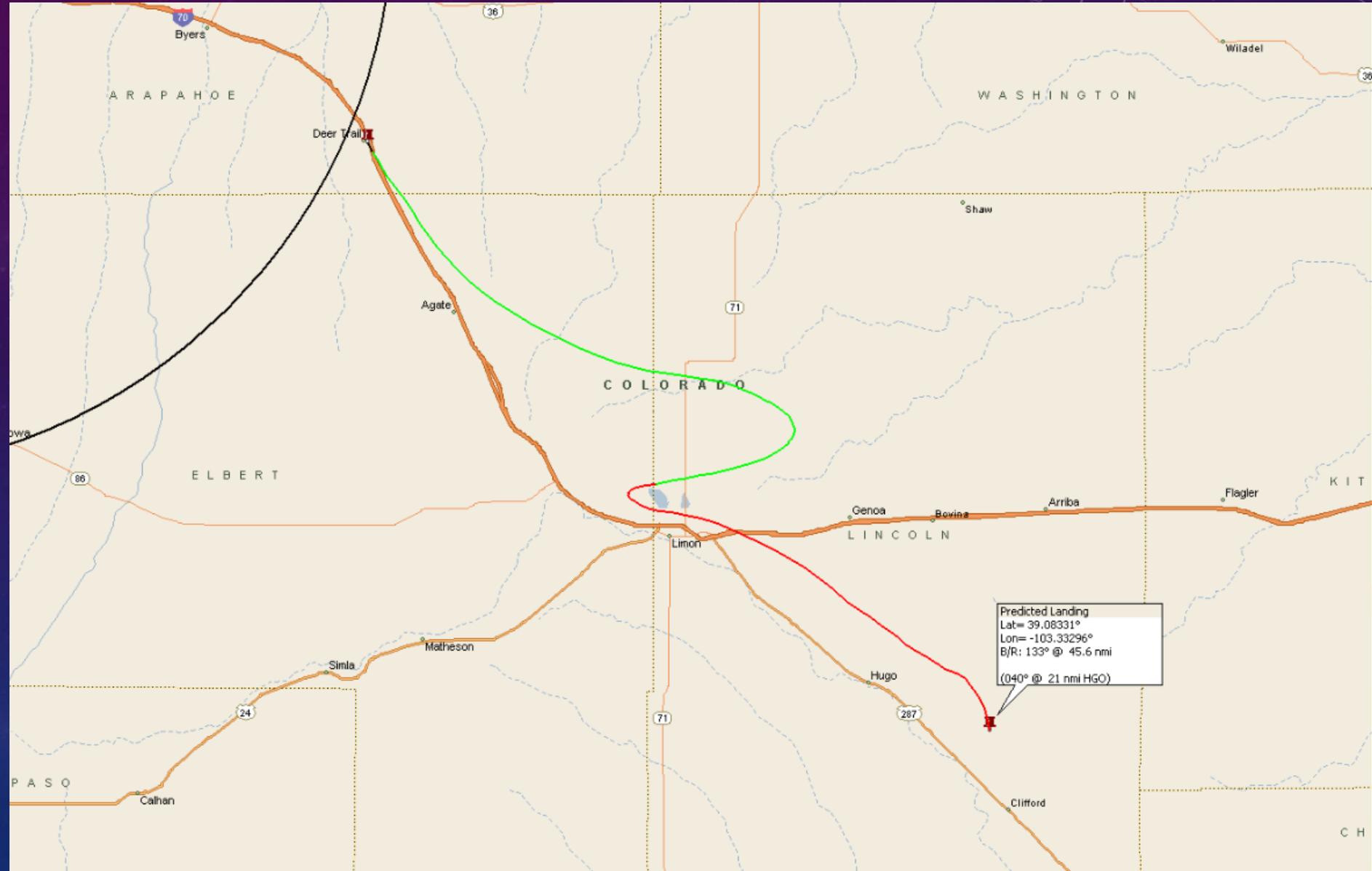
# COMMUNICATIONS PROTOCOL

- Automatic Packet Reporting System
  - GPS (+ other telemetry) beacons on 2 meter ham band
  - Developed in early '80s by US Naval Academy Sr. Research Engineer: Bob Bruninga WB4APR
  - First used to track horses in 100 mile endurance run
- APRS-IS internet server network



# TRACKING & RECOVERY

- Pre-flight Predictions
- Field Tracking
- Web Tracking



RTL-SDR



Small Computer



GPS Puck



# EXAMPLE - ASCENDING

**Flight EOSH-287**

(-) INSTRUMENT PANEL:



(+) RELATIVE POSITION:

(-) MOST RECENT POSITION PACKETS:

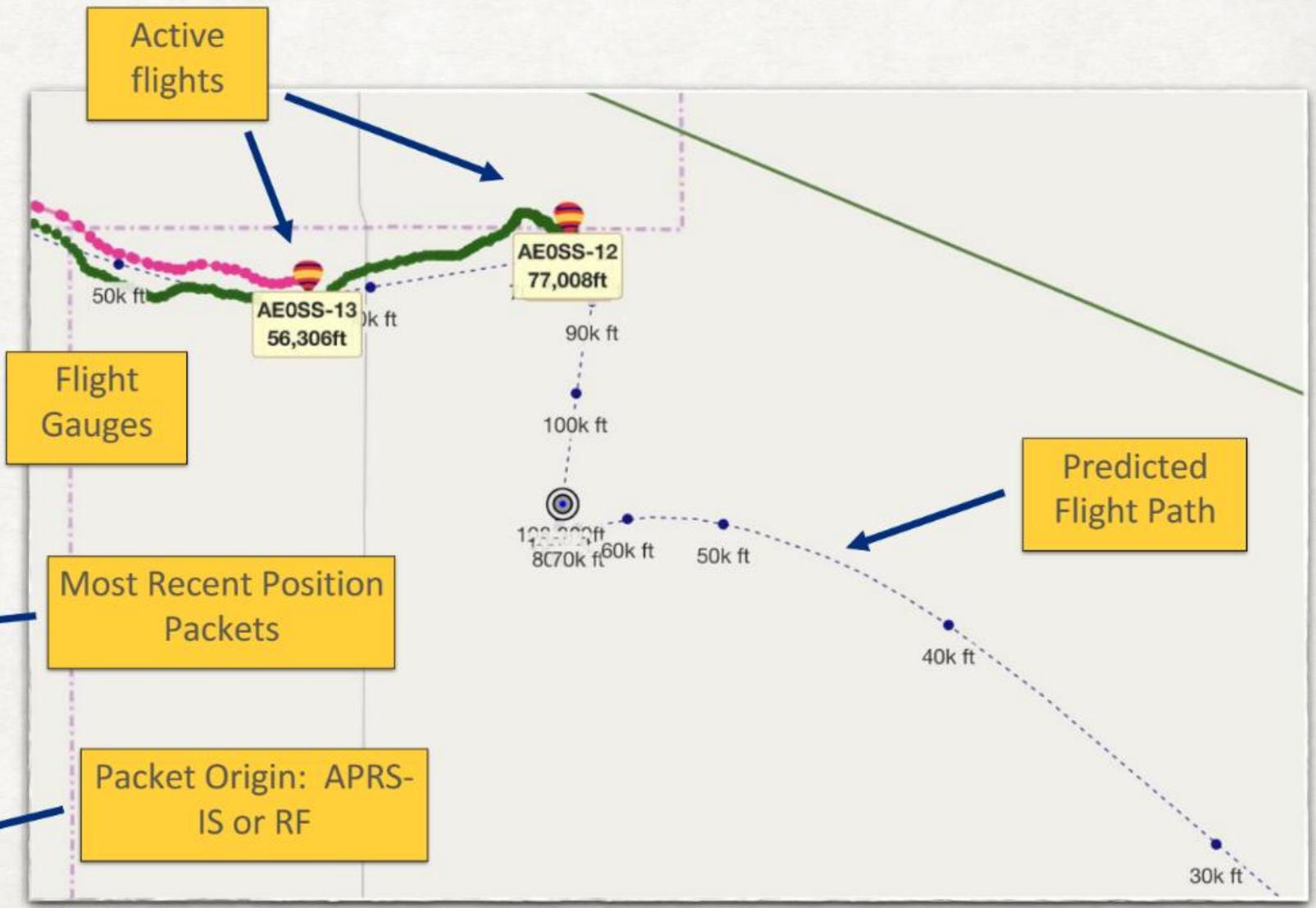
TIME	CALLSIGN	SPEED	V. RATE	ALTITUDE
07:38:01	AE0SS-12	10 mph	844 ft/min	77,008 ft
07:37:46	KC0D-2	9 mph	850 ft/min	76,854 ft
07:37:16	KC0D-2	10 mph	800 ft/min	76,429 ft
07:37:01	AE0SS-12	7 mph	800 ft/min	76,164 ft
07:36:46	KC0D-2	7 mph	822 ft/min	76,029 ft

(+) MOST RECENT STATUS PACKETS:

(-) LATEST PACKET RECEIVE PATH:

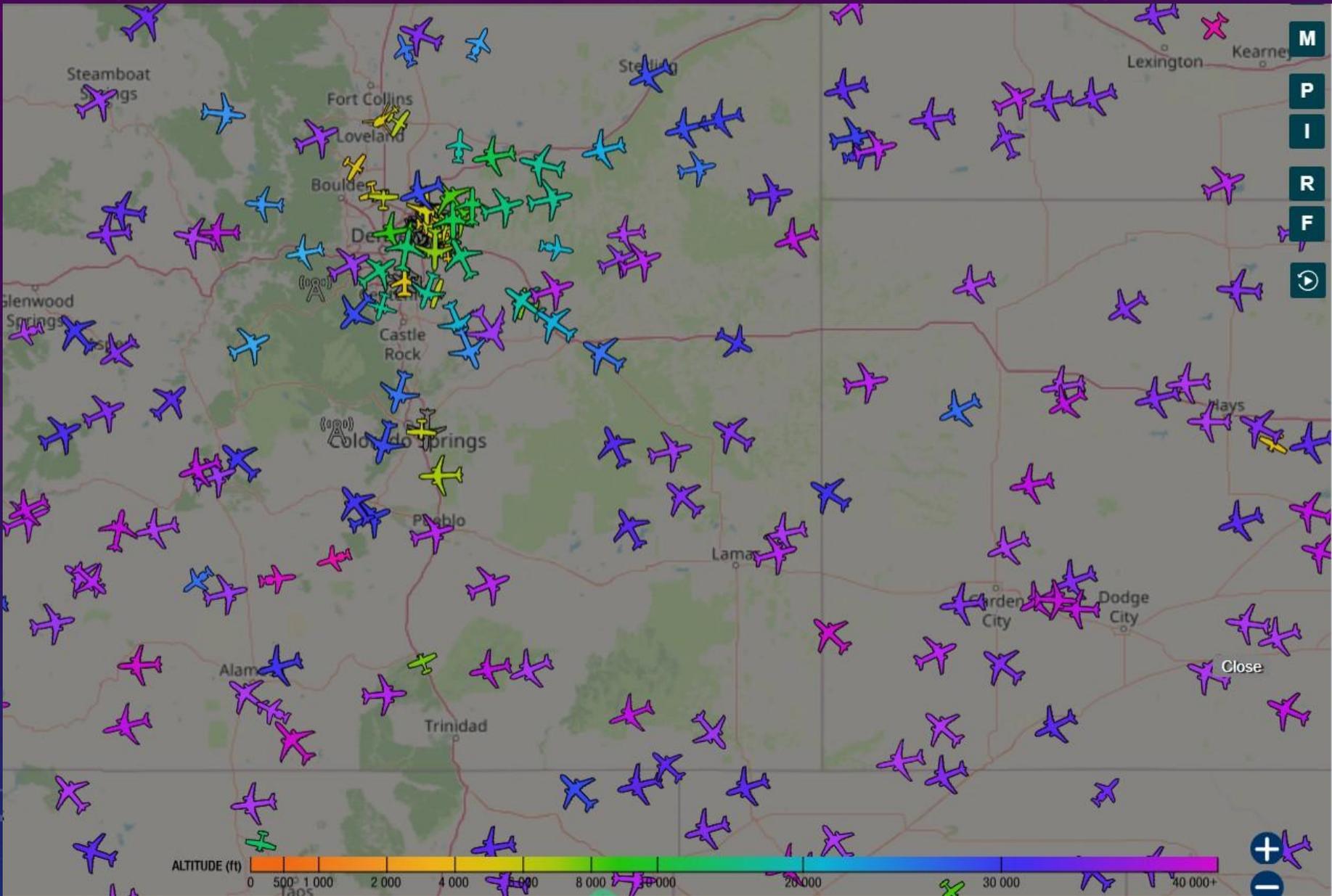
CALLSIGN	RECEIVE TIME	LAST 10 PACKETS
AE0SS-12	07:38:01	██████████
KC0D-2	07:37:49	██████████

Legend: newest----->oldest



# REGULATIONS

- Title 14 Code of Federal Regulations Part 101 -- “Moored Balloons, Kites, Amateur Rockets, and Unmanned Free Balloons “
  - Exempt Balloons, <12 lbs
  - Non-Exempt Balloons, FAA Coordination
  - No person may operate unmanned free balloon in manner creating hazard to other persons or their property
- Kelly Budd SOAR Act
  - “Continuous Aircraft Tracking and Transmission for High Altitude Balloons”
  - Part 101 Modernization Aviation Rulemaking Committee



Hex ID	Callsign	Type	Alt. (ft)	Spd. (kt)	Wind
A1FBA1	N227GJ	FA50	39000	541	
A14AD1	UAL2334	B738	37000	526	
AA35E1	AAL2098	A319	ground	0	
A291B4	N265BL	DA40	6475	87	
346419	IBE03RT	A359	37000	617	
A2FCF2	ASA326	B739	34000	405	
A30460	ASA339	B739	36000	451	
A64CE6	DAL2022	A21N	31950	392	
A6FFC3	DAL373	A21N	36025	368	
AB52A2	DAL858	B739	35000	552	
ACB2AD	SWA2106	B737	28000	392	
A5A2CC	UAL220	A320	31125▼	555	
A264A4	SWA187	B737	38000	334	
A1939A	N200SG	FA50	36000	337	
A6B833	DAL571	A21N	34000	383	
AC7FAF	SCX108	B739	35000	572	
AC2706	UAL1924	A319	33950▼	573	
A0A30E	DAL848	BCS1	37000	461	
A3DC47	DAL1425	A320	36050	455	
A0F73C	AAL1302	A321	30000	440	
A4C722	N407FC	B407	8425	103	
394A0C	AFR25G	B77W	33000	608	
A31829	AAY1597	A320	36000	419	
AA9E28	SWA2653	B737	38675▼	550	
AA7F28	UAL1326	B39M	32000	403	
A9E8CE	ASA293	B39M	34000	366	
A513EA	SWA790	B737	31875▼	553	
ABEF79	SWA2148	B738	36000	369	
AC929C	SWA1593	B737	34000	348	
AB766A	DAL1135	B739	32000	376	
A0F4A2	DAL353	B763	38000	384	
AB38A1	DAL2117	B739	26000	404	
ABC478	SWA310	B738	40000	352	
AC011D	SWA1311	B38M	35000	552	
AC5326	SWA2424	B38M	36000	357	

## OVERVIEW

# Efficient Airspace Access for Unmanned Aircraft

**\$5,500.00**

SKU: UAX-90111-01

ping200XR TSO is a powerful, ultra-lightweight Mode S ADS-B transponder with an integrated TSO-certified aviation GPS. Specially designed for unmanned aircraft, ping200XR enables seamless entry into controlled airspace and ensures global regulatory compliance. Its advanced technology guarantees visibility to Secondary Surveillance Radar (SSR), Traffic Collision Avoidance Systems (TCAS), and ADS-B IN receivers worldwide.

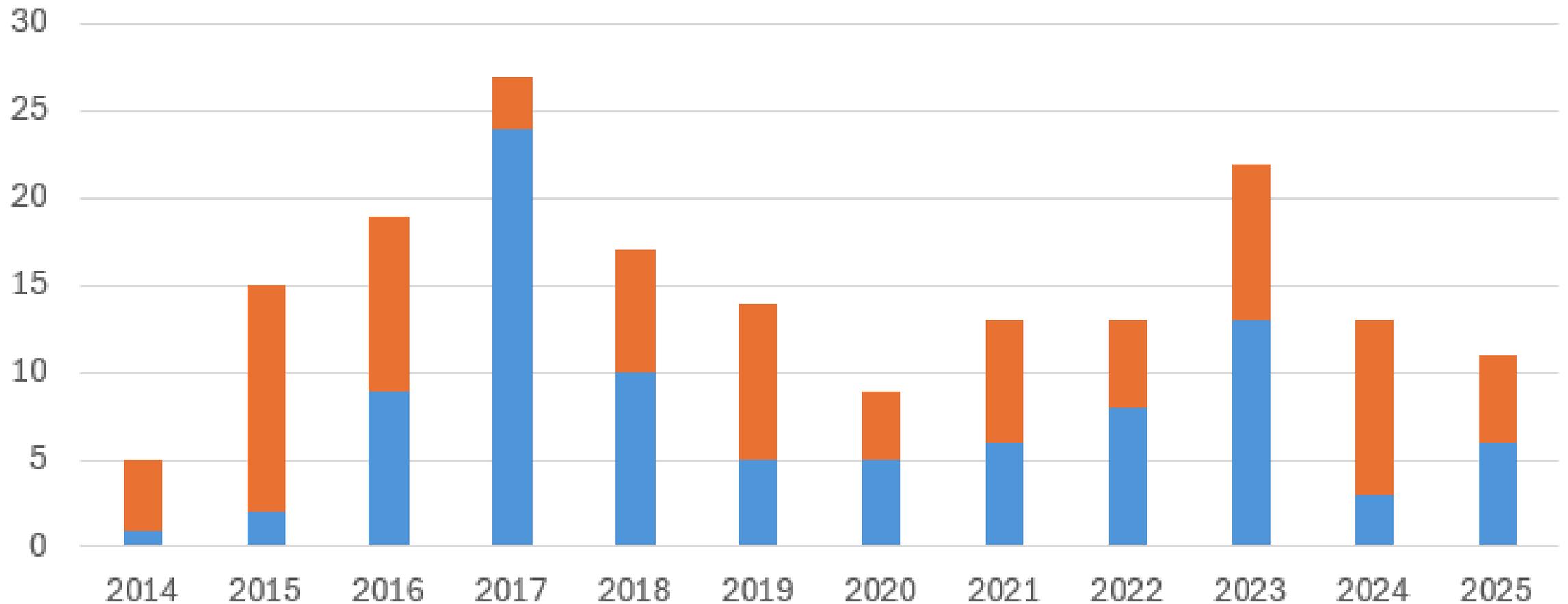
[BUY PING200XR TSO NOW](#)

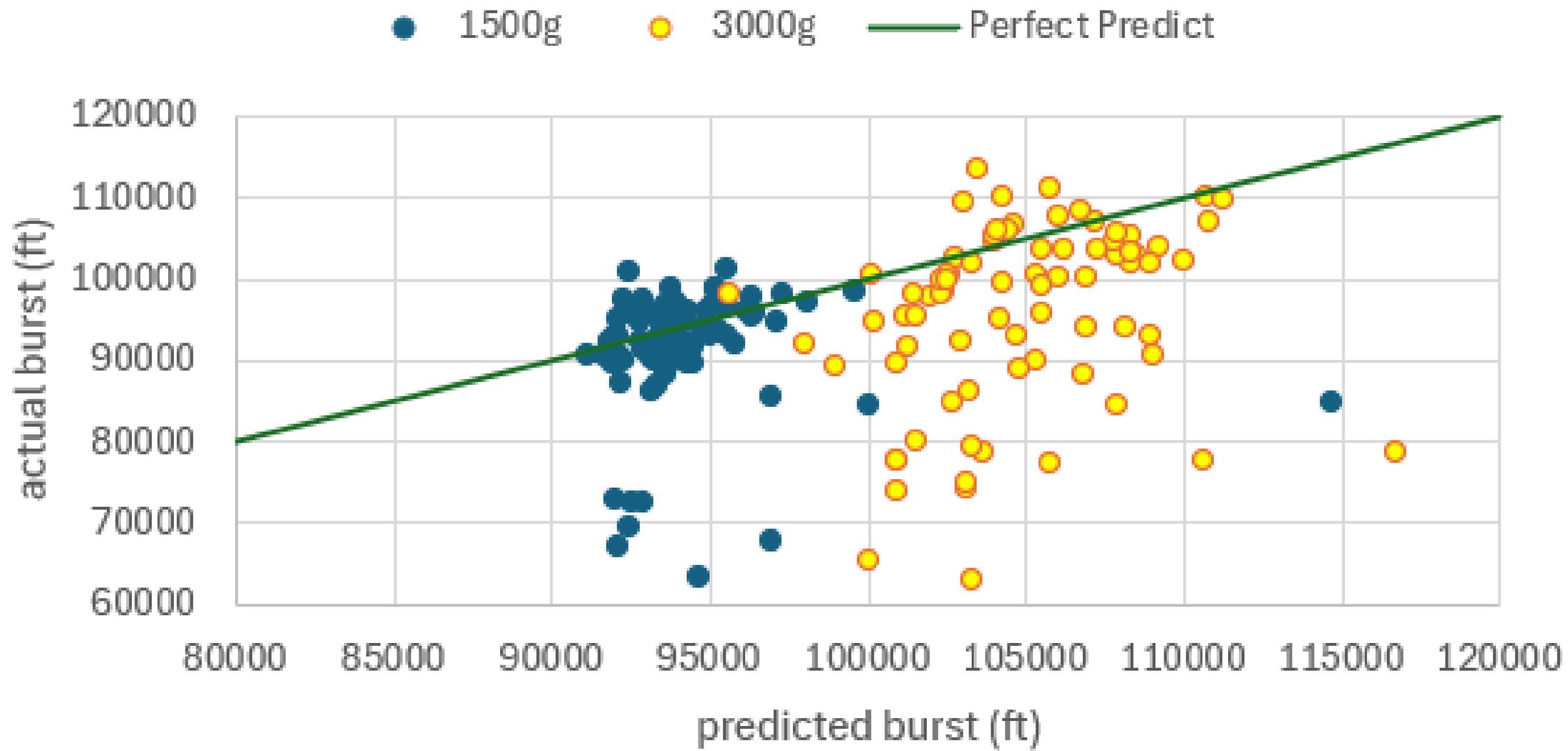


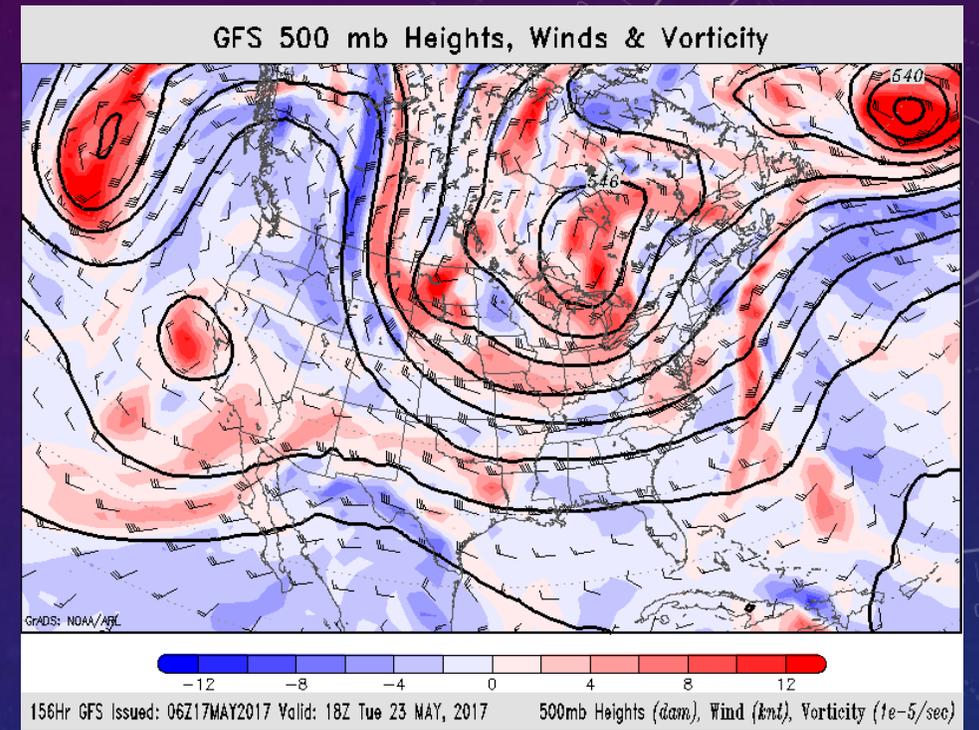


# Balloons per Year

■ Small Balloons ■ large balloons







# WEATHER BALLOONS – RADIOSONDES

A NON-AMATEUR ACTIVITY

# QUICK OVERVIEW

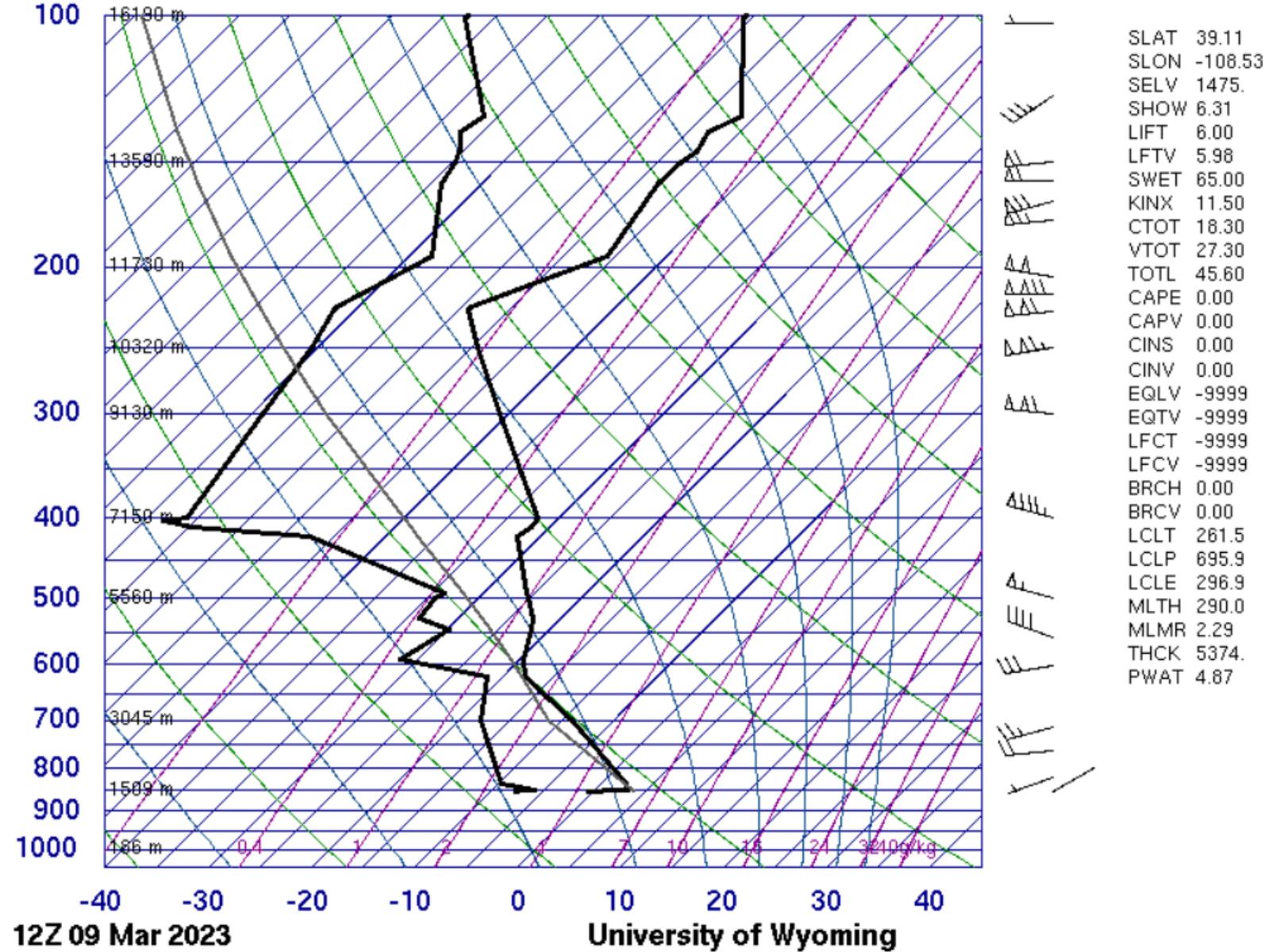
- Hydrogen or Helium-filled latex balloon
- Controlled ascent to burst
- Parachute descent
- Radiosonde beacon
- Upper air data
  - Pressure
  - Temperature
  - Relative humidity
  - GPS position
- 403 MHz communications



# PURPOSE

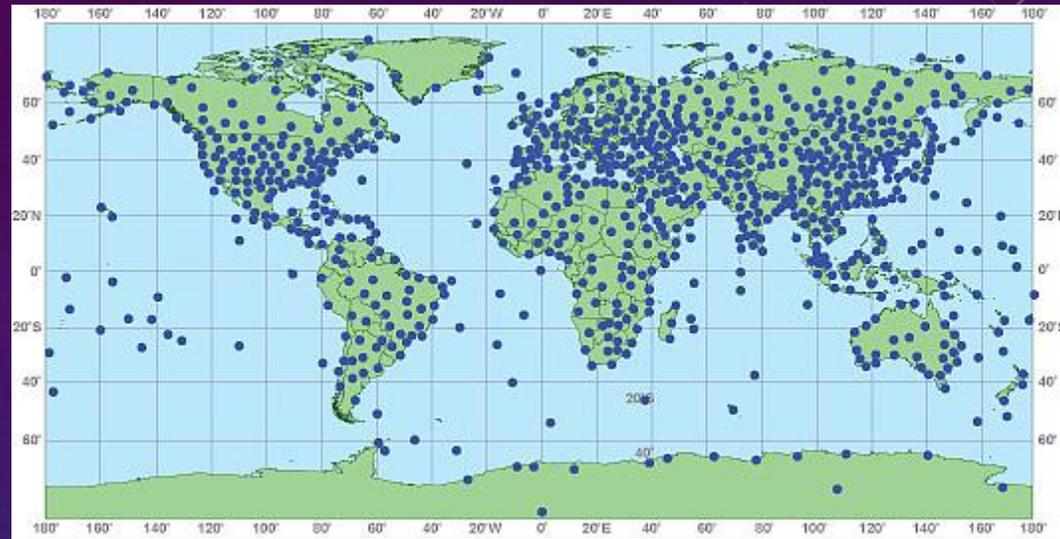
- NWS model input
- Skew-T Chart

## 72476 GJT Grand Junction



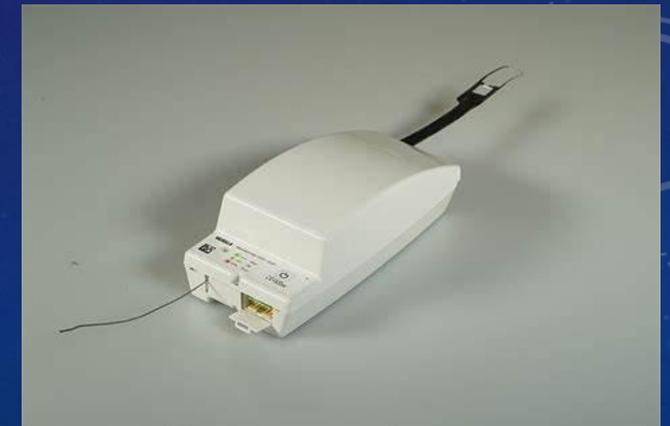
# EXTENT

- Since the late 1930's
- Over 1,300 upper-air stations worldwide
- NWS - 92 locations
- Launch at same time, 0:00 and 12:00 UTC



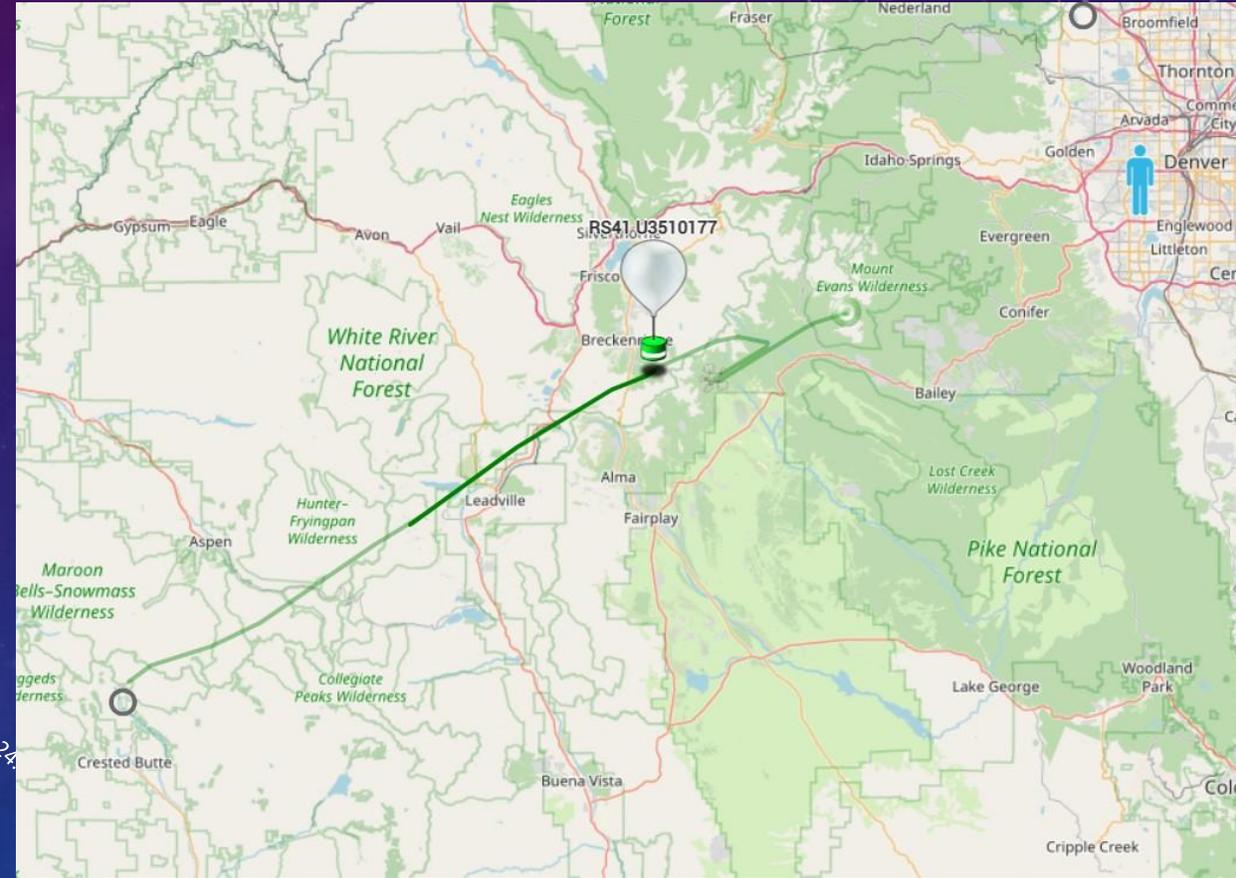
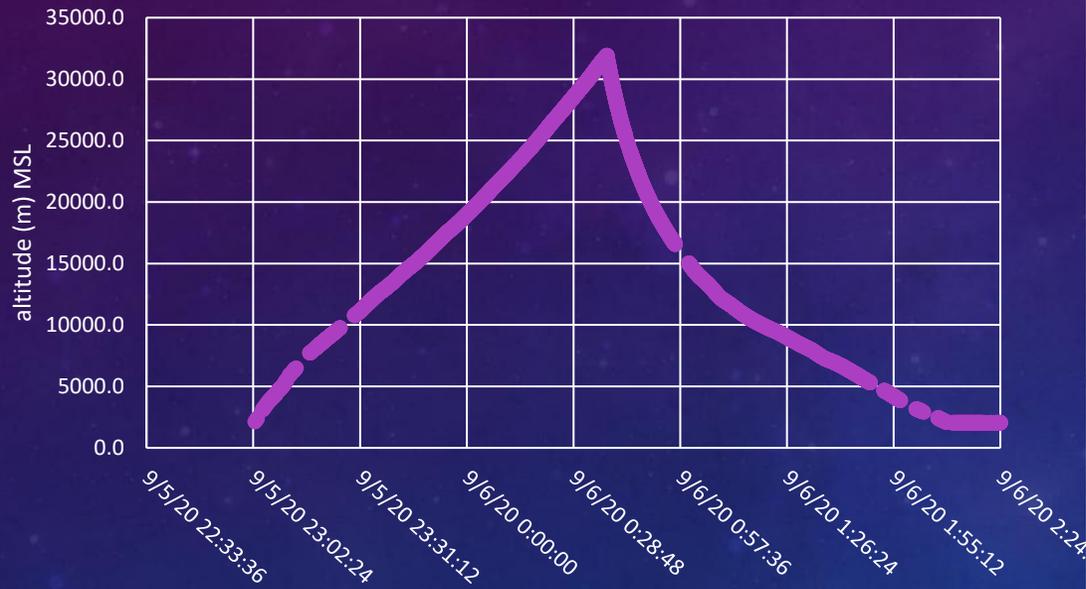
# EQUIPMENT

- Balloon Size – 600g  
5 ft → 25 ft
- Radiosonde 90g – 500g  
(3oz – 18oz)
- Parachute – 48 inch plastic



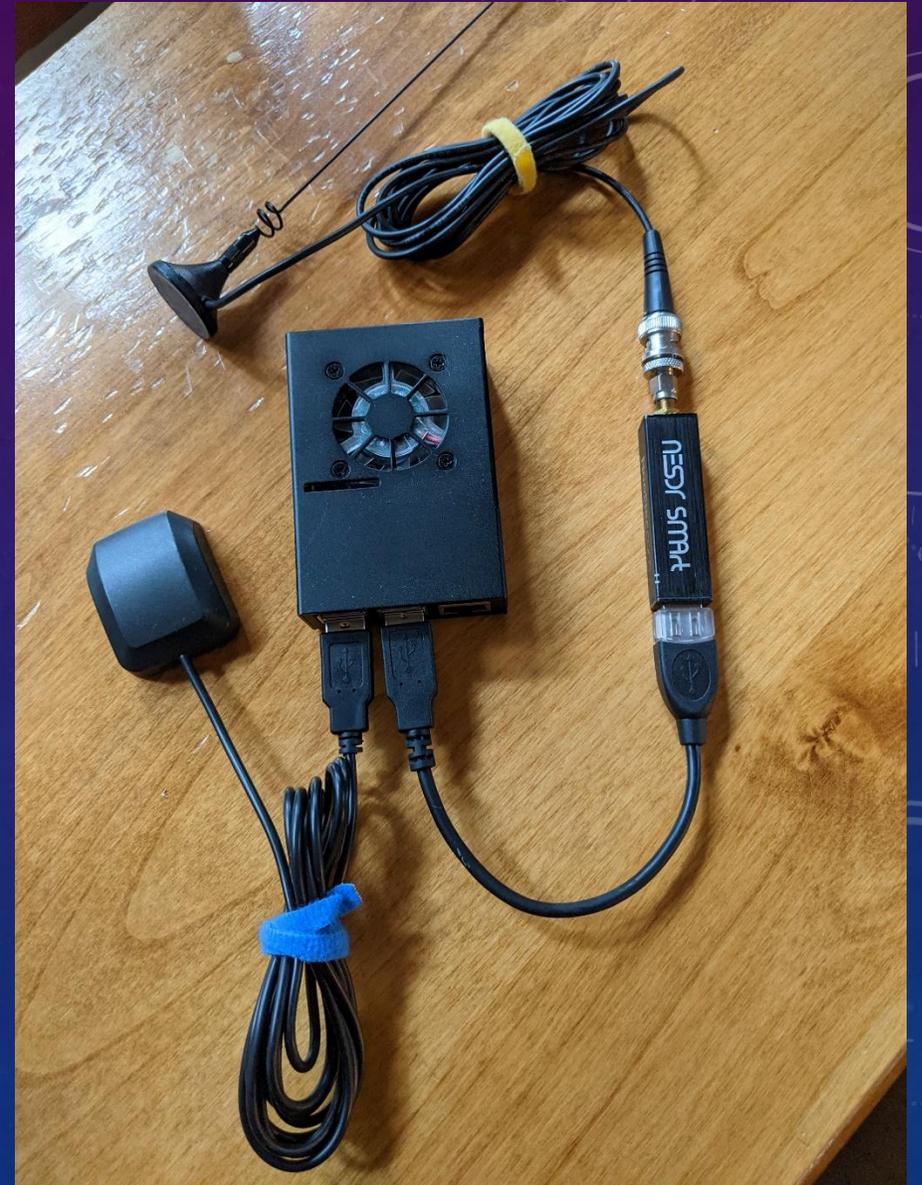
# FLIGHT PROFILE

2002-09-06 00Z Radiosonde



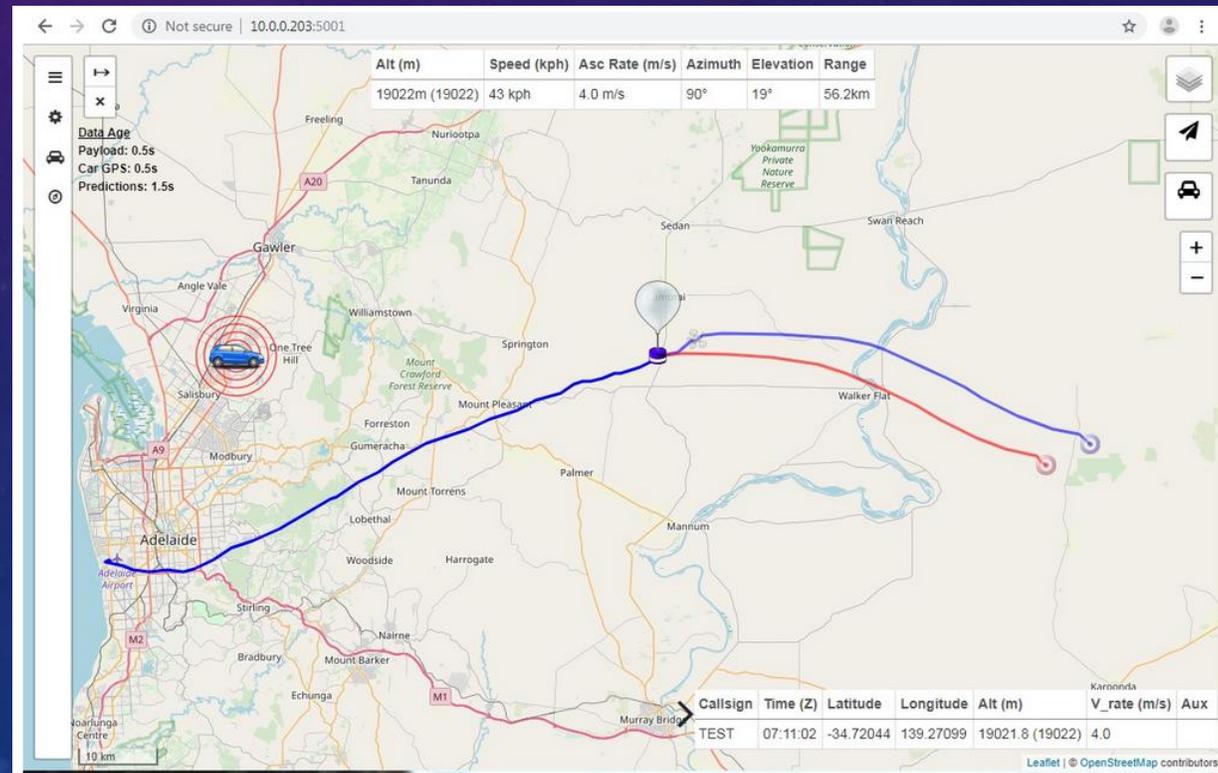
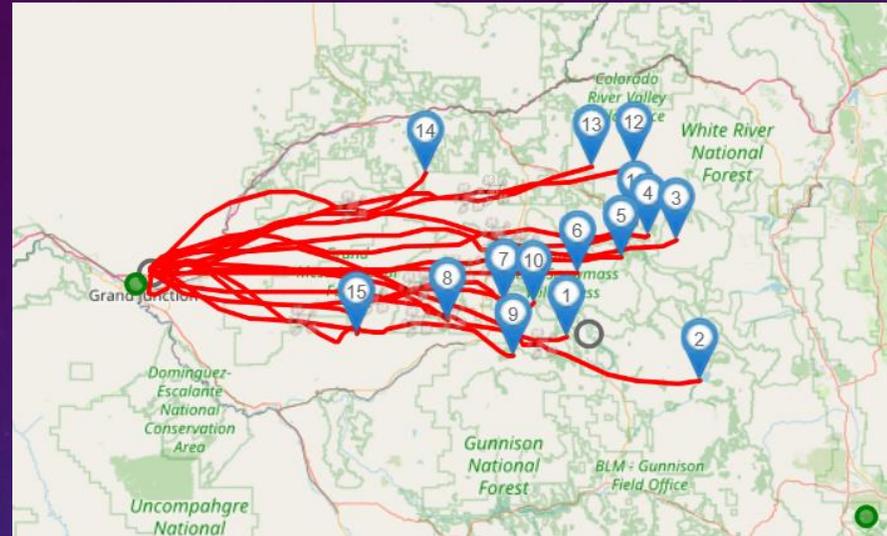
# COMMUNICATIONS PROTOCOL

- Different for each model
- Smart hobbyists develop software to receive & decode
- Tracking system for the car



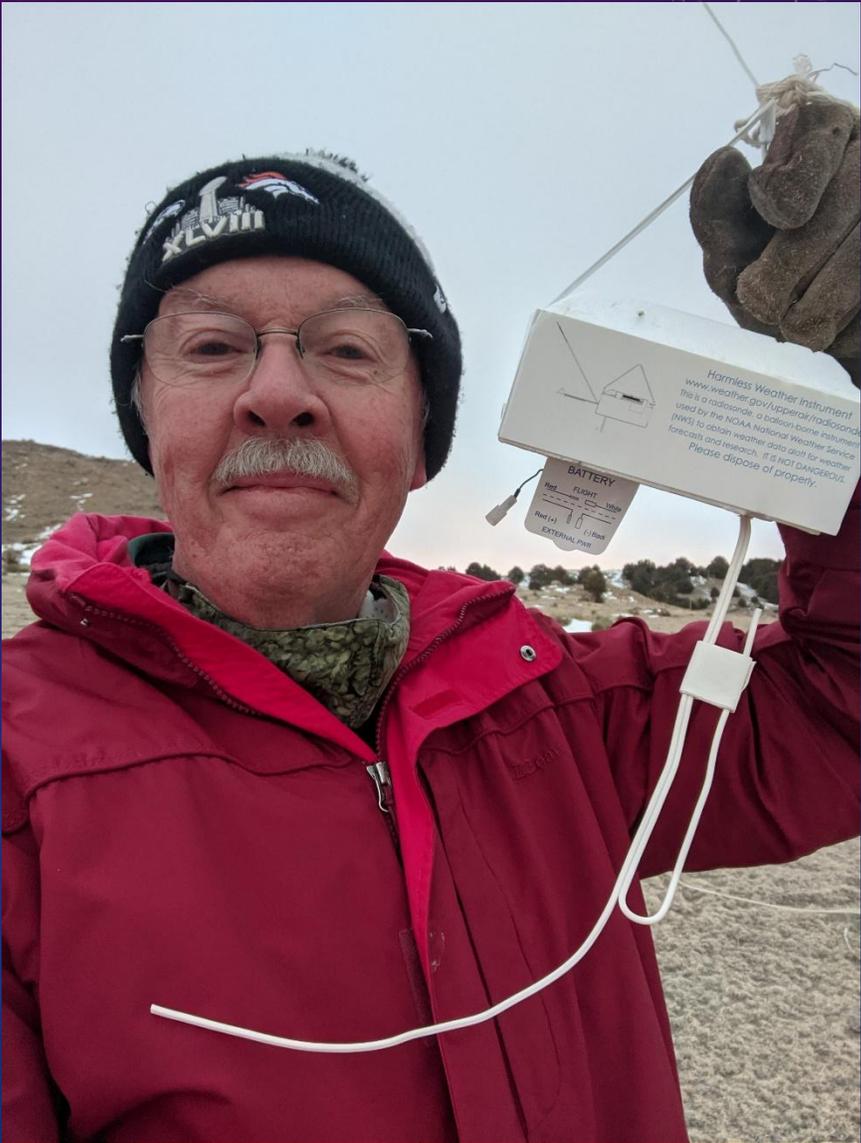
# TRACKING & RECOVERY

- NWS Tracking
  - Ground stations
  - Only interested up to about 55,000 ft
- Hobbyist Tracking
  - Predictions
  - Web tracking
  - Field tracking





# IT'S FUN TO DO!



# PICO BALLOONS

“AROUND THE WORLD IN 14 DAYS”



# OVERVIEW

- Inexpensive balloon
- “Super pressure” inflation
- Ultra-lightweight beacon
  - Solar powered
  - Includes antenna weight
- Float at ~40,000 ft
  - Climb and descend with daylight heating
- Selection of transmission protocols possible

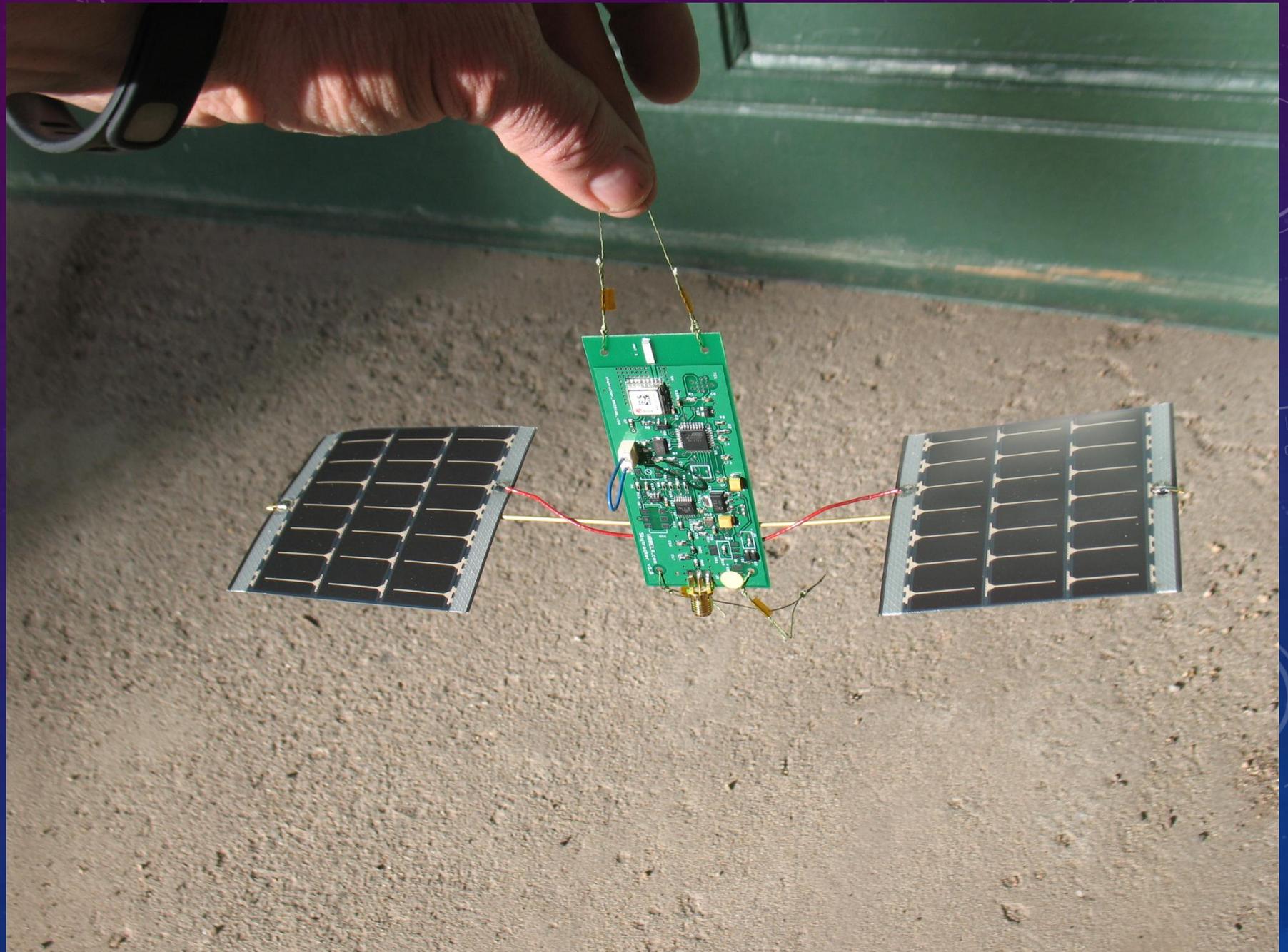


# EQUIPMENT

- Balloon size – 36" or 2'x7.5'
- Beacon – ½ ounce
- ~~Payload~~

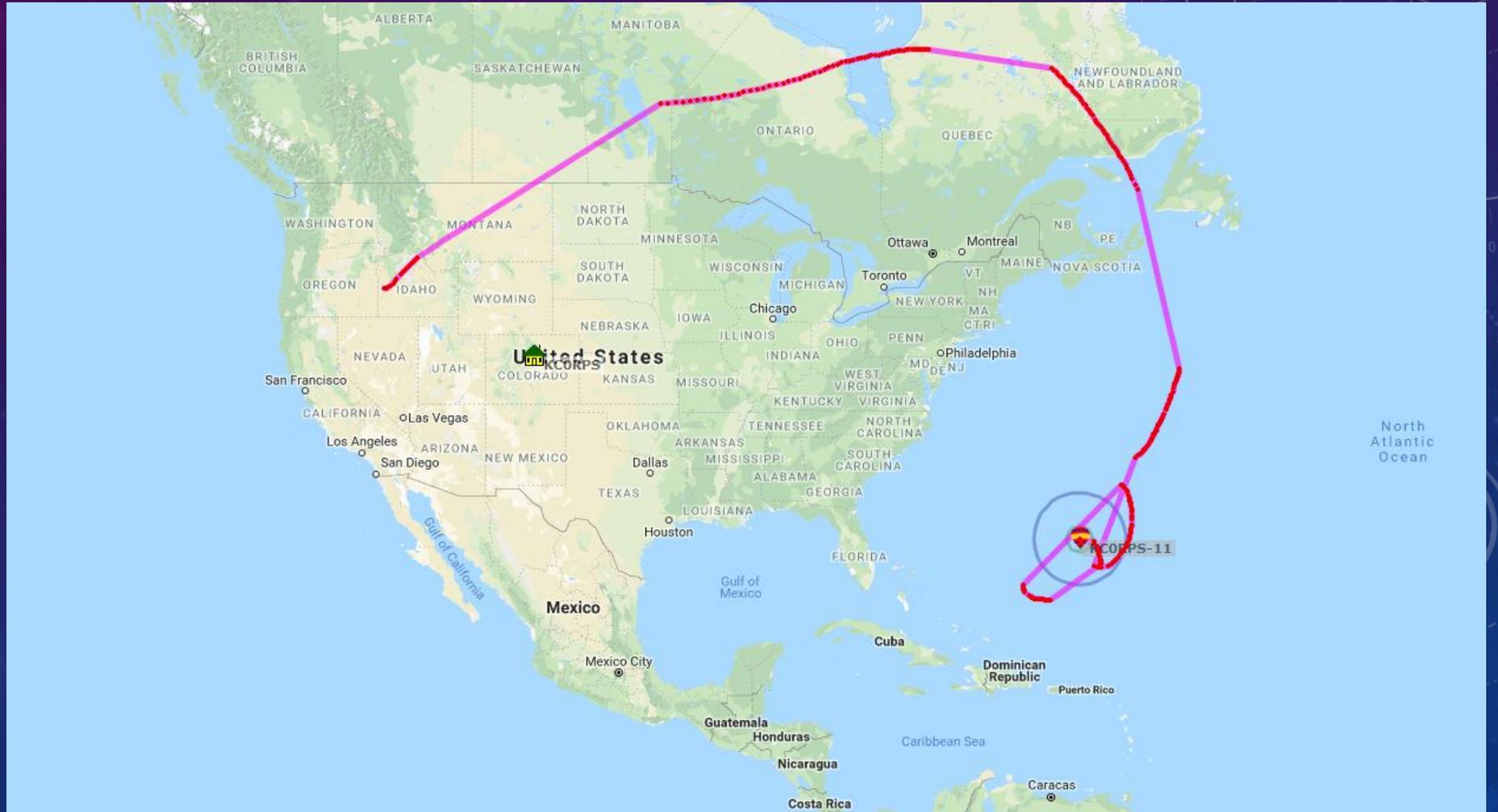


- Beacon
  - ½ ounce
- ~~Payload~~



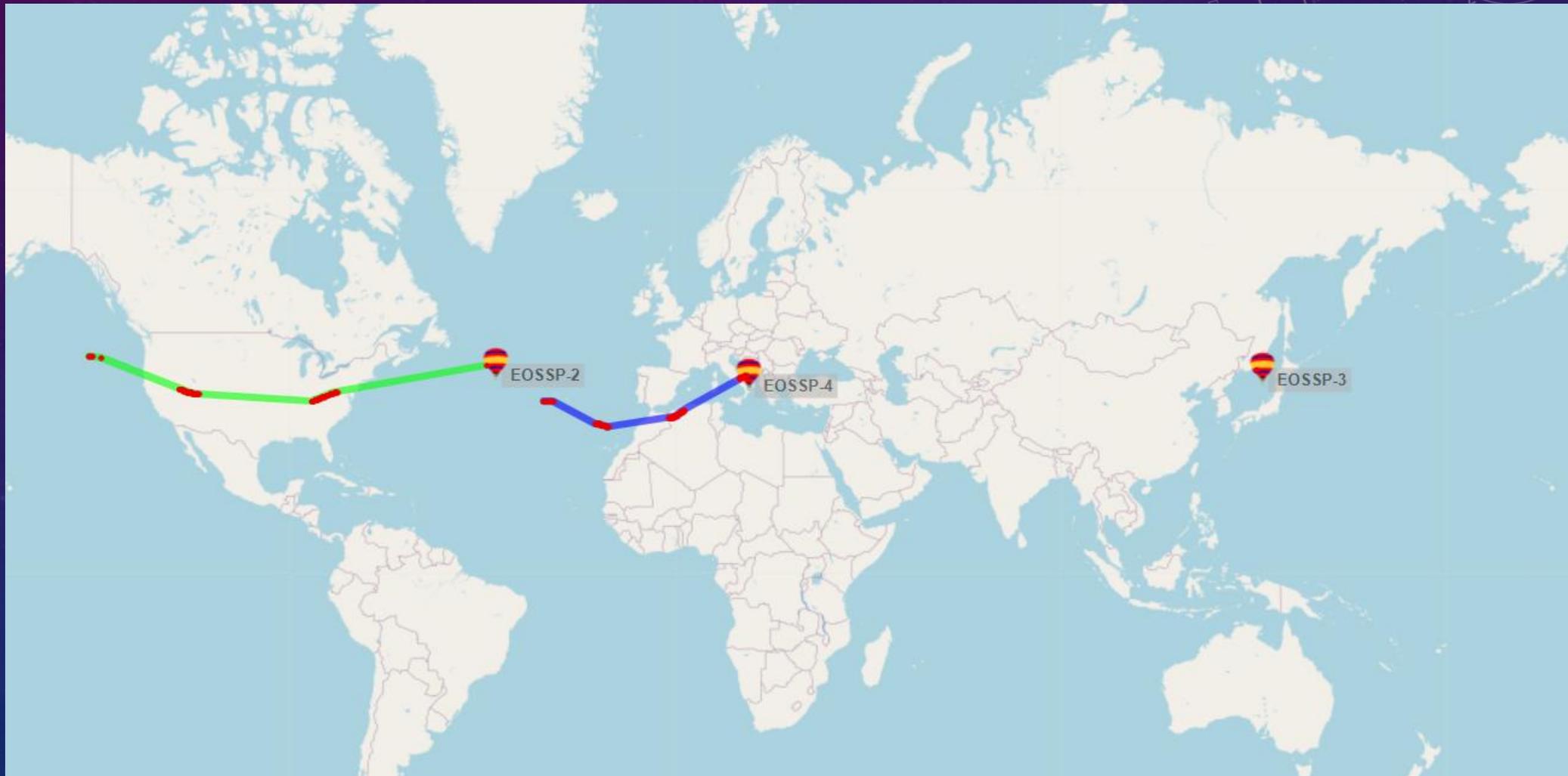
# FLIGHT PROFILE

- EOSSP-1

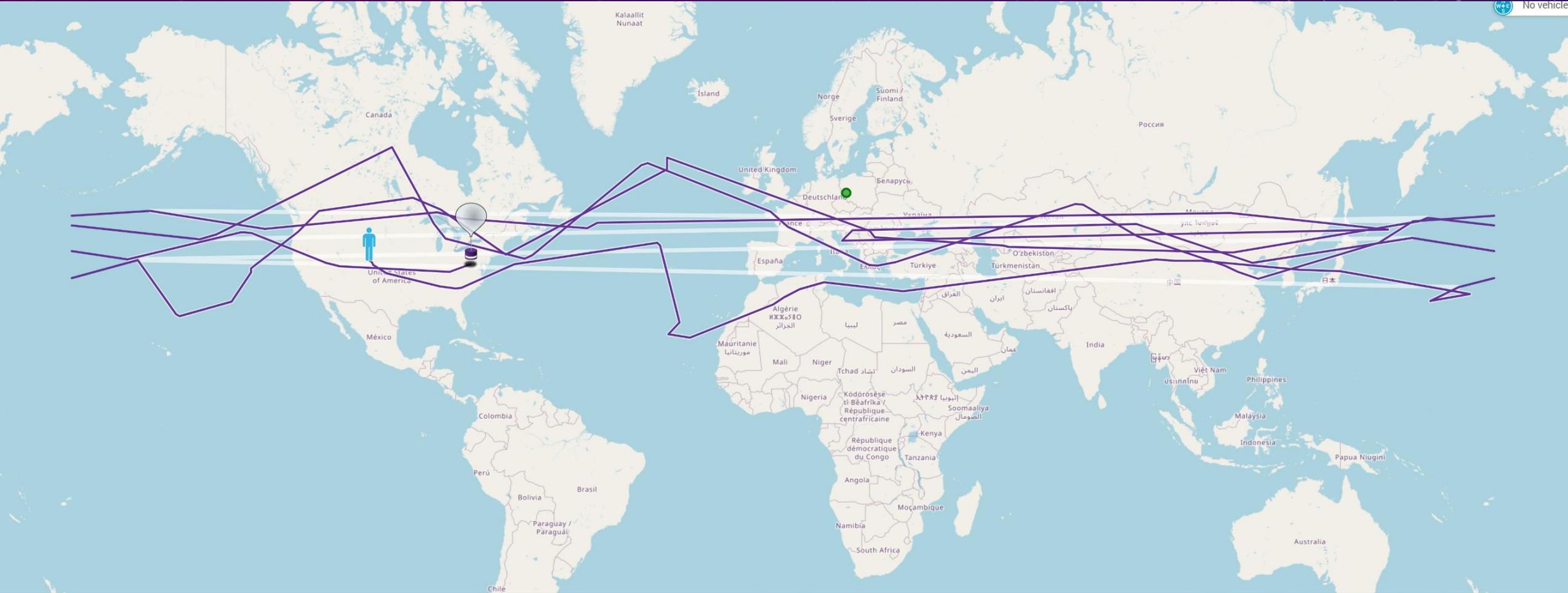


# CURRENT FLIGHTS

- EOSSP-2 (5)
- EOSSP-3 (2)
- EOSSP-4 (2)



# EOSSP-2



# CHINESE SPY BALLOON

## Suspected spy balloon's weeklong traverse over the U.S.

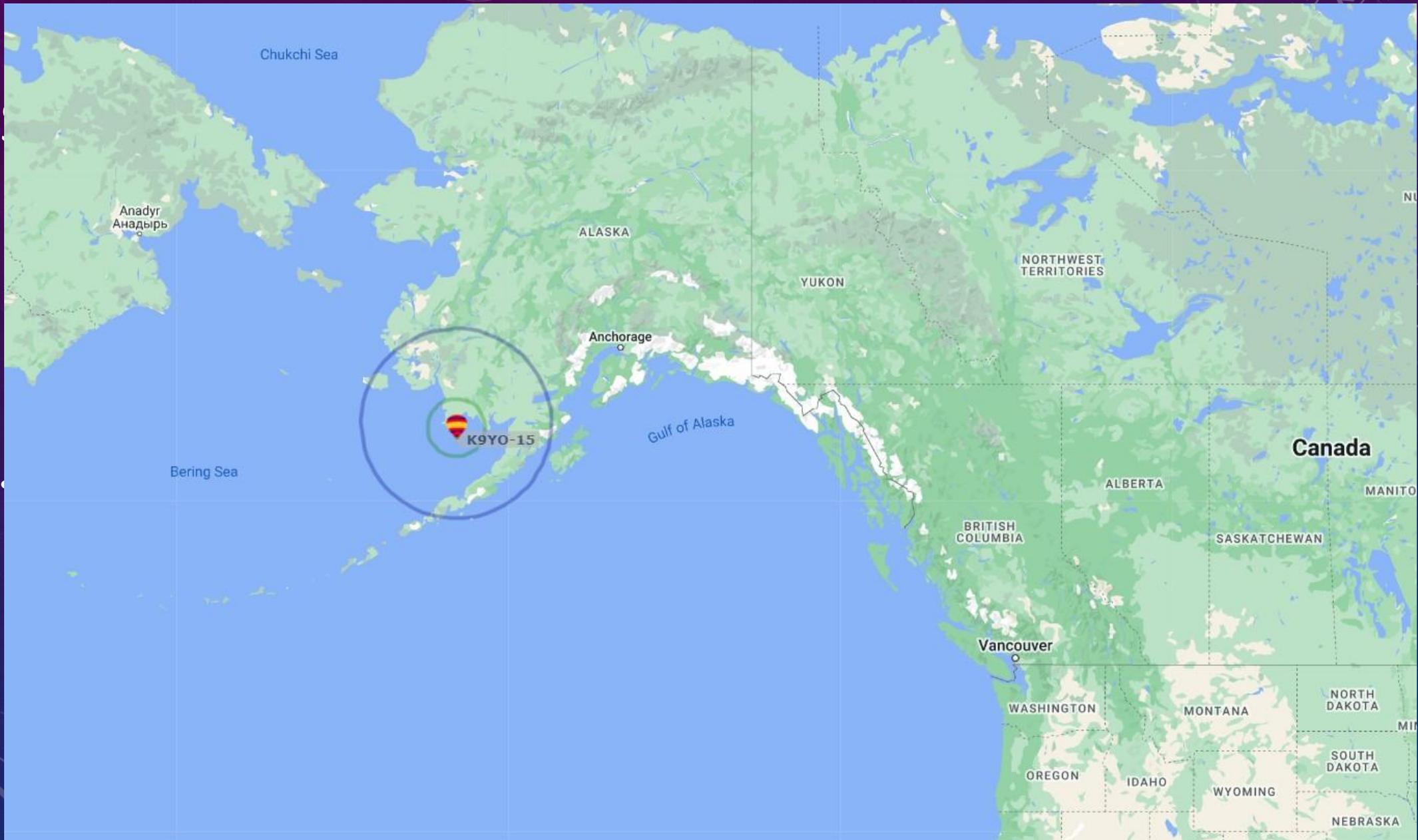




# SHOOTDOWNS

- Yukon - K9YO-15
- Lake Huron - WB0EMJ-9 (timing is wrong)





Chukchi Sea

Anadyr  
Анадырь

ALASKA

YUKON

NORTHWEST  
TERRITORIES

Anchorage

Gulf of Alaska

K9YO-15

Canada

ALBERTA

MANITO

BRITISH  
COLUMBIA

SASKATCHEWAN

Vancouver

WASHINGTON

MONTANA

NORTH  
DAKOTA

OREGON

IDAHO

WYOMING

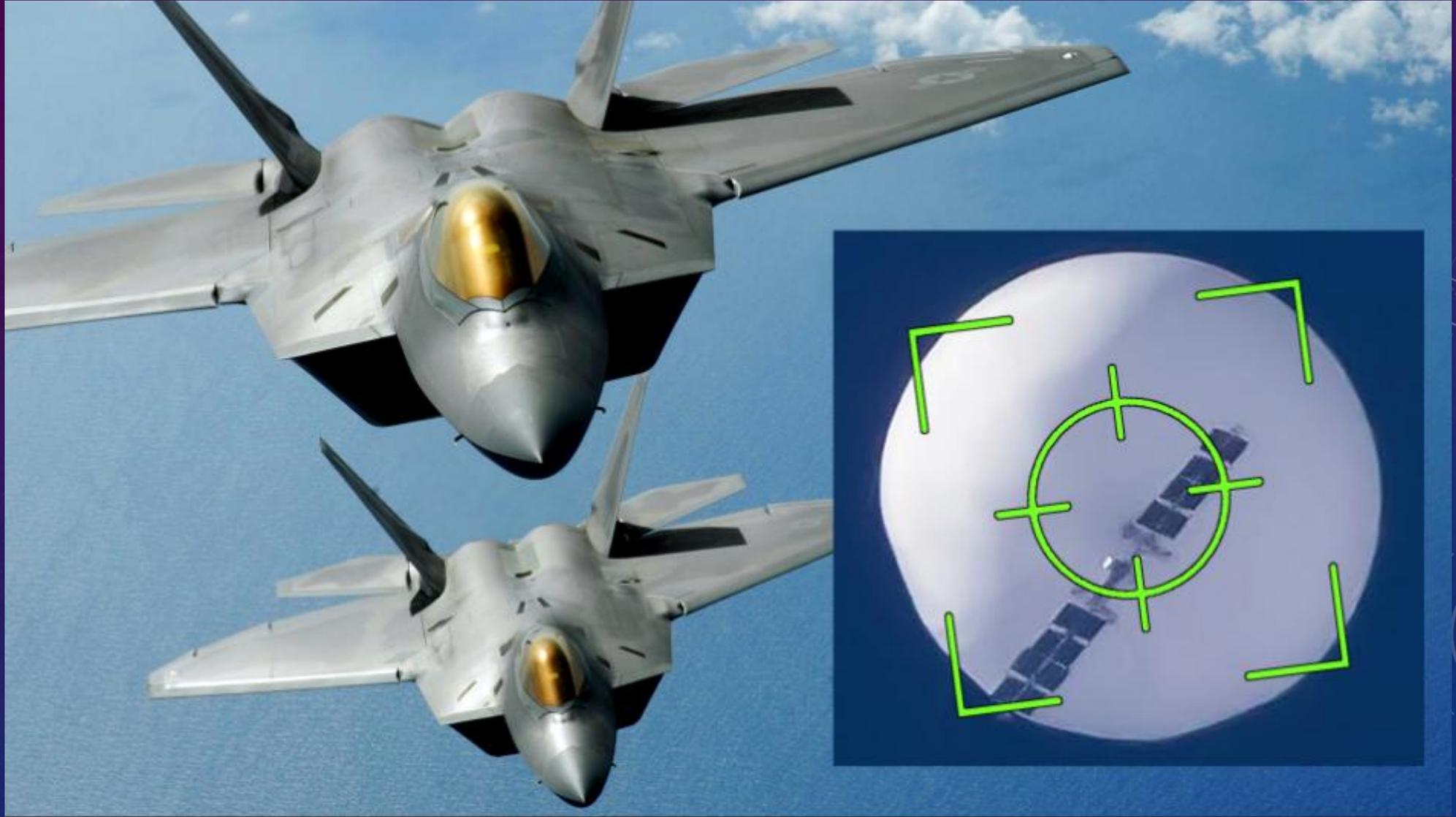
SOUTH  
DAKOTA

NEBRASKA

# SHOOTDOWNS

- K9YO-15 – Yukon







# SHOOTDOWNS

