Red Bull Stratos

Mission to the Edge of Space

U2 Spy Plane

Project High Dive

Project Excelsior – Joe Kittinger

The plan was to use a balloon to reach the stratosphere and then the test subject would jump from the balloon and delay opening his main parachute until 18,000 feet. **The challenge was to find a technique that could be used by pilots who were not trained skydivers.**

The Jump – 102,800 feet - August 16, 1960

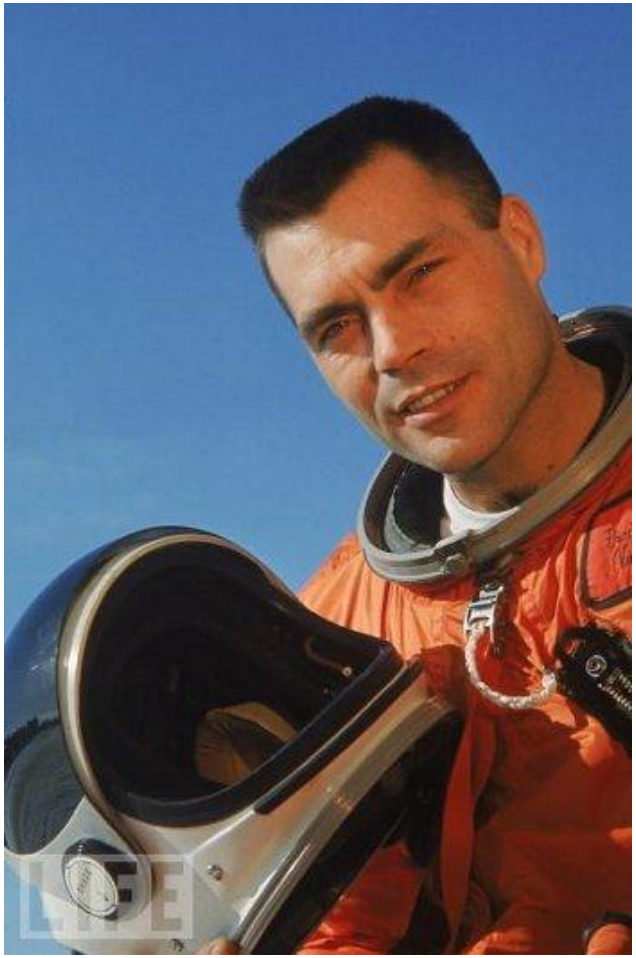
Project Excelsior

The Russians

- **The Volga program**
  - **Pyotr Dolgov** and **Eugene Andreev**. 83,523 ft (25,460 m).

    While Andreev jumped and reached the ground safely. Dolgov died due to a leak in his suit.

Nick Piantanida 1963



Nick Piantanida 1963

Nick Piantanida

Team Red Bull Stratos

- By the end of the program almost 300 individuals were on site to support the mission.
  - Balloon launch team
  - Technical support
  - Communications
  - Television and internet production
  - Recovery and medical support
  - Logistics

Red Bull Stratos - Goals

- Test new designs in pressure suit technology
- Break Col Kittinger's records
- Break the sound barrier without aid of an aircraft
- Prove the feasibility of a survivability of a high altitude escape

Stratos Core Team

SAGE Cheshire AEROSPACE

The Launch Team – ATA Aerospace

Launch Director – Ed Coca

Red Bull Stratos Meteorologist

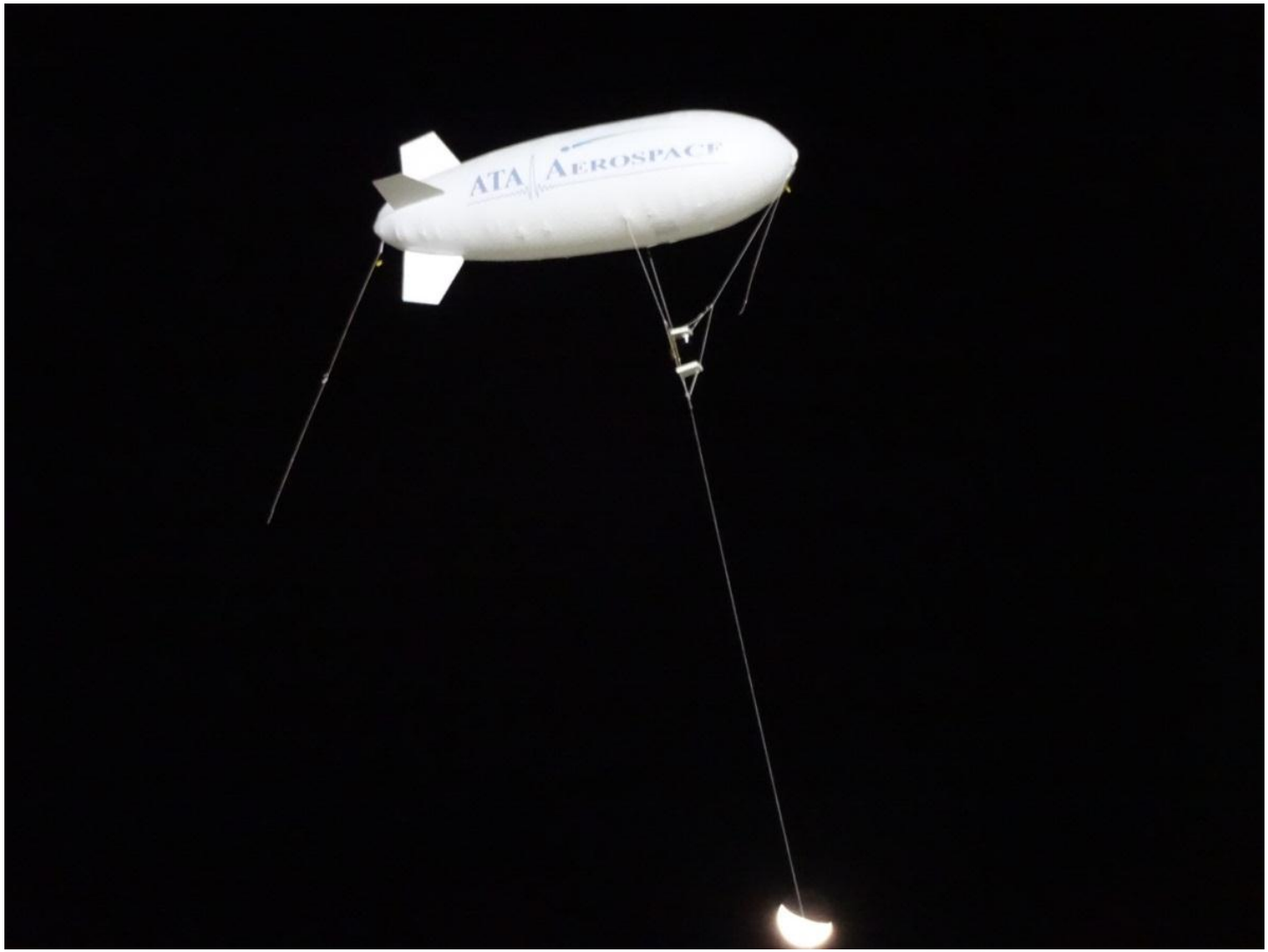
Red Bull Stratos Meteorologist

- Experience
  - Private meteorologist, hot air balloon pilot, forecasting experience in stratospheric flights for the USAF balloon program and long distance gas balloon races and record attempts.
- Duties
  - Weather planning, forecast Launch weather
    - Go, no go decision
    - Balloon layout direction
    - Sky conditions, clouds, precipitation
  - Forecast weather aloft and at jump point/landing
    - Trajectory forecasts for balloon/Felix, descent trajectory forecasts for capsule and recovery
      - Camera and communication placement
      - Airspace clearance (FAA, Military)
      - Obstacle/population avoidance
      - Media

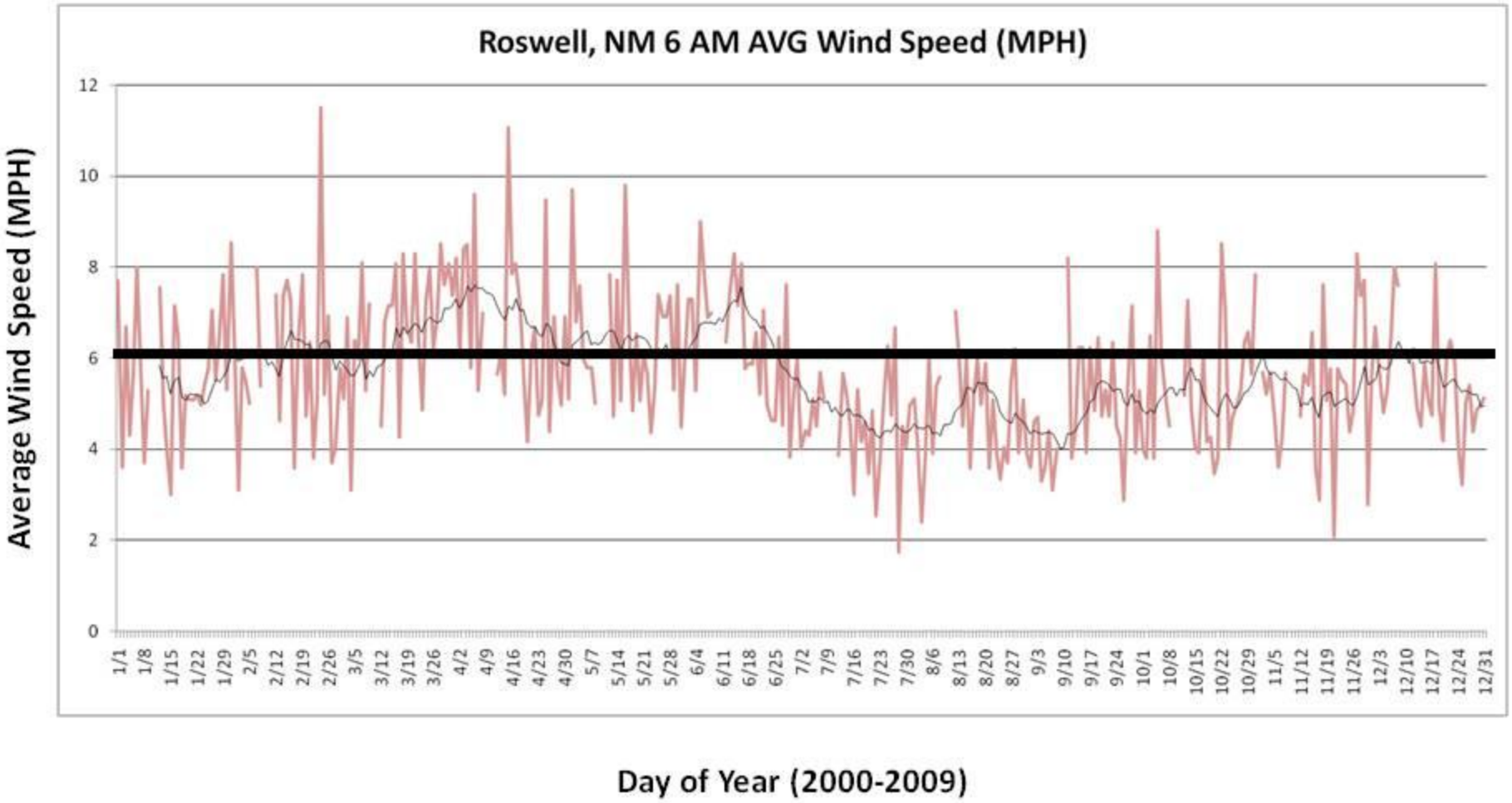
Red Bull Stratos Weather Tools

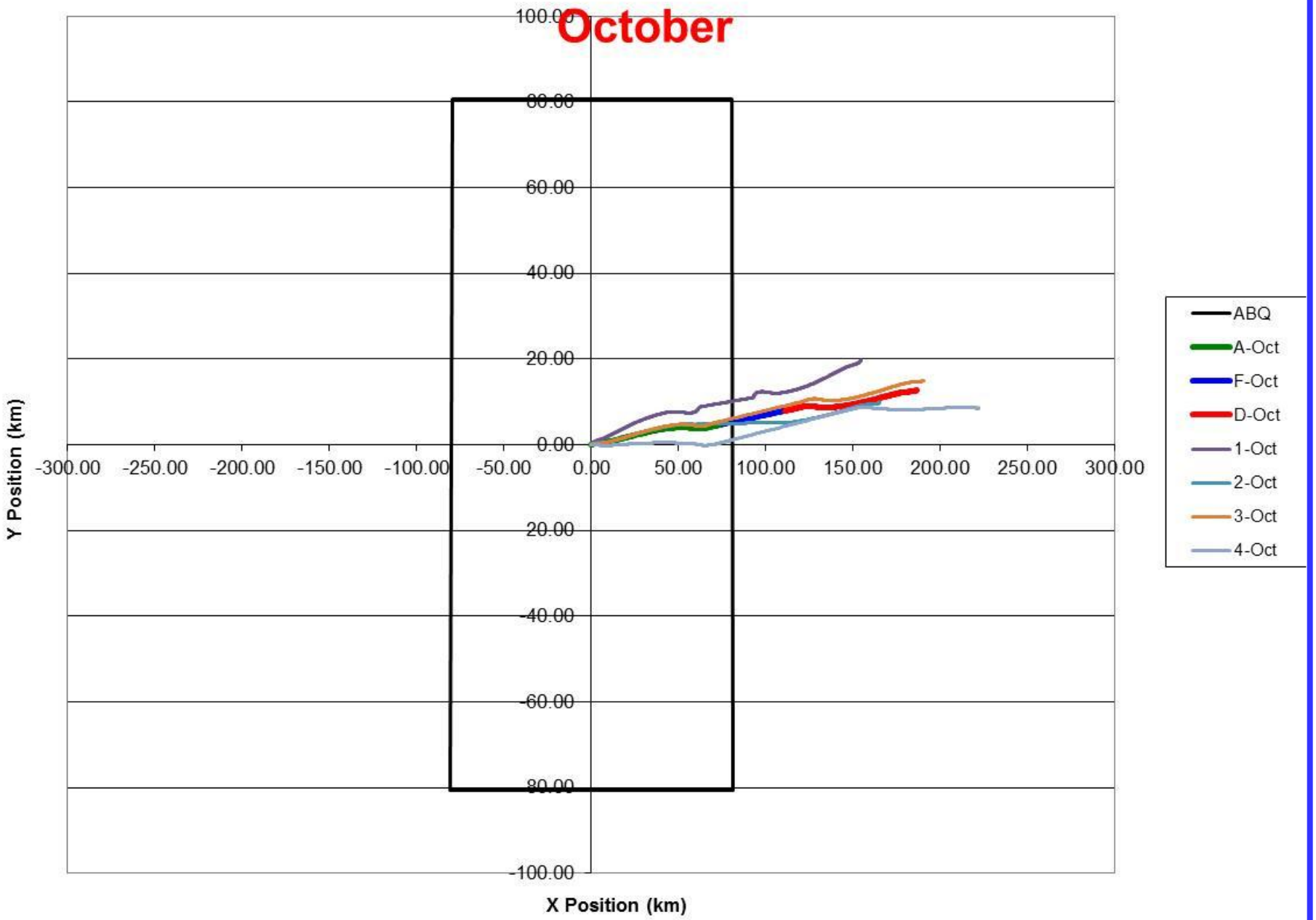
- Models
  - GFS, GEM, EC, NAM, RUC
- Radiosonde
  - Albuquerque, NM and El Paso, TX 00z and 12z sounding data (both approximately 240 km away from launch site).
  - For MBF3 we had our own radiosonde equipment
- On site
  - Roswell, NM airport automated station
  - Weather station at mission control
  - Tethered aerostat

Tethered Aerostat

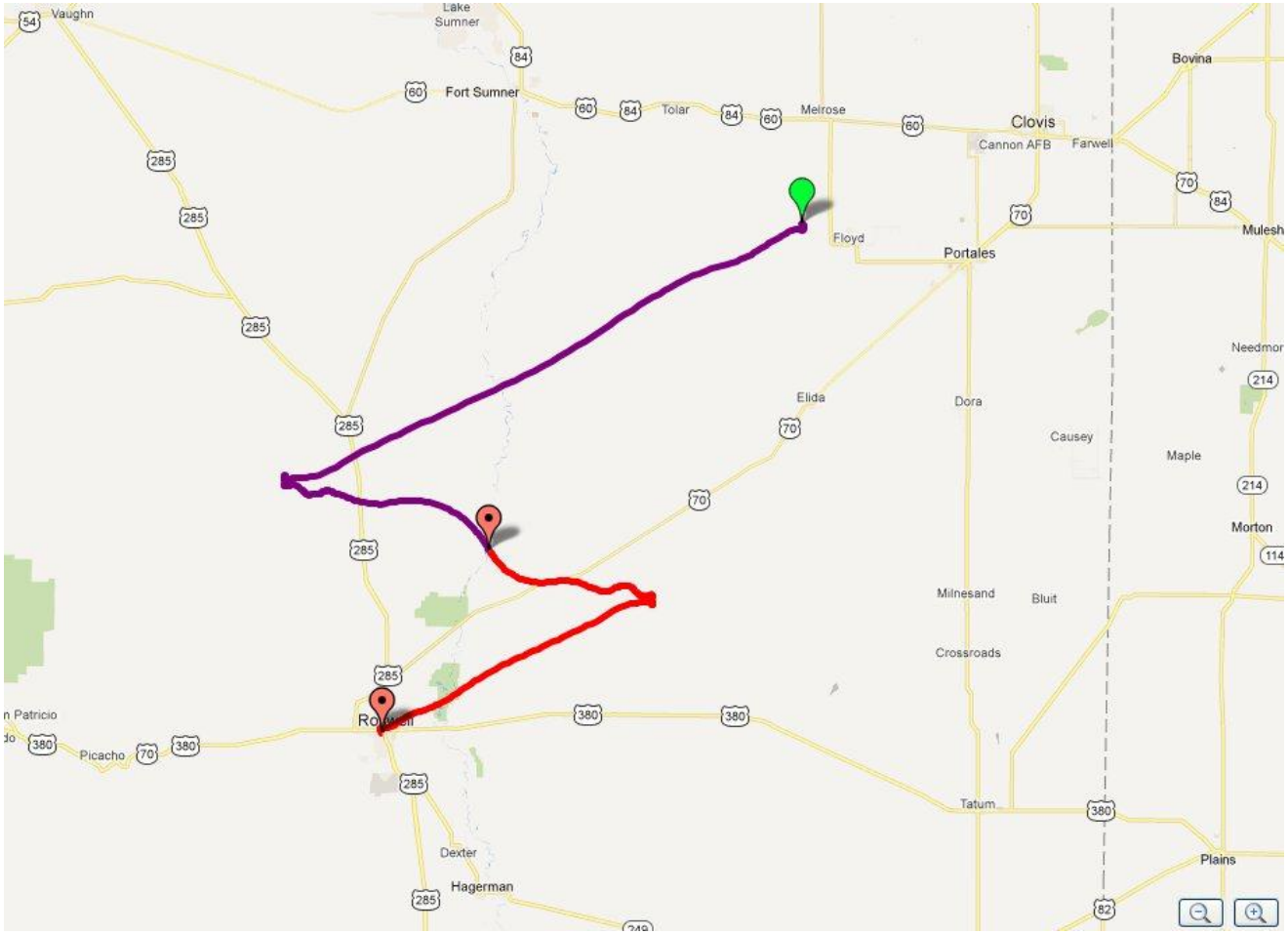


Average Surface Winds at 6 a.m. – Roswell, NM

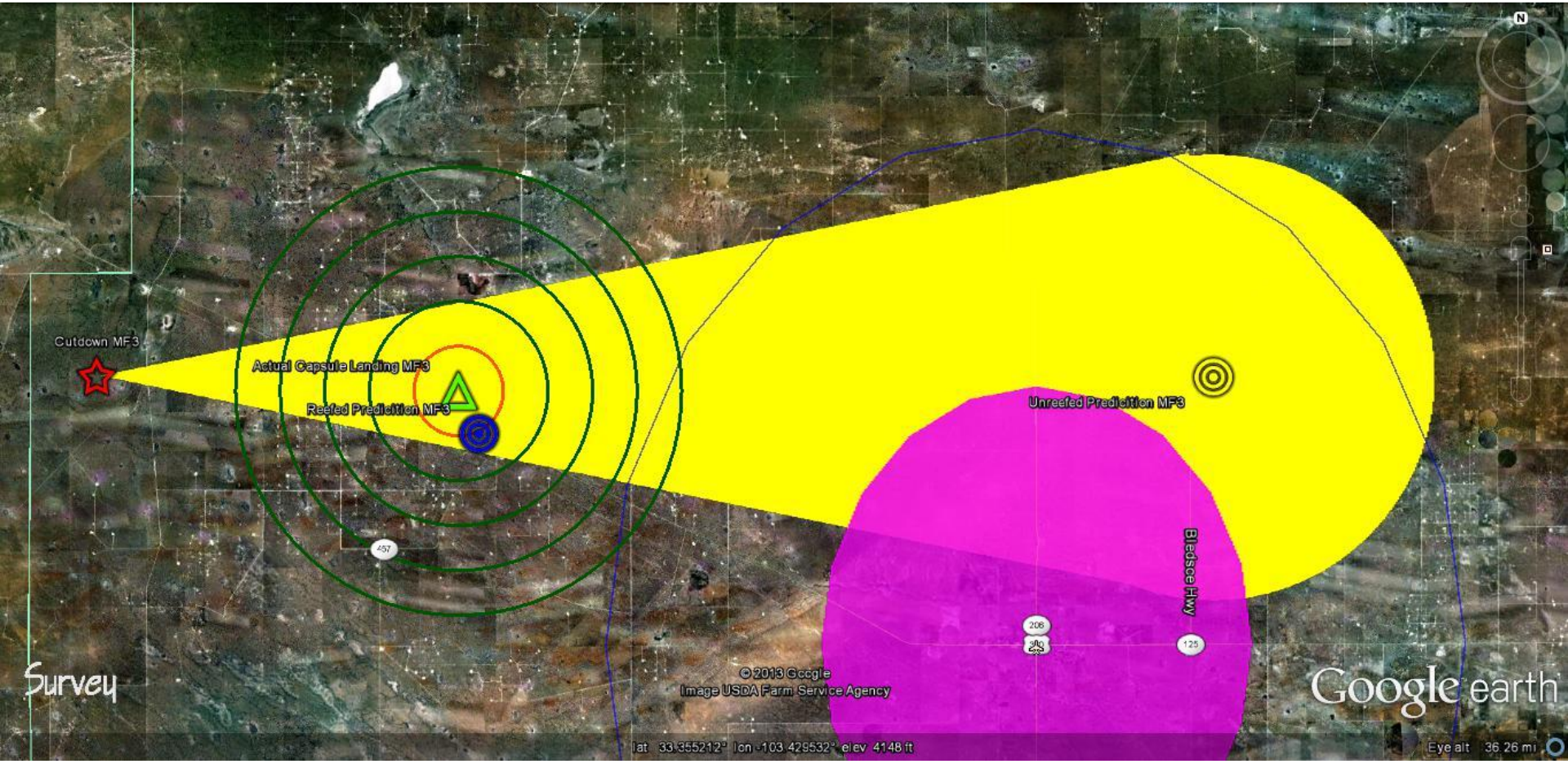



October
100.00
80.00
60.00
40.00
20.00
0.00
20.00
40.00
60.00
80.00
-100.00
-300.00
-250.00
-200.00
-150.00
-100.00
-50.00
0.00
50.00
100.00
150.00
200.00
250.00
300.00
Y Position (km)
X Position (km)
ABQ
A-Oct
F-Oct
D-Oct
1-Oct
2-Oct
3-Oct
4-Oct

Trajectory forecast



Circular Error Probable – Reefed Parachute MF3



Media, Cameras, Communications

Bad News

Roswell, NM

Roswell Daily Record

RAAF Captures Flying Saucer On Ranch in Roswell Region

Claims Army Is Stacking Courts Martial

House Passes Tax Slash by Large Margin

No Details of Flying Disk Are Revealed

Some of Soviet Satellites May Attend Paris Meeting

Miners and Operators Sign Highest Wage Pact in History

The Stratospheric Balloon

Dynamic Launch

Stratospheric Balloon

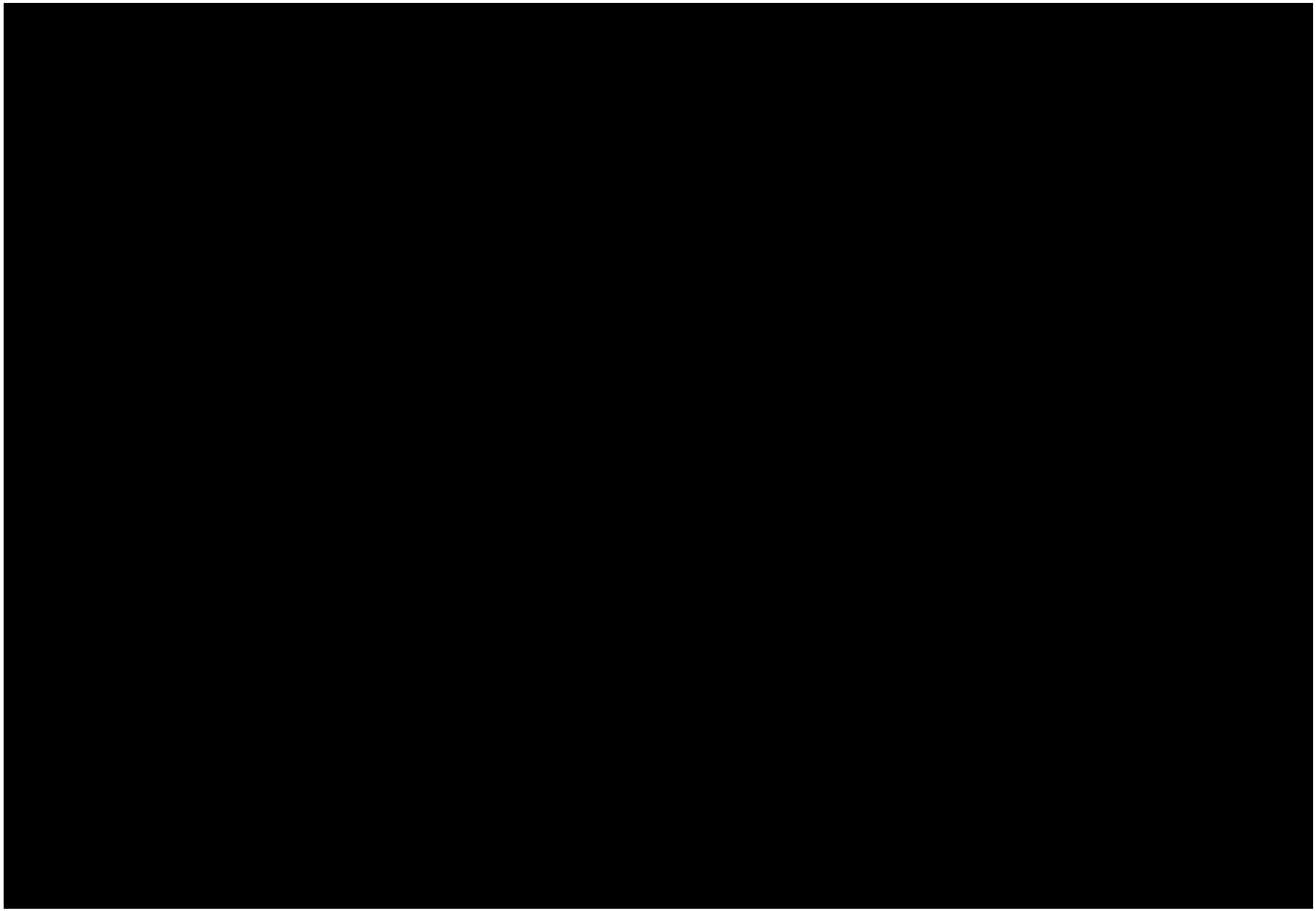
Test Flight Program

- Red Bull Stratos was designed to be run as a flight test program
  - 2 unmanned flights to test systems
  - 3 manned flights, each flight flying higher than previous flight

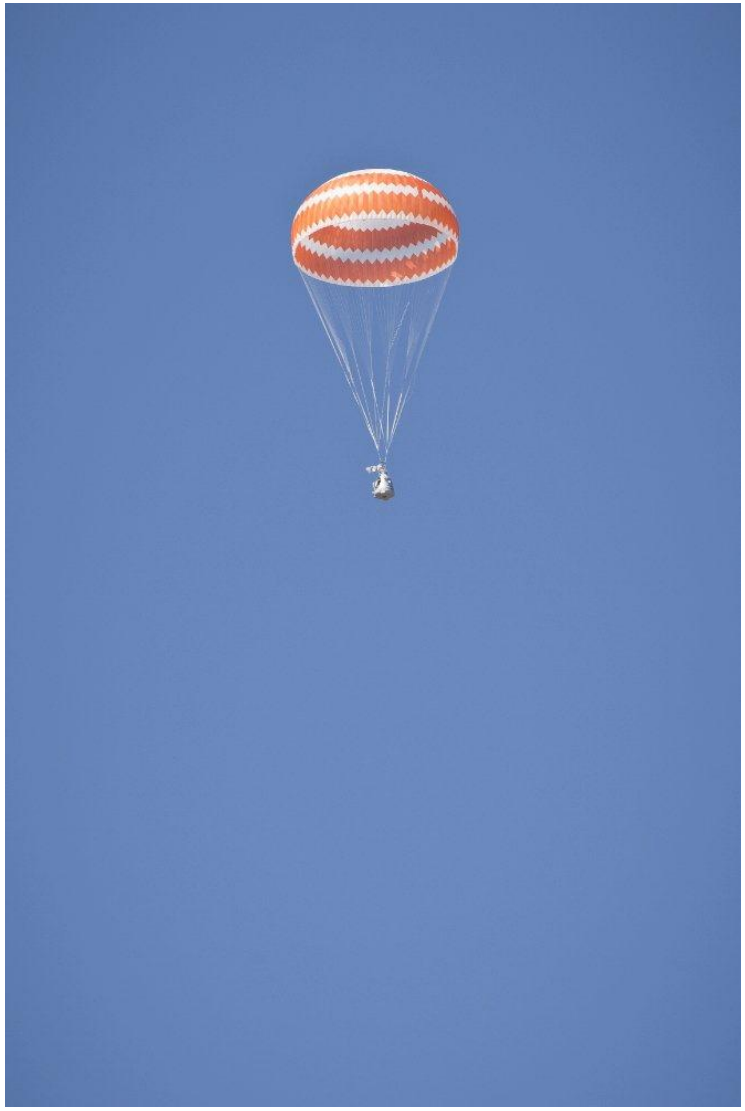
Unmanned Flight #1 – December 2011

- Roswell, NM
- Flight to 90,000 feet
- Pod drop
  - same weight as Felix
  - test parachute and GPS systems
- Dummy capsule
  - Test camera systems
  - G-force – crush pads


2nd RECORD
Highest freefall, Wile E. Coyote, 2012
Parodie: https://www.facebook.com/LeMalaka



Capsule Recovery



Reefed Parachute

Unmanned Flight #1 – December 2011

UMF #2 January 2012

Unmanned Flight #2 – January 2011

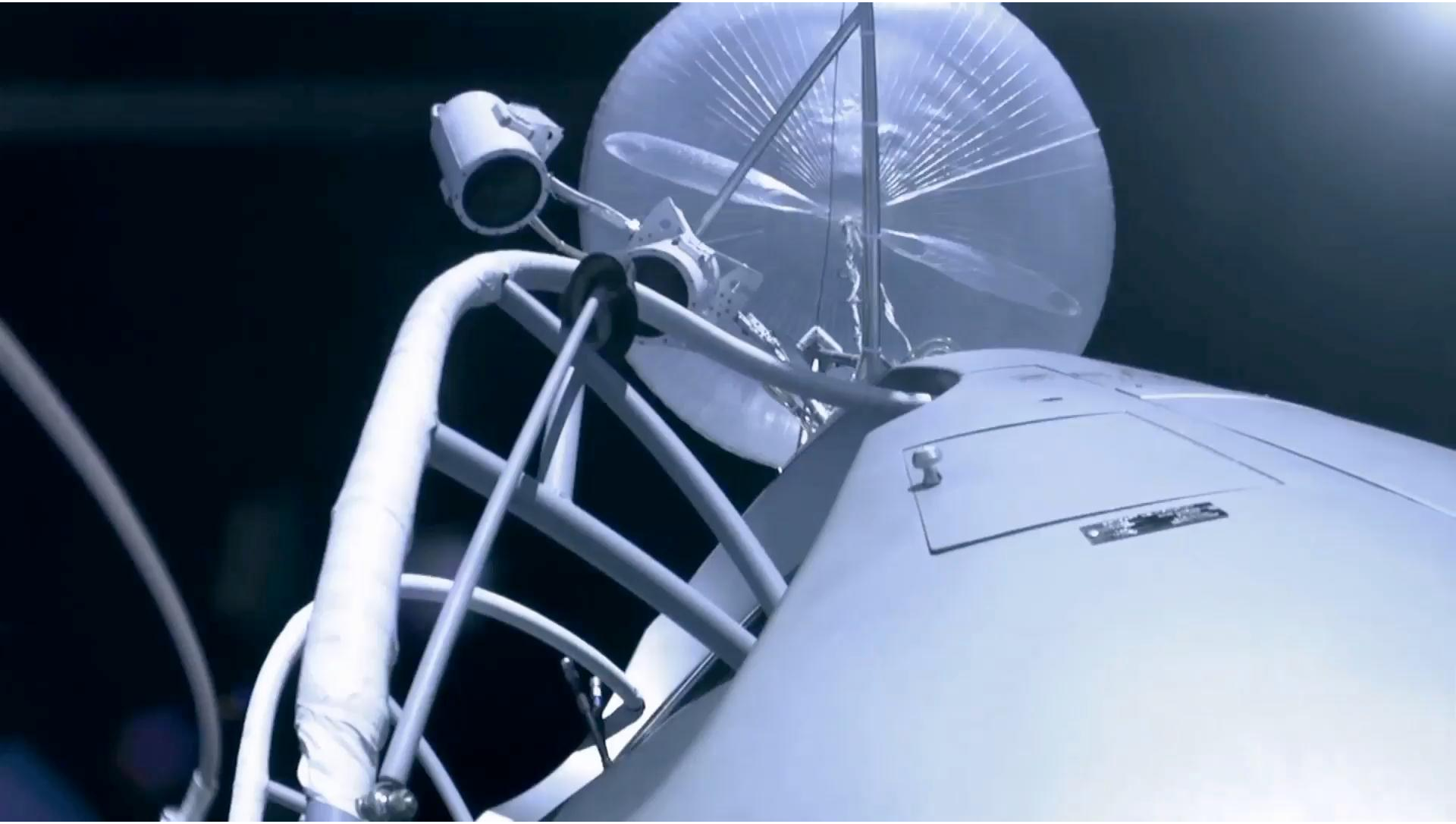
- Flight to 110,000 feet
- Test on all systems after lessons learned from UMF #1.
- Challenging weather conditions, frost covered capsule and balloon

Manned Flight #1 – March 2012

- Flight to over 71,000 feet
- Above Armstrong line
- Balloon failure on first attempt

Manned Flight #2 July 2012

- Very challenging mission
- East to west stratospheric winds
- White Sands Missile Range downwind
- GPS jamming
- Rugged terrain in landing area



Damaged Capsule

Damaged Capsule

Manned Flight #2 July 2012

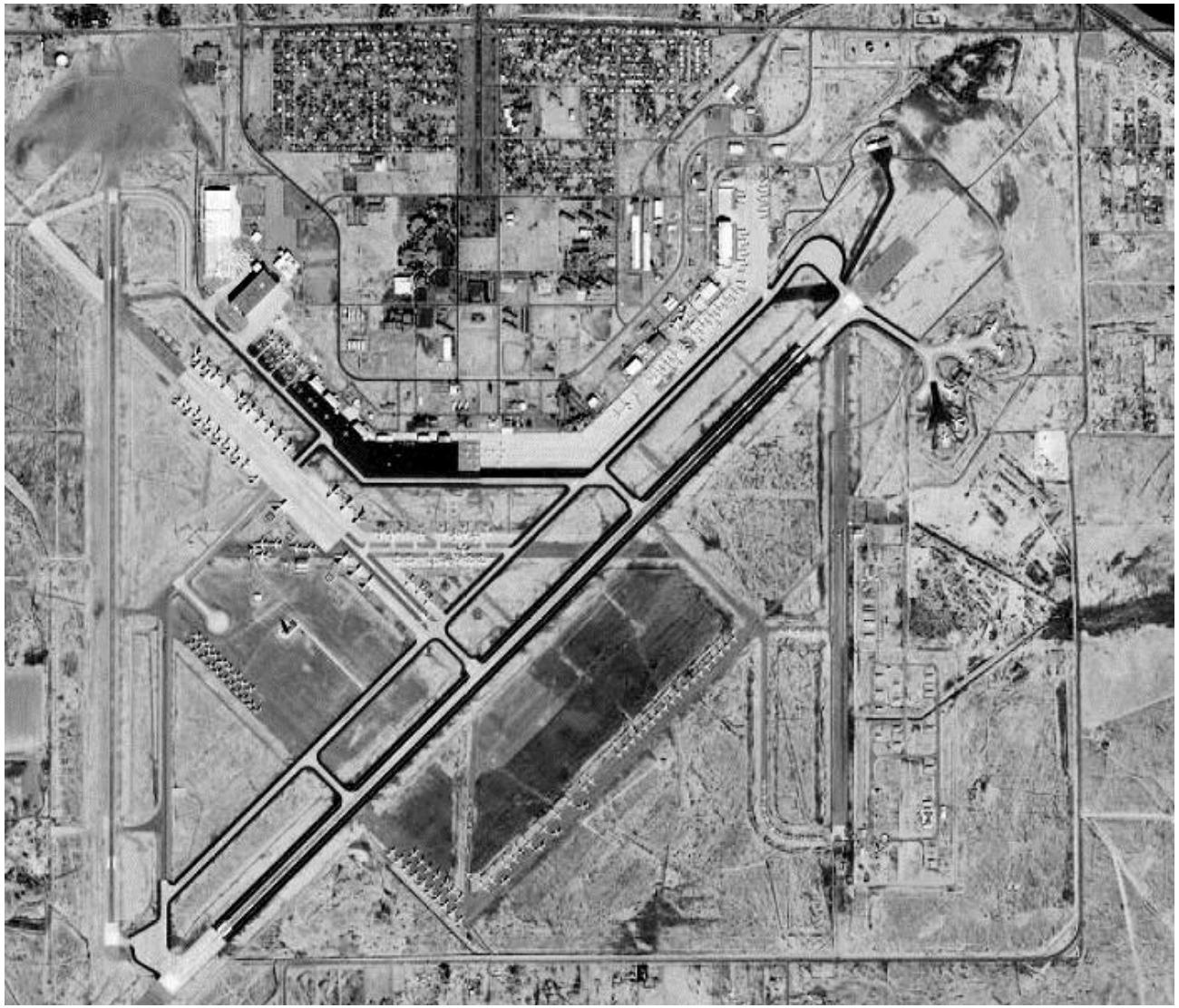
Manned Flight #3 – Big Balloon

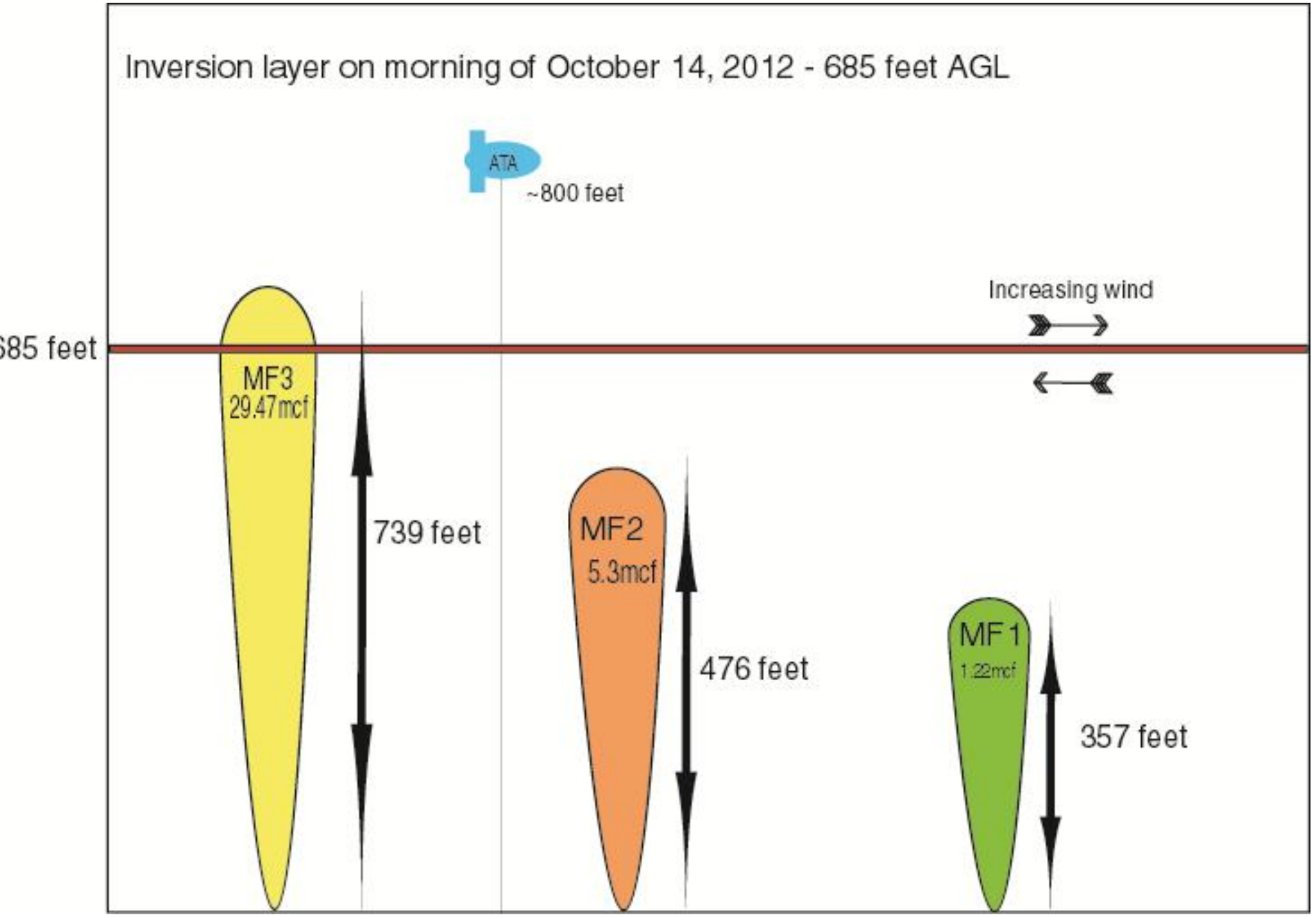
- Helium – 160,000 cf (about 300,000 party balloons)
- 29.8 million cubic feet of volume/843842 cubic meters
- Length of un-inflated balloon before launch: 592.41 feet /181 meters
- Takeoff height from the top of balloon to bottom of capsule: about 800 feet/250 meters
- Size of balloon at 128,000 feet/39000 meters
  - Height 335 feet/102 meters / Diameter: 424 feet/129 meters

Manned Flight #3 – Weather Challenges

- Winds had to be no more than 2km/hr from the ground to 250 meters above ground level (top of balloon upon release)
- Very few clouds
- Wind direction had to be aligned very closely to expected wind direction
- Wind direction different on ground different than wind direction at 250 meters
- Trajectory had to keep balloon and capsule in communication/video range, avoid airspace obstacles, etc.

Roswell Airport Runway




Inversion layer on morning of October 14, 2012 - 685 feet AGL
ATA
~800 feet
Increasing wind
685 feet
MF3
29.47mcf
739 feet
MF2
5.3mcf
476 feet
MF1
1.22mcf
357 feet

Aborted Launch - October 9, 2012

October 14, 2012

- On *October 14*, 1947, Charles E. "*Chuck*" *Yeager* became the first person to fly faster than the speed of sound in his Bell *X-1*

ZENITH
SWISS WATCH MANUFACTURE
SINCE 1865
MISSION TO THE EDGE OF SPACE
RED BULL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Balloon Recovery


Red Bull
STRATOS
FELIX BAUMGARTNER

Summary:

1. Tethered aerostat key to success in launching 29.47 mcf manned balloon.
2. Strict adherence to model data discouraged
3. Meteorological conditions on both October 9th (aborted attempt) and successful launch on October 14th favored a very narrow “window” of opportunity of about 15 minutes or less for deep light winds.
4. Combination of preparation, practice and timely decision making resulted in the success of an extremely difficult endeavor.
5. Reefed parachute approach was critical in recovery and safety operations. Red Bull Stratos program will set new standard in stratospheric lighter than air flights and payload recovery.

Red Bull Stratos Documentary

http://stratos.rdioexclusives.com/landing