






# NSSL Mobile Ballooning

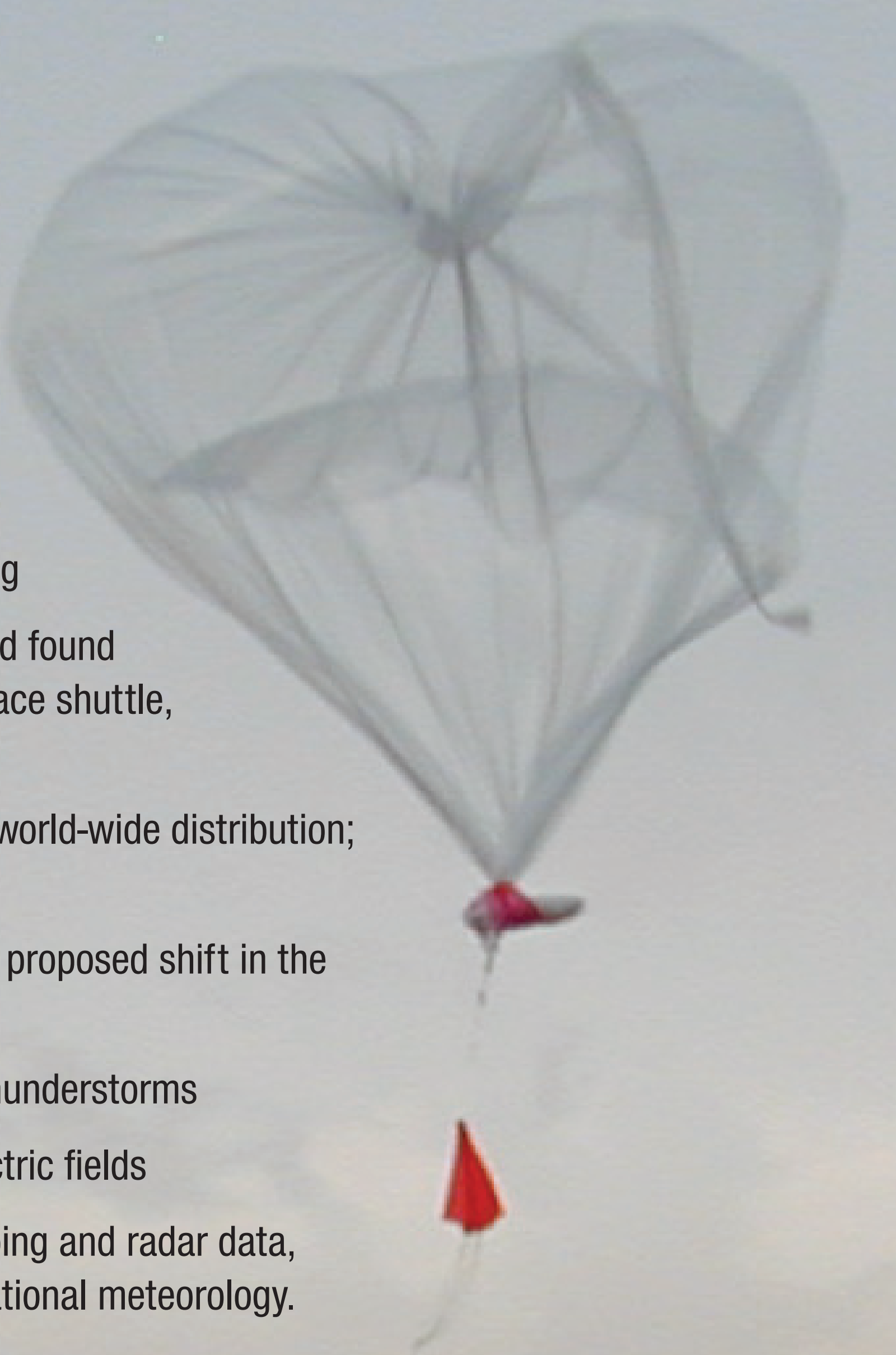


-  Parachute
-  SPOT GPS
-  Amateur radio GPS tracker  
Letdown 30 m (100 ft)
-  Ozone sonde to measure ozone, temperature, relative humidity, GPS-derived location and winds
-  Electric field meter to determine the electrical structure of storms

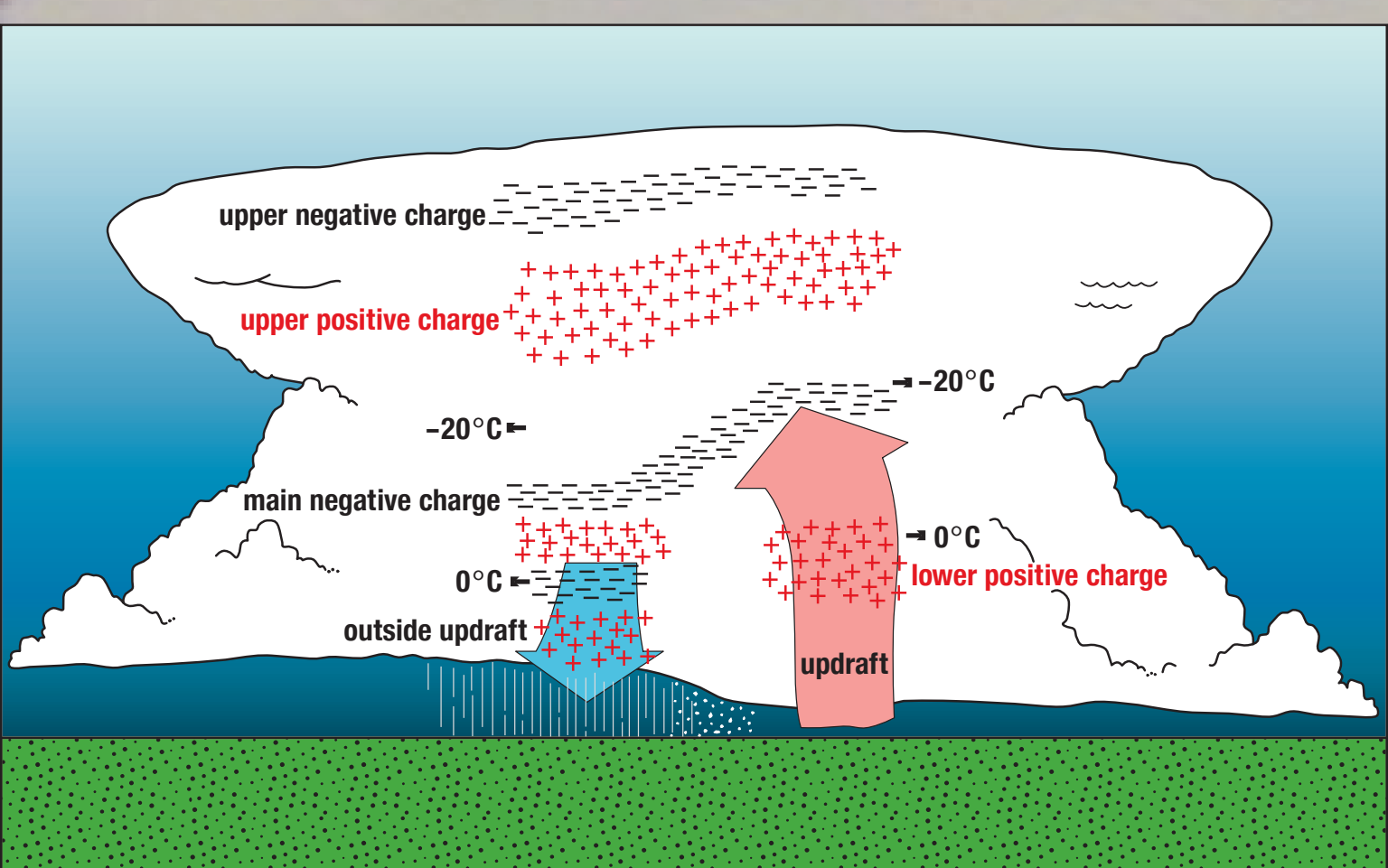
(Above) This balloon-borne instrument train took measurements in a storm to discover if there are relationships between ozone and large electric fields and lightning.

## Some Examples of Results and Impacts of Mobile Scientific Ballooning

- Developed techniques for handling balloons in high winds
- Have measured the electrical structure of storms to learn how storms become electrified and produce lightning
- Mobile ballooning has been used in landfalling hurricanes.
- Temperature, pressure, relative humidity and winds from radiosonde flights used in Warn on Forecast and storm modeling
- A study of the sunrise effect on the electric field near the ground found the conditions safe for launch of unmanned rockets and the space shuttle, increasing the time window for launches.
- A NOVA show on lightning documented our ballooning and had world-wide distribution; additional documentaries by Discovery, National Geographic
- Profiles through storms with balloon-borne instruments led to a proposed shift in the paradigm of the electrical structure of thunderstorms
- Verified the existence of electrically inverted (“upside down”) thunderstorms
- Preliminary study of ozone inside thunderstorms with large electric fields
- Balloon data, combined with high resolution 3-D lightning mapping and radar data, increases knowledge that can lead to new techniques for operational meteorology.



Calm winds on a mountain ridge allow scientists and students to release a balloon and instrument train directly into the storm.



Conceptual model of the electrical structure inside a thunderstorm, which was inferred from several years of balloon-borne electric field meter data inside storms.



NSSL mobile lab/mobile field command that is equipped to receive data from aircraft, lightning mapping arrays and ground-based radar and balloons.



(Left) Pre-storm and near-storm flights in fair weather are used for storm modeling.

(Right) Data from instruments carried by the balloon show the electrical intensity of the storm in real time, with detailed analyses done later.



(Right) Crew members in a truck configured as a mobile inflation shelter inflate a balloon and check out instruments for the next flight. Inflating a balloon in its launch tube allows it to survive handling and launch in strong winds.

