There is an "X" in Texas

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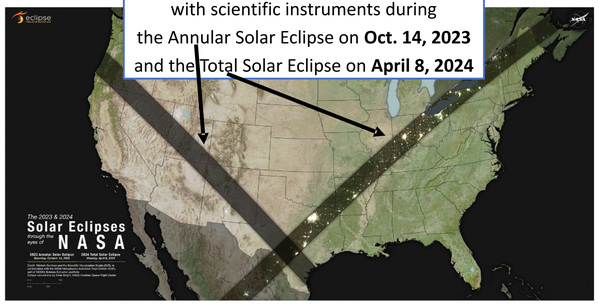


NEBP RESEARCH GOALS

The core scientific and engineering questions are:

- Can eclipse-induced atmospheric gravity waves be definitively detected in data across all sites?
- What is the magnitude of the temperature drop at the surface, in the planetary boundary layer (PBL), troposphere, and stratosphere?
- How much time lag is there between the temperature minimum, and minimum in solar flux?
- At which altitude(s) is the temperature variation the largest?
- How do boundary layer heights vary during an eclipse?
- Is the kinematic response of the surface wind field within the path of totality instantaneous or time-lagged to the thermal response?
- How do the findings for the 2023 and 2024 eclipses compare to those for prior events?
- How do measurements of the 2023 and 2024 eclipses taken at the same place compare with each other?
- Determine the origin of the phenomenon known as eclipse shadow bands.
- Can current high-resolution weather-forecasting models simulate the observed responses and improve the model physics and forecasting?
- How far can reliable streaming video be transmitted?
- Can a lower-cost scientific payload with sophisticated capabilities be developed and replicated?
- Confirm the 2017 Very Low Frequency radio emission observations.

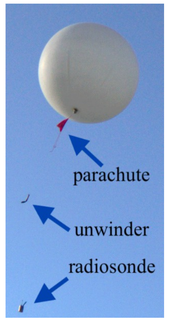
NEBP teams participate on one of two tracks:
Atmospheric Science or Engineering

Atmospheric Science teams launch a balloon every hour for 24 hours prior to and 6 hours after the eclipses.

Teams also measure surface weather.

Each balloon carries small devices called **radiosondes** that send weather information to a **ground station**.

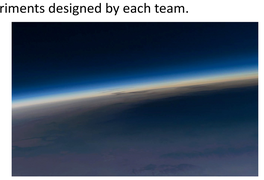
Teams will examine the data for atmospheric changes driven by the eclipse shadow.



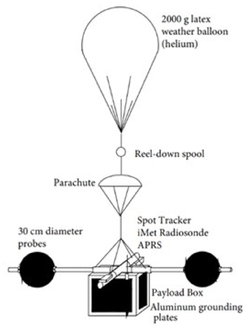
NEBP Engineering Track

Engineering teams fly just one or two larger balloons during each eclipse.

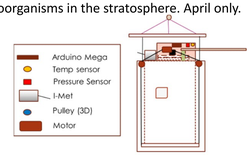
The payloads on these balloons – built by the students – carry live streaming cameras, precision GPS for catching gravity waves, and individual experiments designed by each team.



Conductivity:
Measure the electrical conductivity of the stratosphere.



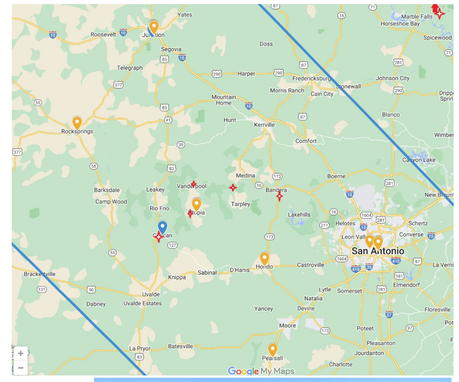
Microplastics/Extremophiles:
Measure density of microplastics and microorganisms in the stratosphere. April only.



Texas Field Campaigns

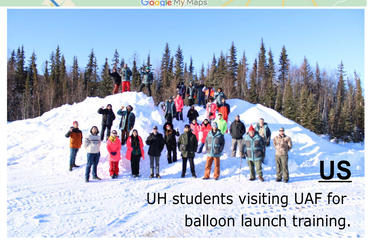
- ATMOSPHERIC SCIENCE
  AK: Utopia, TX
  CT: Junction, TX
  KY: Corpus Christi, TX
  LA: San Antonio, TX
  PA: Concan, TX
- ENGINEERING
  AL: Hondo, TX
  CT: Junction, TX
  DE: Junction, TX
  FL: Pearsall, TX
  GA: San Antonio, TX
  MA: Junction, TX
  MD: San Antonio, TX
  PA: San Antonio, TX
  PA: Rocksprings, TX
  TN: Utopia. TX
  TX: Utopia, TX
  WV: Odessa, TX

Red Star: UH Observatories



Ground Observatories

GoPro cameras (5)
All-Sky Imager (1)
GNSS TEC receivers (3)
Quasi DC magnetometers (2)
HF receivers (5)
VLF Receivers (3)
Weather Stations (3)
Ionosonde ?



US
UH students visiting UAF for balloon launch training.

USIP UH Experiments

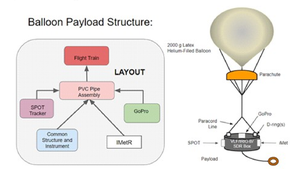
Very-Low-Frequency Waves:
0-22kHz e-m activity observed using an air-core loop antenna.

High Energy Particles:
ADVACAM's USB MiniPix camera will be used to detect 40-250 keV X-rays. Looking for correlation with VLF waves and high energy astroparticles.

Gaseous Compounds:
Measured the vertical profile of O_3, NO, NO_2, and CO using electrochemical (ECC) sensors.

High Frequency Waves:
Study sudden changes in e-m radiation from multiple terrestrial sources. HF waves from 1-5 to 5 MHz are recorded by an SDR to remote sense the ionosphere. Operated as ground receivers in NEBP at 5 sites

Balloon Payload Structure:



Total Electron Content
A dual frequency GPS receiver maps electron content of the ionosphere along satellite signal paths.