

WYOMING

NASA Space Grant Consortium

HIGH-ALTITUDE BALLOON NEWSLETTER

ISSUE 2 • SPRING 2024

Howdy and thanks for once again taking a few minutes out of your day to check out the second edition of our high-altitude balloon newsletter! We do apologize as it has been more than 18 months since the first edition was released in Fall 2022. We were hoping to release a newsletter twice a year, following each college semester. Perhaps we can be more consistent with this goal going forward.

As before, this edition of the newsletter will include highlights from the balloon launches we conducted during this past school year as well as a few program updates and announcements about upcoming opportunities. We will also share some exciting highlights and photos from our participation in the 2023–24 Nationwide

Eclipse Ballooning Project, which only just recently concluded!

If you have any questions about our program or would like to reach us, please use the contact information provided at the end of the newsletter. Thanks again for reading and we hope you find this to be helpful and informative!

– Wyoming Space Grant Staff

UPDATES & ANNOUNCEMENTS

Now Accepting New Launch Requests

We recently reopened our online [K-12 Balloon Launch Request Form](#) for the 2024–2025 school year! Two spots in Spring 2025 have already been reserved (April and May), but we still have spots available for Fall 2024 and 1–2 more for the earlier in the spring. This form is for K-12 launches only. For all non-K-12 balloon launch requests, please email us (wsgc@uwyo.edu) and provide more information about your balloon launch needs.

Website Updates

We have revamped the main balloon program [landing page](#) on our website to improve the aesthetic and include more information about various flight opportunities and projects we've been involved with. We're currently working on adding more information about how college and science fair students can utilize our program

BALLOONING BY THE NUMBERS

(As of May 2024)

Total balloon flights: 81

Launch observers: ~4,700

Direct participants: ~1,800

K-12 student participants: ~1,400

Average burst altitude: 93,070 ft

Highest burst altitude: 107,373 ft

Average flight distance: 52.5 miles

Longest flight distance: 122.2 miles

HIGH-ALTITUDE BALLOON NEWSLETTER

for their own projects. Expect to see more content added throughout the summer.

Space Radiation Activity

Within the last few years, we've also been working on the [Space Radiation Activity](#) that we mentioned in the previous newsletter. This activity was originally developed by UW undergraduate students who participated in our [LIFT Project](#) way back in 2019. It is designed for middle and high school classes and tasks students with building a payload to measure and block cosmic radiation during a balloon flight. All of this is done within the scenario of a space race between competing nations.

We currently have two kits available for groups who would like to do this activity in conjunction with one of our K-12 balloon flights. You must be scheduled to host one of our K-12 balloon launches within the next year if you wish to borrow one of these kits. This activity is still being tested, so if you have any suggestions for how to improve it, we'd love to hear from you!

BALLOON LAUNCH HIGHLIGHTS

During the 2023–2024 school year, we conducted four high-altitude balloon flights. All were with K-12 groups in Wyoming. Highlights from each flight are given below.

Circuit Breakers 4-H Robotics (Cheyenne)

Our first and only high-altitude balloon launch of the Fall 2023 semester was in early November with students from the Circuit Breakers 4-H Robotics Club. We launched the balloon from the Laramie County Fire Authority on the northeast side of Cheyenne. The flight, from launch to land, lasted 1 hour 47 minutes. The



balloon popped at an altitude of 84,336 feet above sea level, a little lower than expected. The payload then parachuted back to Earth and landed northeast of Kimball, Nebraska, 65 miles from the launch site, in a field just 300 yards from a county road.

[Highlight Video](#) / [Flight Tracker](#)

Whiting High School (Laramie)

In February 2024, our local friends at Whiting High School invited us over to launch another balloon with one of their science classes. This was our third launch with the school in the last four years. The student payload boxes included, among other things, bacteria samples, raw bacon, and several varieties of plants.



HIGH-ALTITUDE BALLOON NEWSLETTER

The balloon reached a maximum altitude of 90,503 feet above sea level, traveling almost directly east past Cheyenne. After burst, the payload eventually landed in a dormant wheat field about six miles north of Pine Bluffs, WY, close to the Nebraska state line, and about 76 miles from where we launched it. The total flight time was 1 hour 55 minutes.

[Flight Tracker](#)

Story Elementary School (Story)

Mid-March took us upstate to the town of Story, WY, a beautiful little haven nestled into the foothills of the Bighorn Mountains north of Buffalo. We were welcomed on launch day by a small group of about 30 students from Story Elementary School. After launching their balloon, we watched it drift eastward over the sparsely populated Powder River Basin. The balloon eventually popped at an altitude of



92,137 feet above sea level, about 90 minutes after launch. After an additional 27-minute parachute-aided descent, the payload finally came to rest in a rugged draw on some ranchland nearly eight miles south of the tiny town of Arvada, WY, almost 40 miles from Story and less than two miles from the Powder River.

[Flight Tracker](#)



Montessori Charter School (Laramie)

Our final launch of the spring took place in Laramie at the Montessori Charter School in early May. We had attempted to launch with them in December 2023, but last-minute unfavorable wind conditions forced us to postpone. The winds on this beautiful May morning, however, were almost perfectly calm, and the launch went off without a hitch.

As the balloon quickly zipped off to the northeast thanks to a 100-mph jet stream, everything was looking good. Then, at the unexpectedly "low" altitude of 63,267 feet above sea level, the balloon suddenly popped. This was our lowest burst altitude in more than nine years! What happened? We can't be sure, but the most plausible explanation is that the balloon had a slight manufacturing defect that resulted in a premature rupture.

HIGH-ALTITUDE BALLOON NEWSLETTER

As the payload slowly descended back to Earth, it became clear that it was going to land somewhere near LaGrange, WY. And it did — right on top of the prominent, expansive bluff to the north of town. Thankfully, after contacting the landowner, we were able to recover the payload with relative ease. All in all, the payload traveled 80 miles and was in flight for a total of just 1 hour 29 minutes.

[View Flight Tracker](#)

ECLIPSE BALLOONING PROJECT

Following a wonderful experience during the total solar eclipse in 2017, we once again chose to participate in the [Nationwide Eclipse Ballooning Project](#) (NEBP) for the 2023–2024 solar eclipse cycle. The NEBP, led by the Montana Space Grant, is a NASA-funded project that involved more than 50 teams from 75 different institutions across the country. Most of the teams were on the engineering track. These teams built sophisticated payloads capable of transmitting live video footage from a high-altitude balloon in the stratosphere to the internet during both the October 2023 annular solar eclipse and the April 2024 total solar

eclipse. The remaining teams were on the atmospheric science track. Instead of building payloads, the atmospheric science teams flew commercial radiosondes on smaller balloons every hour for 30+ consecutive hours before, during, and after each eclipse. The data collected by these radiosondes could later be analyzed to better understand how solar eclipses affect Earth's atmosphere.

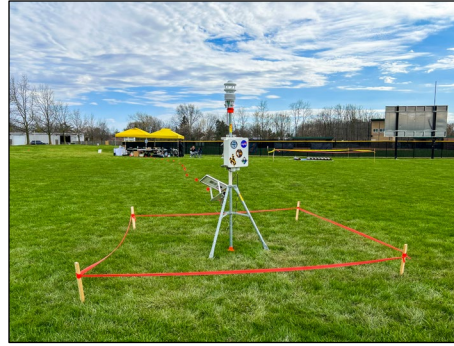
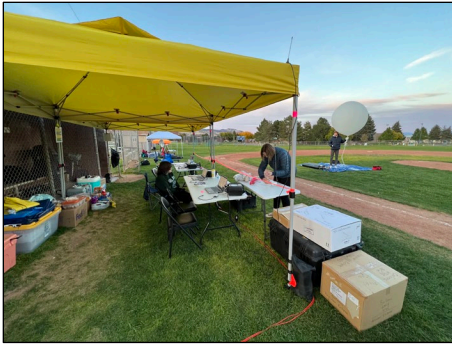


The Wyoming Space Grant supported three teams from Wyoming for the 2023–24 NEBP. Two of these teams, led by faculty from Casper College and Central Wyoming College, received partial support from us. Both teams were on the engineering track. We also fully supported and led the ["UW Space Cowboys"](#), an atmospheric science team from UW.

The Space Cowboys were comprised of eight undergraduate students, two mentors on staff with the Wyoming Space Grant, and a graduate student mentor from the UW Department of Physics & Astronomy. Six of the undergraduate participants were women, and seven majored in STEM fields. We structured the project to provide the students with plenty of hands-on learning opportunities for both personal and career growth. Each student was assigned a team role with specific responsibilities (data analysis, outreach, programming, social media, etc.), which allowed everyone to contribute in some way to the team's success.



HIGH-ALTITUDE BALLOON NEWSLETTER



Our students completed multiple phases of training, beginning with a 1-credit introductory course during the Spring 2023 semester to help them get better acquainted with topics relevant to the NEBP (eclipses, meteorology, how to conduct field projects, etc.). In summer of 2023, the students completed two weeks of intense, hands-on training where they learned how to launch weather balloons, set up and operate the radiosonde equipment, and analyze the data. They conducted more than 25 practice flights between summer 2023 and April 2024.

For the annular solar eclipse on October 14, 2023, all three of our Wyoming teams shared a launch site at Snow College in Richfield, Utah. The atmospheric science team launched 30 balloons, beginning 24 hours before annularity. The two engineering teams launched just one balloon each, about an hour before annularity,

and successfully recovered their payloads more than 50 miles east of the launch site in the rugged San Rafael Swell. On eclipse day, the teams were treated to fantastic weather and nearly perfect viewing conditions for the eclipse itself.

Just six months later, the teams departed Wyoming once again and headed east to go witness the big show — the total solar eclipse on April 8, 2024!



HIGH-ALTITUDE BALLOON NEWSLETTER

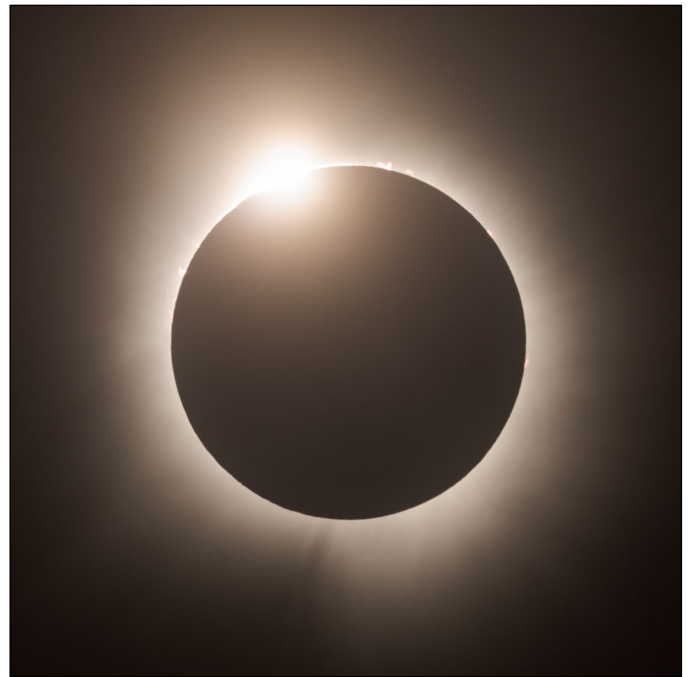
Our Space Cowboys team traveled to Bluffton, Ohio, which was located within the path of totality. There, they launched 32 balloons in 31 hours from the campus of Bluffton University. The weather on eclipse day was about as good as you can hope for in Ohio for that time of year: 70°F and mostly sunny, with thin high clouds and a light breeze.

During the eclipse, the team's surface weather station at the launch site measured a temperature drop of 6.5°F. One of their radiosondes that was launched 23 minutes after totality ended revealed that this temperature drop was present only within the lowest ~50 m above the ground. The air above that was much less affected by the eclipse-induced decrease in solar heating.

Meanwhile, the two engineering teams launched their balloons just before totality from the Oklahoma State University Kiamichi Forestry Research Station in Idabel, Oklahoma. After successful flights, their payloads eventually landed in central Arkansas, where the teams recovered later that evening.

Following the total eclipse, our Space Cowboys students analyzed the data they obtained and presented their preliminary results, as well as highlights from the project, at UW's annual Undergraduate Research and Inquiry Day on April 20.

To learn more about the Space Cowboys or look back at photos from their NEBP adventures, check them out on [Facebook](#) and [Instagram](#)!



SPRING 2024 | 6



CONTACT US

wyomingspacegrant.org
wsgc@uwyo.edu
307-766-2862

FOLLOW US

