

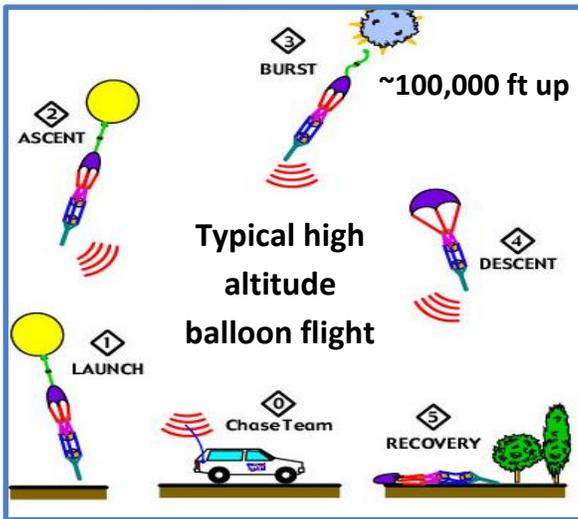
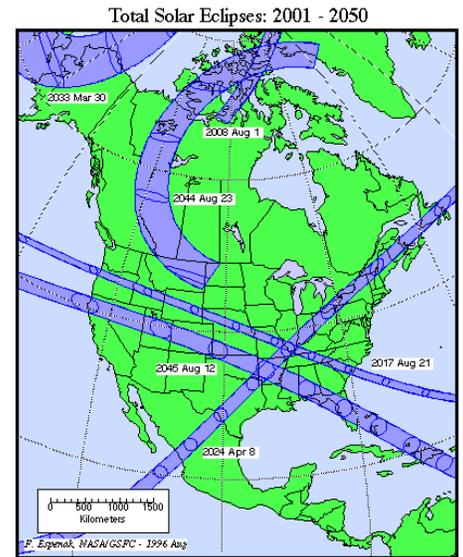


Nationwide network of total solar eclipse high altitude balloon flights

Project overview as of January 2016
<http://eclipse.montana.edu>

NASA BELIEFS: We believe strongly in making the most of this rare astronomical event, in the realms of the general public, education, and creating meaningful long-lasting partnerships. We also believe strongly in giving the student participants career-making opportunities. We will endeavor to use the most cutting edge tools, resources, and communication.

WHAT: Students will conduct high altitude balloon (HAB) flights from 15-20 locations across the 8/21/2017 total eclipse path, from Oregon to South Carolina, sending live video and images from near space to the NASA website. Video and images of a total eclipse from near space are fascinating and rare. It's never been done *live*, and certainly not in a network of coverage across a continent.



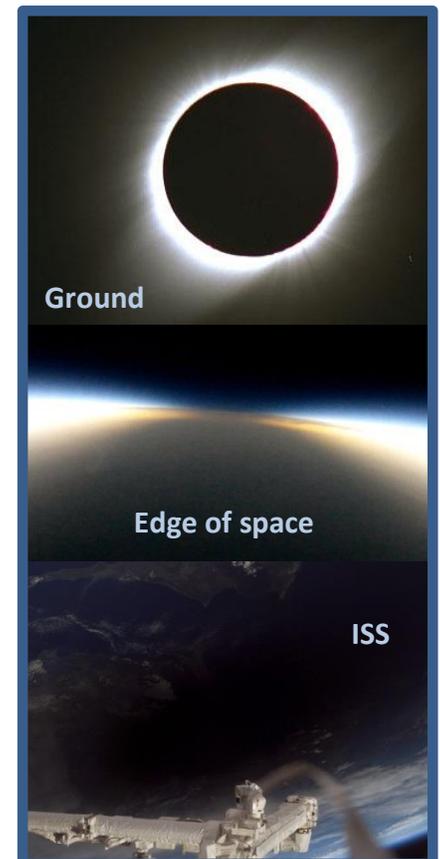
WHY: #1: Public engagement. Total eclipses are rare and very impactful events. The continental US hasn't had a total eclipse since 1979. The NASA Space Grant network is in a unique position to engage the public in an awe-inspiring and educational way and for surprisingly small cost. **#2: Workforce development.** This project presents an amazing hands-on learning opportunity for the thousands of students who participate. **#3: Partnerships.** Several long lasting partnerships with other federal agencies and

with industry (ATA Aerospace, Google Loon, Raven Industries, World View Enterprises, etc.) have developed and will continue to mature.

WHO: Currently 65 teams from 38 states are already participating in practice events. Organization and planning is led by Montana Space Grant with assistance from 20 other Space Grant Consortia. Working groups include: Common Camera Payload Design, Launch Sites, Coordination, Atmospheric Science, Solar Science, Art, External Engagement, and Media.

WHEN: Eclipse totality starts on the Oregon coast at about 1:20 PM EDT on **August 21st, 2017** and ends about 2:50 PM EDT on the South Carolina coast. Major project milestones:

- July 2016: workshop to build common camera/tracking payloads
- Fall 2016: virtual workshops to train, test, and brainstorm
- June 2017: dry run with at least one flight per location





WHERE: Live from 15-20 locations along the eclipse path to tens of millions on NASA TV and NASA.gov.

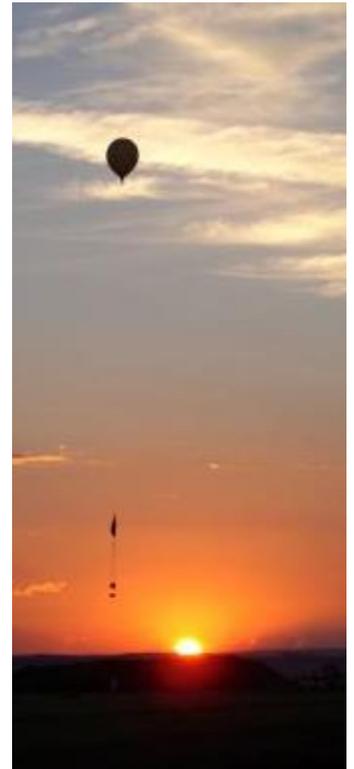
FUN CHALLENGES: While uploading live video and images from the edge of space to the internet has been done by an academic HAB group, carrying out a network of flights from across the country that is streaming live images and video to the NASA webpage presents a few challenges. These challenges provide compelling training opportunities for the student participants and make the project exciting and meaningful for

the teams. Challenges conquered: creating a downlink system capable of streaming live video, collaborating with dozens of groups of mentors and students at locations spread across the country; challenges still in progress: making the necessary media arrangements with NASA so that the live content can be shown on NASA TV and linked to the NASA web page, and completing the required steps to secure agreements with the industry partners/donors.

EXPERIMENTS: In addition to the common camera payloads that will provide near real time footage of the moon's shadow on Earth and the darkened sun, teams will fly a secondary payload of their choice. Links to information and pictures about each team's secondary payload will be included online. It is not necessary to fly the common camera payload to participate in the project as long as teams conform to our FAA and NASA safety requirements. In a second effort in collaboration with NOAA and NSF, 1,000 radiosonde balloons will be flown to gather important science data on eclipse effects to our atmosphere.

COSTS PER TEAM: The following numbers are rough estimates. A funding opportunity for Space Grant *undergraduate teams* will be released in winter 2016. In this opportunity, two latex balloons and common payload kits are also provided at no cost to funded teams. Teams not composed of undergraduates are welcome to participate but will need to seek funding separate from the undergrad opportunity.

- Common payload with camera, satellite communication: \$3,100
- Secondary payload: \$50 - \$1,000
- Balloons, helium/hydrogen, basic flight supplies: \$1,500 - \$3,000
- Travel to launch and recovery sites: \$1,000 – \$10,000
- Data download fees: \$100 – \$2,000



CONTACT: If you're interested in participating, partnering or sponsoring, please contact one of the following AND sign your team up at <http://eclipse.montana.edu>

- Local participation: Your Space Grant: nasa.gov/offices/education/programs/national/spacegrant/home/
- Overall project concept: Angela Des Jardins, [Angela.Desjardins \[at\] montana.edu](mailto:Angela.Desjardins@montana.edu)
- Participation details: Shane Mayer-Gawlik, [shane.mayergawlik \[at\] montana.edu](mailto:shane.mayergawlik@montana.edu)
- Ballooning basics: <https://www.balloonchallenge.org/tutorials>
- Coordination Team: Caitlyn Nolby, [CNolby \[at\] space.edu](mailto:CNolby@space.edu)
- Atmospheric Science Team: Jennifer Fowler, [Jennifer.Fowler \[at\] mso.umt.edu](mailto:Jennifer.Fowler@mso.umt.edu)