



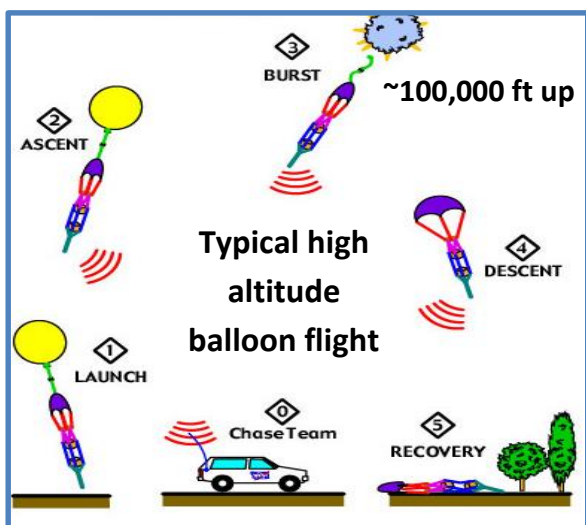
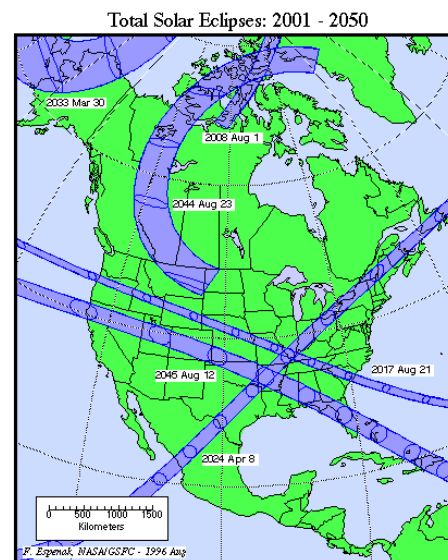
NASA

Nationwide network of total solar eclipse high altitude balloon flights

Project overview, Summer 2015

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. This means there will be no black boxes and 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.



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

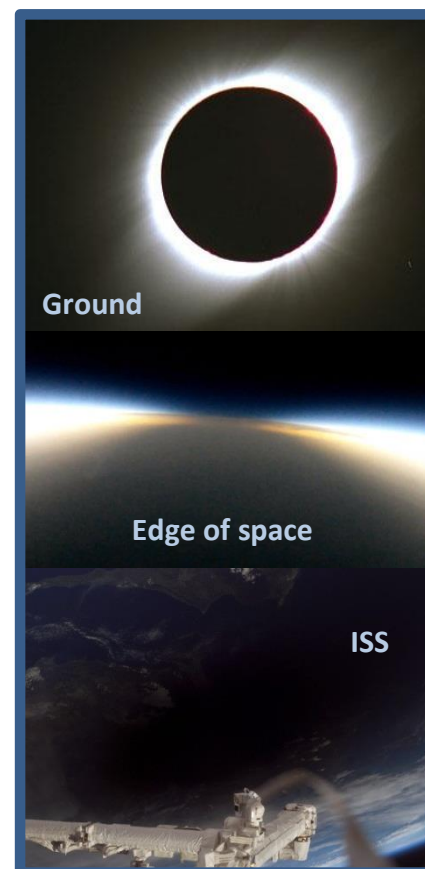
WHO: Currently 60 teams from 35 states are already participating in practice events. Organization and planning is led by Montana Space Grant with assistance from 25 other Space Grants. Working groups include: Common Camera Payload Design, Launch Sites, Coordination, Atmospheric Science, Solar Science, 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:

- December 2015: distribute common camera/tracking payload kits
- Summer 2016: virtual workshops to train, test, and brainstorm
- June 2017: dry run with at least one flight per location

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 (NOAA, NSF) and with





WHERE: From 20+ locations in eclipse states to tens of millions on NASA TV and NASA.gov.

FUN CHALLENGES: While uploading a live image 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/or 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

include: creating a downlink system capable of streaming live video, collaborating with dozens of groups of mentors and students at locations spread across the country, making the necessary communications 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 primary camera payloads that will provide 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. 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 late summer 2015. In this opportunity, zero pressure balloons and common payload kits are provided at no cost to funded teams.

- Primary payload with camera, satellite communication: \$2,500
- 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: \$20 – \$2,000

CONTACT: If you're interested in participating, partnering or sponsoring, please contact one of the following:

- 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)
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