



Anticipated LaACES Flight Operation 2021

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Flight Certification Checkpoints



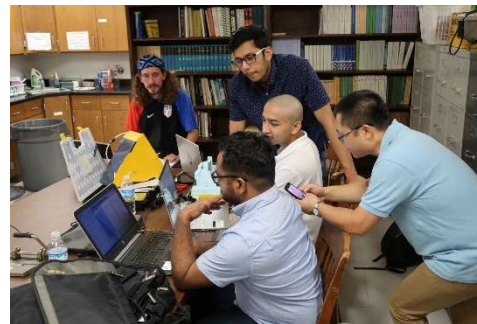
- Accepted Design Review Documents
 - PDR due 15FEB2021
 - CDR due 31MAR2021
 - FRR due May 3, 2021
- Successful Completion of Thermal Vacuum Test at LSU April 16, 2021
- Successful FRR defense
- Conform with physical requirements (string width and weight)



Thermal / Vacuum System Test



- Use LSU thermal / vacuum (T/V) chamber to simulate the extremes of balloon flight
- All LaACES must complete T/V Test to fly, teams may attend T/V in person or deliver payload to LSU via post or physical drop off/pickup
- All payloads are to be flight ready and configured for flight.
- Payloads are cold cycled and heat cycled while under the vacuum equivalent of 100,000 feet
- Timestamped chamber temperature and pressure data will be available





Recommended Pretests

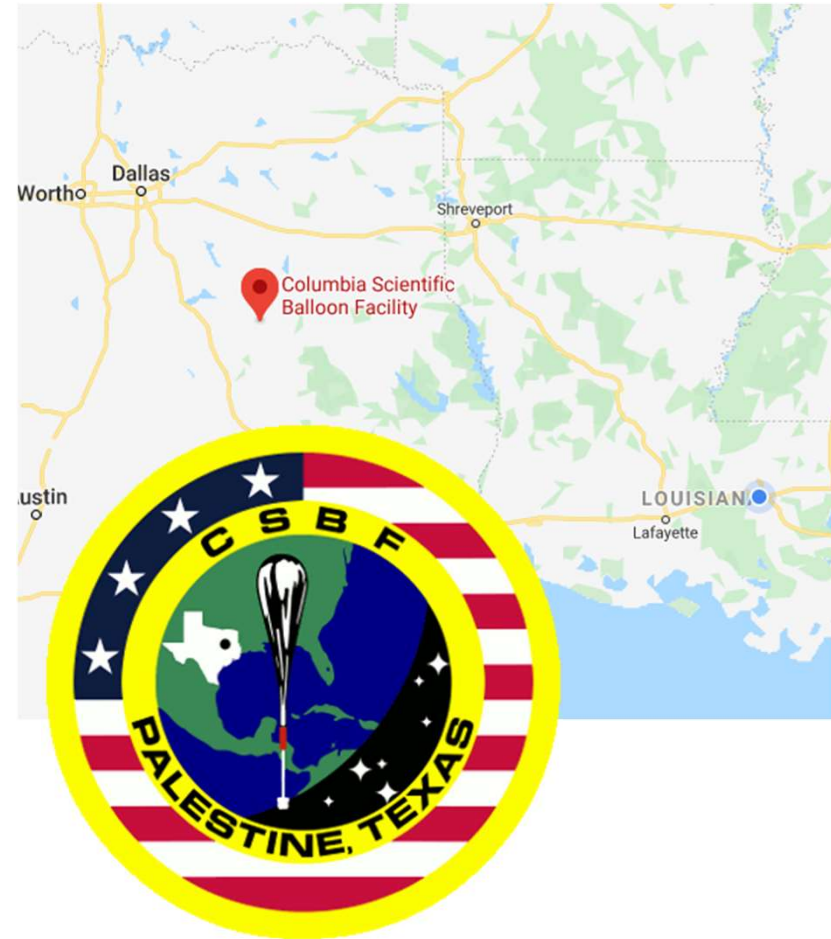
- Testing to prior to T/V will make it more likely to have payload operate successfully
- Home freezer or dry ice testing
- Bell Jar vacuum testing at home institution
- Extended time ground payload testing, i.e. let it run and collect data for several hours
- Physical Drop testing





2021 LaACES Flight

- 2021 LaACES Flight Planned for May 16-21 2021 from NASA's Columbia Scientific Ballooning Facility in Palestine Texas
- Teams will be responsible for own travel and lodging
- Prompt completion of security screening paperwork in March 2021 will be required





LaACES Launch Week Schedule



- Monday
 - AM : Check in FRR Presentations
 - PM : Final Certification and Flight String Assembly
- Tuesday
 - Flight and Recovery Operations
- Wednesday Flight
 - Analysis and Science presentation prep
- Thursday
 - AM : Science Presentations
 - PM : Return Travel
- Friday
 - Contingency Day



The balloon payload assembly hanger at NSBF



FRR Presentations



- SHORT summary of FRR (~15 min)
- Science Goals (What you are measuring and why)
- Technical Goals (How you are measuring, hardware and software)
- Pre-Flight Testing with results
- Should demonstrate that the team has a working payload





Launch Preparation



- Teams perform last minute fixes, adjustments and initializations
- Address any comments from FRR presentations
- Final Weigh In of Payload <500 g
- Limited tools and staff support available for troubleshooting
- Payloads placed on String must be in Ready to flight condition:
 - All hardware (Batteries, SD cards, etc.) installed
 - Flight Software Loaded
- Payloads must be on the flight string by Monday evening





Launch Day

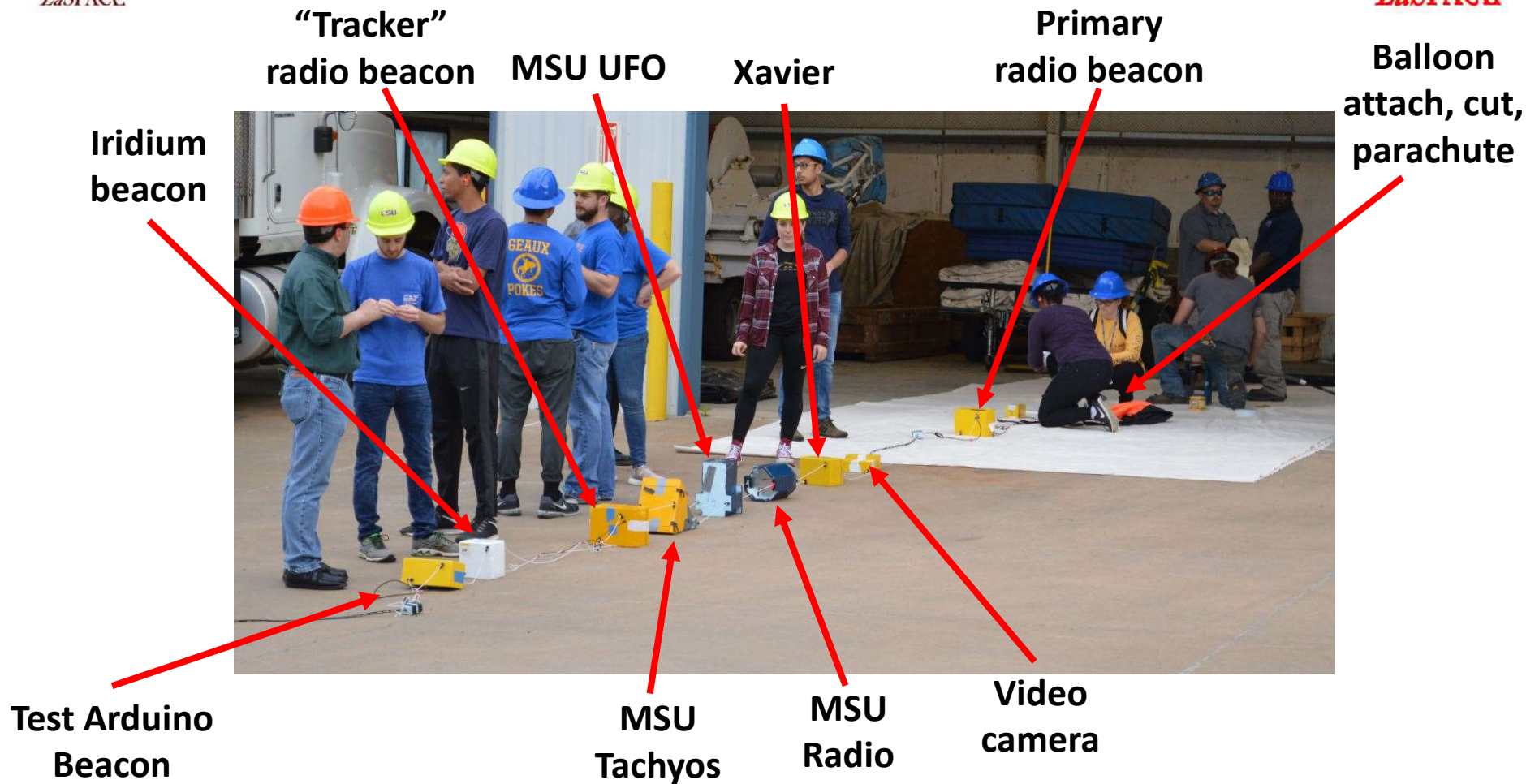


- Teams should be at CSBF prior to 5 am (Exact time to be discussed prior day)
- Teams make final payload flight preparations
 - Powering payloads on, checking indicators, etc. not troubleshooting
- CSBF crew sets up the helium truck while students walk the flight string to launch pad
- Compliance with CSBF staff instructions and safety rules is paramount
- Countdown... Launch!





A Typical Flight String



ACES-60 total suspended weight is 4.960 kg or 10.9 pounds



Tracking The Payload



- Balloon Position Tracked via Amateur Radio frequency beacons (APRS) and Iridium Satellite
- Tracking information will be available on LaACES website
- Mobile Data(Cell) may or may not be available during recovery
- All chase vehicles should have amateur licensed person for radio comms
- Driver should have no other duties
- Cut down command is issued from the primary beacon





Recovery



- Payload lands 45 minutes after cut-down command issued
- Ideally, the tracking team is at the landing site upon landing
- Recoveries range from easy to very difficult
- An assortment of recovery tools is brought to assist





Safety during Recovery

- Personal Safety is top priority on flight day
- Chase vehicle driver should not have other duties (no tracking)
- No entering private property without explicit LaACES management direction
- Rural State Highways: High Speed Traffic, Narrow Shoulders, possible poor visibility
- Water, Sunscreen, Bug Spray, Proper Attire



Post-Flight Science Report



- During the launch trip teams will be required to present a report on their preliminary science results
 - PowerPoint presentation including science background, brief description of instrument, calibrations, analyzed data, science results and error analysis
- Teams will have a full day following the flight to analyze the payload data and prepare their report
- Teams will be provided with a time to altitude converter program for the flight
- Recommend the following prior to the launch trip
 - Have the team's presentation done except for the science results
 - Have the payload calibrations complete and ready to apply
 - Have the ground data handling and analysis software complete, tested and ready to go



CSBF Closure/Covid Contingency



- Still Support T/V Test at LSU if possible
- Teams will be instructed to include additional section in FRR
 - Payload Delivery to LSU
 - Pre-Launch Instruction
 - Post-Recovery Instruction
 - Payload Pickup from LSU
- LaACEs Management will evaluate dates for Louisiana flight based on weather and flight predictions



ACES-65

- Were able to launch ACES-65 on Aug 3, 2020 during Phase 2 conditions

