



**LaACES
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Ballooning
Course**

The Flight Readiness Review (FRR)



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What is the FRR for?

- Determine that all issues from CDR have been resolved
- Document Experiment Readiness
 - As-built configuration
 - Environmental testing results
 - Calibrations performed
- Provide quantitative evidence that the payload:
 - Meets requirements
 - Is safe
 - Will perform properly
- Determine any impact on other payloads or the vehicle
- Describe procedures for checkout, integration with the vehicle and mission operations
- Identify outstanding issues that must be addressed prior to flight



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FRR Outcomes

- All experiments certified
- All experiments plus vehicle conform to FAA guidelines
- Approval for flight operations

OR

- Experiment does not meet requirements
- Remove it from flight operations



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Documenting the Payload - 1

- Complete description of payload as built
 - Mechanical drawing, electronic schematics, photos
 - Written description of construction & operation
 - Flight & ground software flowchart, description, listings
 - Specifications for all sensors and electronics
- Weight budget divided up into major components and all components measured
- Drawings of payload as-built, showing location of components and structural supports
- Specifications for all structural hardware



Documenting the Payload - 2

- Are the instrument calibrations adequate?
 - Calibration needs, procedures and sources
 - Calibration data and results
- Will the instrument perform in the flight environment?
 - Thermal, vacuum & shock test procedures
 - Instrument data and results during tests
- Thermal tests of all structural materials showing survivability
- Vacuum test of payload showing survivability
- Shock test of payload showing survivability
- Pay particular attention to vehicle interface and box integrity



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Impact on other payloads

- Does payload conform to weight constraint?
- Does payload conform to size constraint?
 - Are there booms or other protuberances that might affect other payloads?
- Does the payload emit any RF?
 - What frequencies and strength?
 - Is it transmitting on any restricted frequencies?
- Does the payload conform to the flight vehicle interface?
 - Spacing between attach points
 - Does the flight string pass freely through payload?



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Flight Integration & Mission Ops

- Are there any launch or flight profile conditions that might affect the quality of your science?
- What must be done to prepare the payload for flight and how long will these operations take?
 - Launch day – 24 hours operations
 - Launch day (prior to flight line) operations
- What must be done to prepare the payload for launch and how long will these operations take?
- What are the procedures for payload recovery?



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FRR Procedure

- FRR will be organized & held by the La ACES project
- Team must produce a written document
 - Formatted like PDR & CDR documents
 - Received at LSU two weeks prior to launch
- Feedback on the written document will be returned to the team at least one week prior to launch
- Team must produce a presentation
 - PowerPoint format like CDR
 - Presented one day before launch at CSBF
 - Address feedback on FRR document
- All issues must be resolved prior to balloon vehicle integration



Student team experiment undergoing FRR prior to ACES-01 flight



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Questions?

- Any questions about the FRR requirements or procedures should be addressed to the LaACES Project at LSU as far in advance as possible
- E-mail T. Gregory Guzik
 - Guzik e-mail guzik@phunds.phys.lsu.edu