# The Louisiana Solar Eclipse Project or What did I get myself into?

T. Gregory Guzik

Louisiana Space Grant Consortium

# Initial plan was simple

- LaSPACE has developed a number of ballooning programs over the years
  - E.g. LaACES, PACER, WBEE, HASP
- So working with the Montana Solar Eclipse balloon project should be straight forward
- Use the Montana developed HD video payload and ground station

- Fly the system somewhere along the path of totality that we could drive to from Louisiana
- Kentucky seemed like a good place to go, but they became overloaded very quickly
- Decided to try southern Illinois.  How about somewhere around Carbondale?

# Why Carbondale?

- I grew up around Chicago, so I consider Illinois to be a cool state
- Colleen wants to visit Chicago (and I told her it is only a short drive away from Carbondale)

- Have some established contacts to help with logistics
  - Sarah Kovac is attending Southern Illinois University
  - Sarah was a REU student with my group at LSU during 2015
- Good location in path of totality
- Drive of about 8.5 hours via I-55

# Next Level Plan

- Recently refurbished our "Mobile Astronomy Resource System (MARS)" truck that we use for outreach
  - Portable digital planetarium to support "sky shows"
  - Two 8" Meade LX200 computer controlled telescopes
  - Solar filters, Large screen LCD, telescope video cameras, Bluray player, 5 kW electrical generator
- Also use MARS to transport ballooning equipment
- Setup public show in conjunction with the balloon launch

# Include other LA teams

- Over the years up to 12 affiliates participated in our student ballooning program
- Included a “Solar Eclipse Competition” in the 2016 LaACES RFP

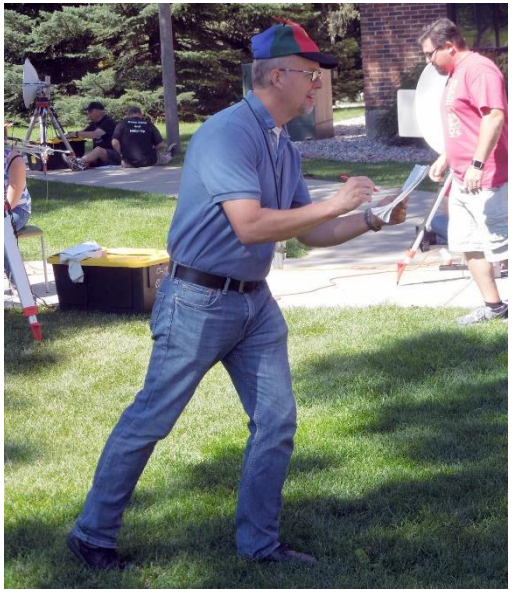
- Funded teams will need to develop a balloon payload appropriate for flying during the solar eclipse
- Teams need to deliver PDR, CDR and FRR documents and payloads will be flown during our May 2017 event at NASA CSBF in Palestine, TX
- Teams and payloads will be judged and the top teams will be supported to fly with us during the Solar Eclipse

# Now it starts getting interesting

- We were invited to help Montana, Colorado and Minnesota conduct the Solar Eclipse workshops
- Plan for 50 teams to construct ground station, HD video payload, still picture payload, Iridium beacon, terminate device, plus testing and training in usage (!!!!!)
- All workshops were in Bozeman, MT
  - January was to train the trainers
  - May was a test run of the workshop with only a few teams
  - July was the full workshop for most teams
  - For July LA and MN conducted a “How to fly a balloon” session.

# The workshop action

**Action Heroes**



**LSU Workshop Wizards**

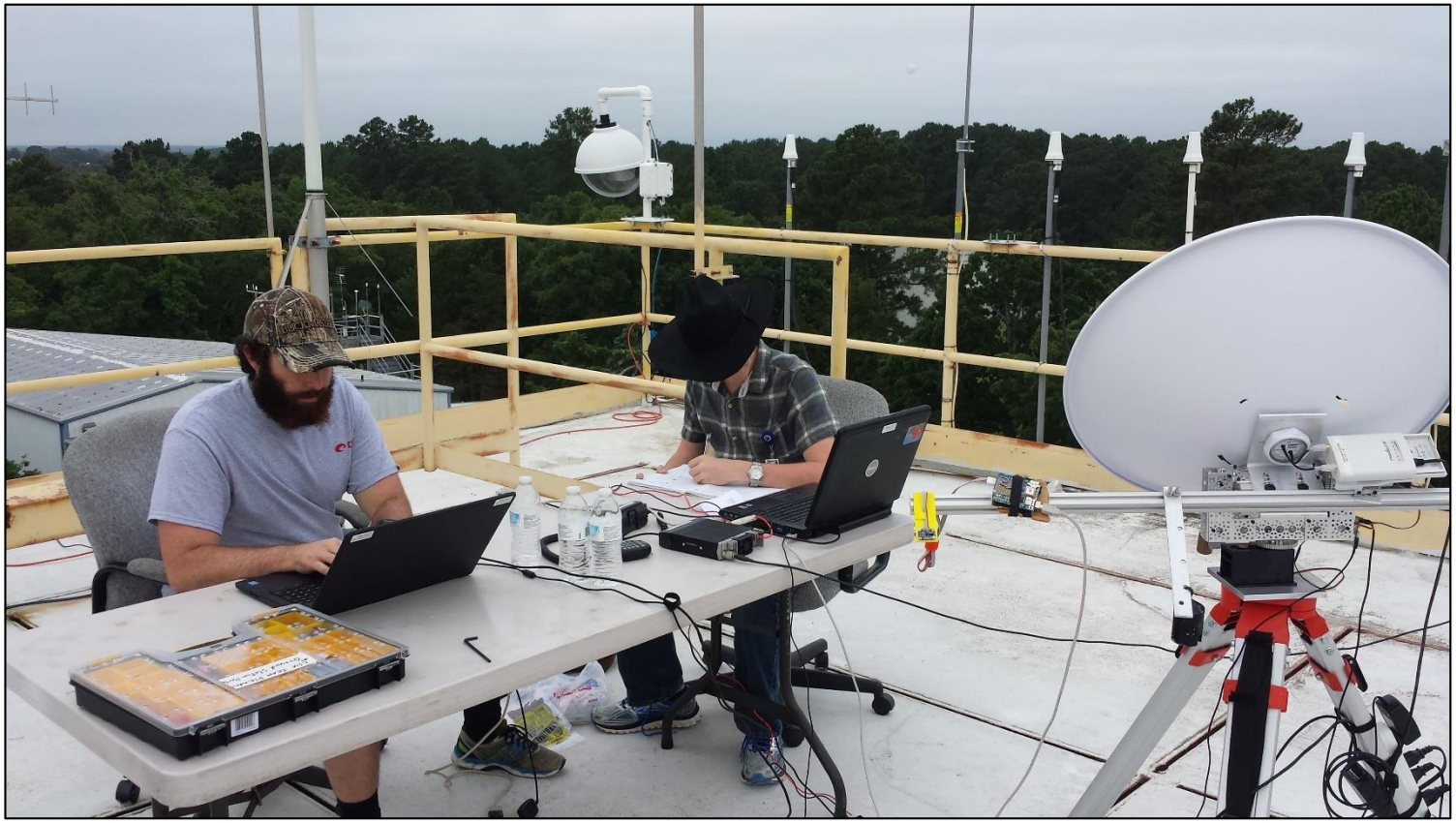
# Parallel testing / refinement of baseline video payload

- Decided to focus exclusively on the HD video payload
- Modified the ground station software to use a direct feed from an APRS beacon

- Flew a test payload during the LaACES trip to the NASA balloon facility in Texas during May, 2016

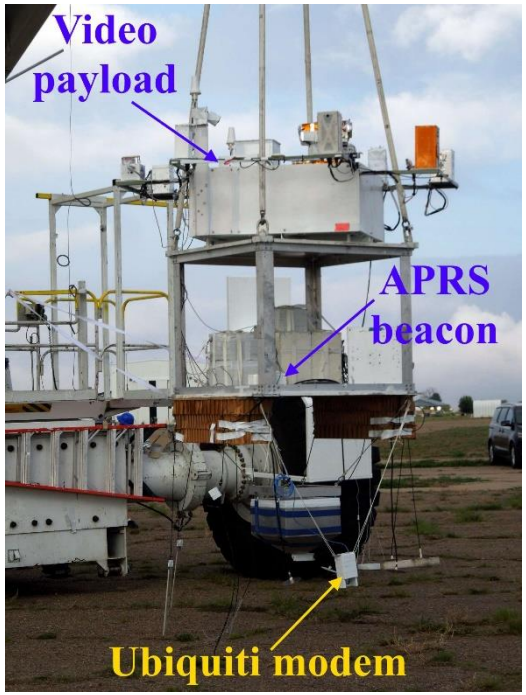
- Setup ground station on top of payload building to get clear view
- It was a “learning experience”
- That’s code for “things didn’t work too well!”

# This is what they claim they were doing!

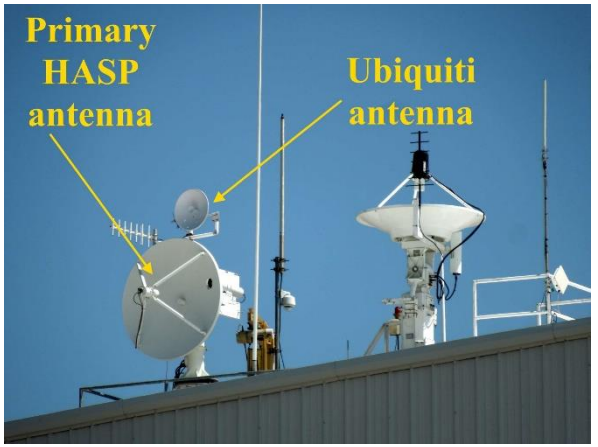


# This is what they were actually doing!

# Prepared another test for HASP




- Developed a version of the HD video payload that uses HASP power
- Used the Byonics Micro-Trak RTG as a separate APRS beacon
- Ubiquiti modem mounted below ballast hopper




- Mounted one of our receivers on the NASA CSBF tracking system
- Significantly refined the ground station APRS tracking software

# HASP flight test was successful

- Launched HASP on 9/1/16 at 16:08 UTC
- Ran the APRS beacon transmitter at only 5 W
  - Received packets from up to about 250 miles away!
- Streaming success using the CSBF tracking system and the revised GS
  - Stream 1080p at 122,000 feet and LOS ~40 miles
  - Stream reduced bit rate out to LOS ~56 miles

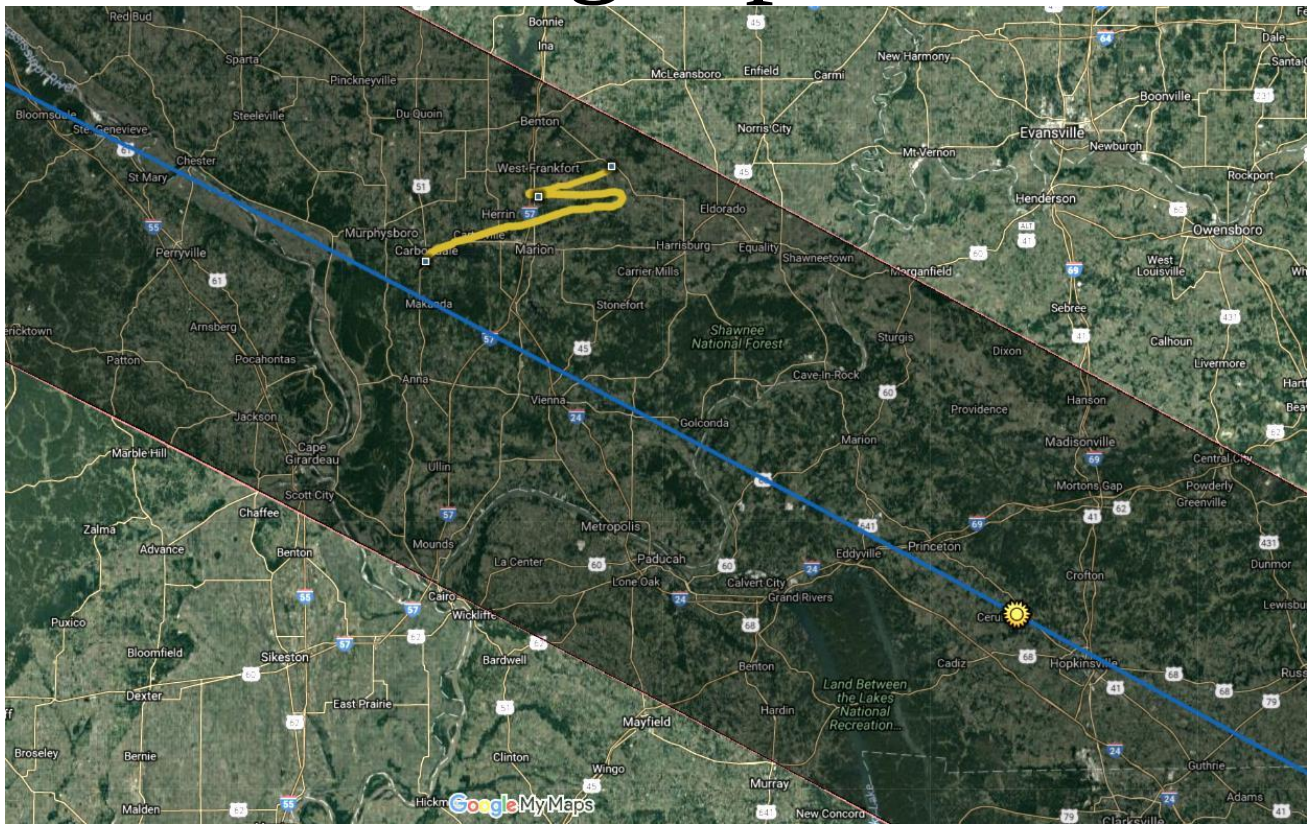
# Now planning for Carbondale

- Discovered this is going to be a major NASA outreach site for TWO solar eclipses!
- Eclipse 2017
- NASA Edge
- Adler Planetarium
- Citizen CATE

http://eclipse.siu.edu/

YIKES!!!!

# Potential flight path on 8/21

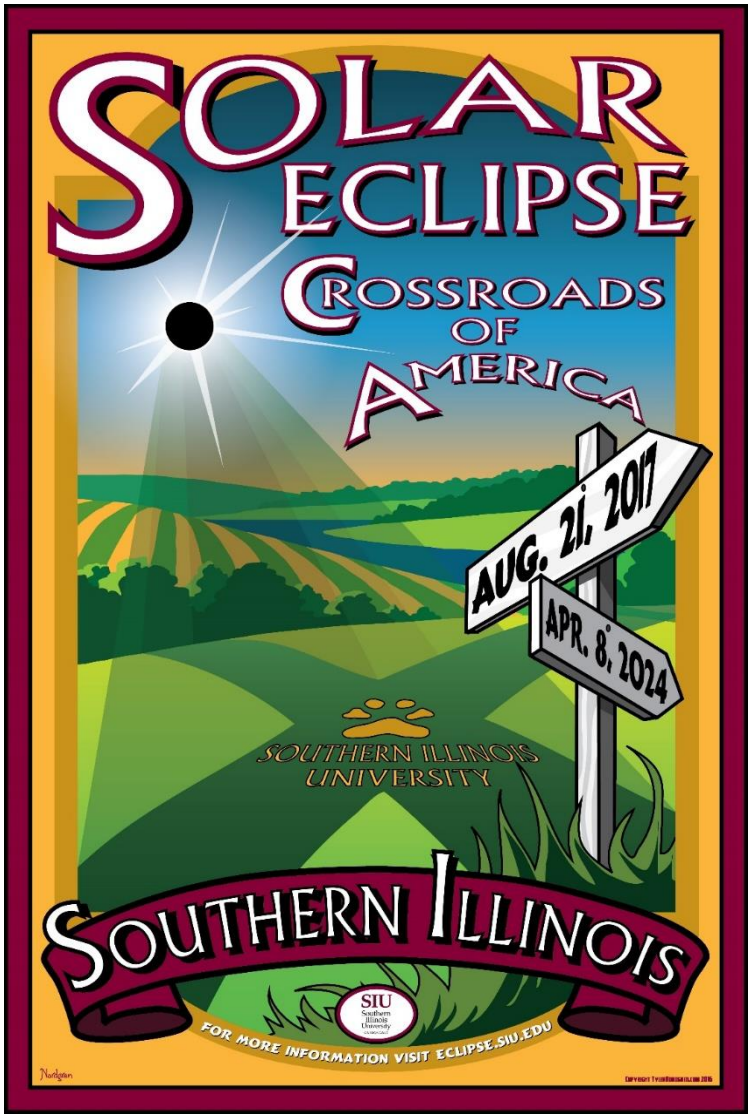



- Averaged NOAA sounding measurements made on 8/21 for ten years
- Launch at SIU stadium at 11:02 am and reach 90,000 feet at about 12:18 pm (maximum eclipse) at ~28 miles LOS

# Things are coming together

- Visiting Carbondale on Oct 11 to begin logistics planning
  - Meeting with Bob Baer, Sarah Kovac, look at launch sites, ground station sites, coordinate with FAA, etc.
- Beginning discussions with NASA Edge to investigate possible collaboration
- Investigating how low in bit rate we can go and still have the WOW factor!
- Revised ground station using Yaseu antenna rotator
- ePlanetarium (Patricia Reiff) is looking to develop a Solar Eclipse 2017 planetarium show

# 325 days left!




**TRIPLE YIKES! !!!!**