
National Aeronautics and Space Administration
NASA
NASA Flight Opportunities
Practicing Fly-Fix-Fly: Re-flight Opportunity Through NASA TechLeap Prize
Ben Gorr, Texas A&M University
Paul De León, NASA's Flight Opportunities Program
Community of Practice Webinar Series – August 2, 2023
Session will start at 10 a.m. PT – Please mute your microphone and turn off your camera
www.nasa.gov

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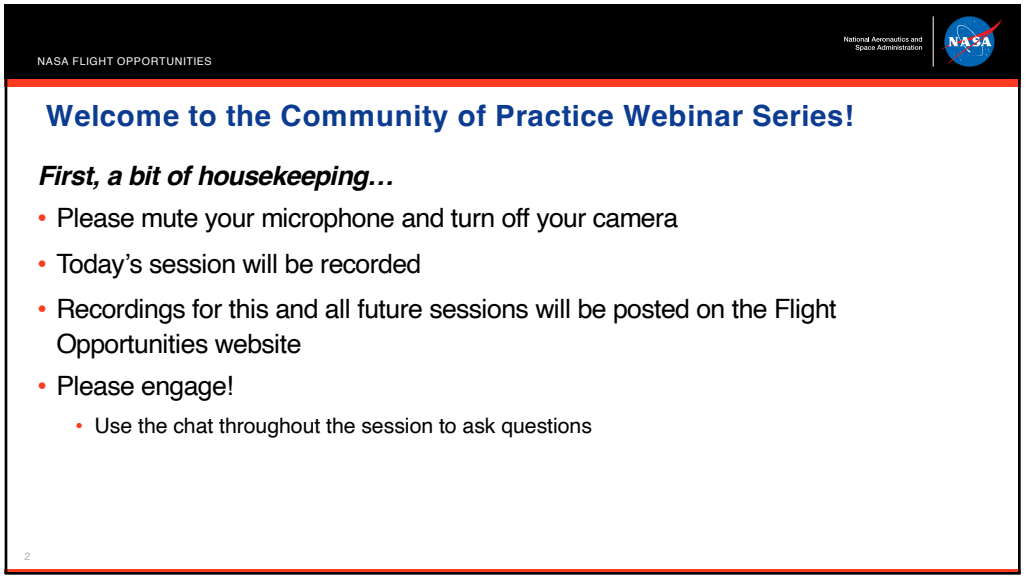
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Welcome to the Community of Practice Webinar Series!
First, a bit of housekeeping…
• Please mute your microphone and turn off your camera
• Today's session will be recorded
• Recordings for this and all future sessions will be posted on the Flight Opportunities website
• Please engage!
• Use the chat throughout the session to ask questions
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NASA FLIGHT OPPORTUNITIES

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Welcome to the Community of Practice Webinar Series!

Flight Opportunities hopes these webinars will enable researchers, program staff, and flight providers to connect informally and share information

- Designed to distill and share the most important lessons learned to:
  - Increase the impact of suborbital flight tests
  - Transfer best practices
  - Optimize the experience of current and prospective program participants
- Part of a broad effort to capture, organize, and communicate lessons learned by suborbital researchers
- An opportunity to hear from subject matter experts on best practices for preparing for suborbital flight tests

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Join us for future Community of Practice webinars!

Subscribe to our newsletter for updates on future webinars!

https://www.nasa.gov/directorates/spacetech/flightopportunities/newsletter

Future webinars

- Webinars are held 1st Wednesday of each month at 10 a.m. PT
- Topics will be announced in the Flight Opportunities newsletter and website
- Session recordings will be posted on the Flight Opportunities website
- Let us know session topics you would like to see covered

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Now open:

Suborbital/Hosted Orbital Flight and Payload Integration Services 4

- The new solicitation is designed to replace contracts for existing flight test services and seeks to add new capabilities, including hosting payloads in orbit and flying NASA researchers on suborbital flights.
- This contract will be managed by NASA's Flight Opportunities program, in cooperation with the agency's Small Spacecraft Technology program.
- Flights and other services solicited will be available for NASA internal use across the agency as well as for use by other government agencies.

Key dates:

- Questions due: 12:00 pm Pacific on August 7, 2023
- Proposals due: 12:00 pm Pacific on August 28, 2023
- Please watch SAM.gov for more information and updates.

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Today's Speakers

Ben Gorr
Ph.D. Candidate
SEAK Lab, Texas A&M University

Paul De León
Campaign Manager,
NASA's Flight Opportunities program

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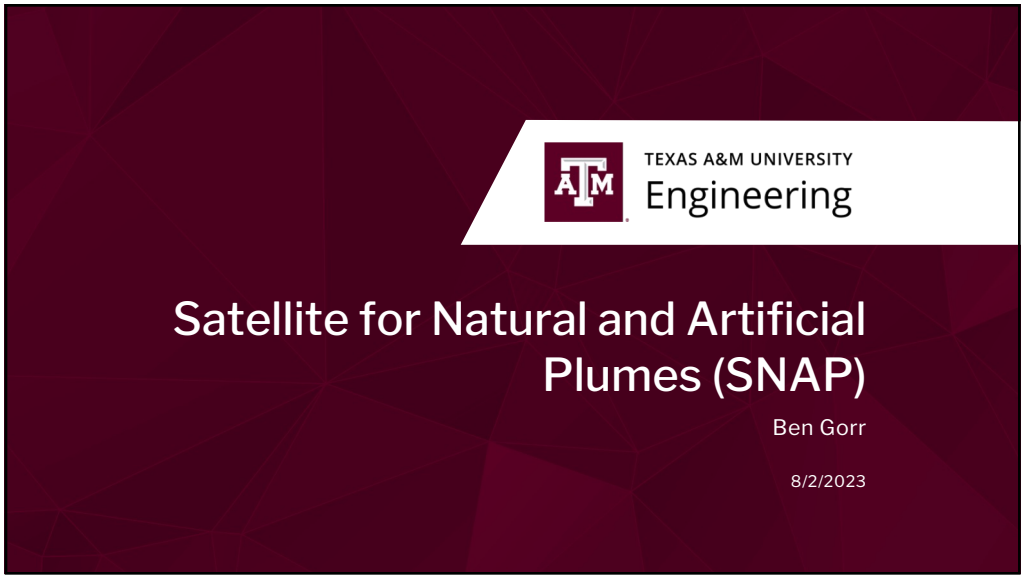
TEXAS A&M UNIVERSITY
Engineering
Satellite for Natural and Artificial Plumes (SNAP)
Ben Gorr
8/2/2023

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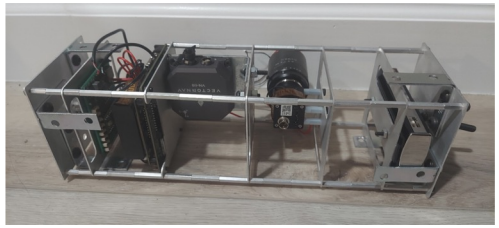
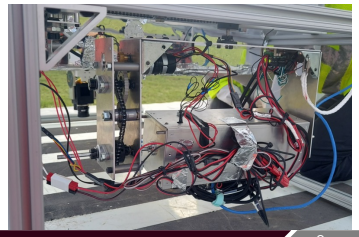
Overview

TEXAS A&M UNIVERSITY Engineering

- The SNAP payload is intended to collect images of plumes on Earth's surface and identify the plumes in order to track them.
- The payload consisted of a computer, IMU and camera within a 2-axis gimbal that allowed the payload to track identified plumes.
- Objectives for the flight:
  - The payload autonomously identifies and segments (determines the plume shape by classifying pixel by pixel) one plume and records accompanying video.
  - The payload slews to track the plume to keep it within the field of view.
  - The plume is geolocated within 100 meters.





TAMU SEAK Lab 9

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Timeline

TEXAS A&M UNIVERSITY Engineering

- October '21 – TechLeap challenge kickoff
- January '22 – NASA FO site visit
- June '22 – NASA FO site visit
- Aug '22 – first flight
- May '23 – second flight

TAMU SEAK Lab 10

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Flight on 8/4/22

TEXAS A&M UNIVERSITY Engineering

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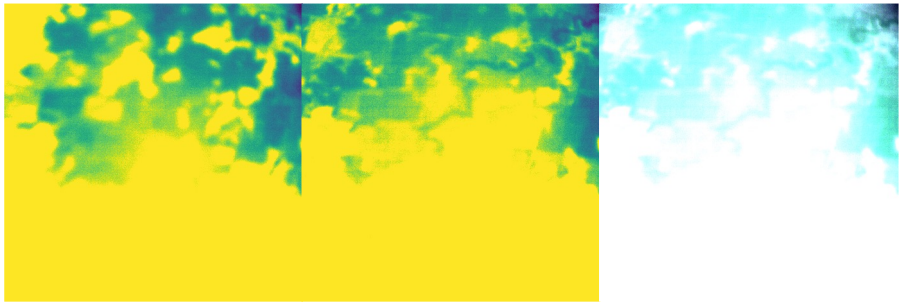
Collected images from first flight

TEXAS A&M UNIVERSITY Engineering

197 images taken at 10 ms exposure time
150 images taken at 0.5 ms exposure time,
~20 of which are not completely
overexposed, none of which are not cloudy



NIR Red RGB

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Major issues identified by first flight

TEXAS A&M UNIVERSITY Engineering

- Computer shutdown due to overheating
- Computer shutdown due to heaters drawing 15V line low (not confirmed, but likely)
- Camera settings caused overexposure of images
- Insufficient structural strength to withstand landing

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Changes between flights

TEXAS A&M UNIVERSITY Engineering

- Thermal strap for computer
- Separate 15V lines for heaters and computer
- Watchdog to hard reset computer
- Adaptive camera settings to adjust to lighting conditions
- Relocating pan gimbal motor to below waffle plate
- Sturdier turntable
- Added thermal camera
- Housing for payload
- Much improved flight software

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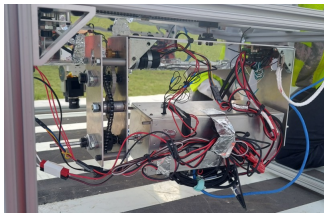
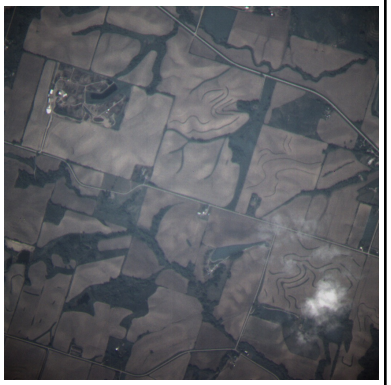
Second flight

TEXAS A&M UNIVERSITY Engineering





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Lessons learned (some of them)

TEXAS A&M UNIVERSITY Engineering

- Have a secondary mission!
  - Especially if your primary mission is operationally challenging
- Robust flight software
  - Well-tested
  - Easily modifiable
- Think about wiring/harnessing early on
- Test, test, test
  - Should start testing things at the halfway mark or sooner, NOT right before flight
- Collaborate!

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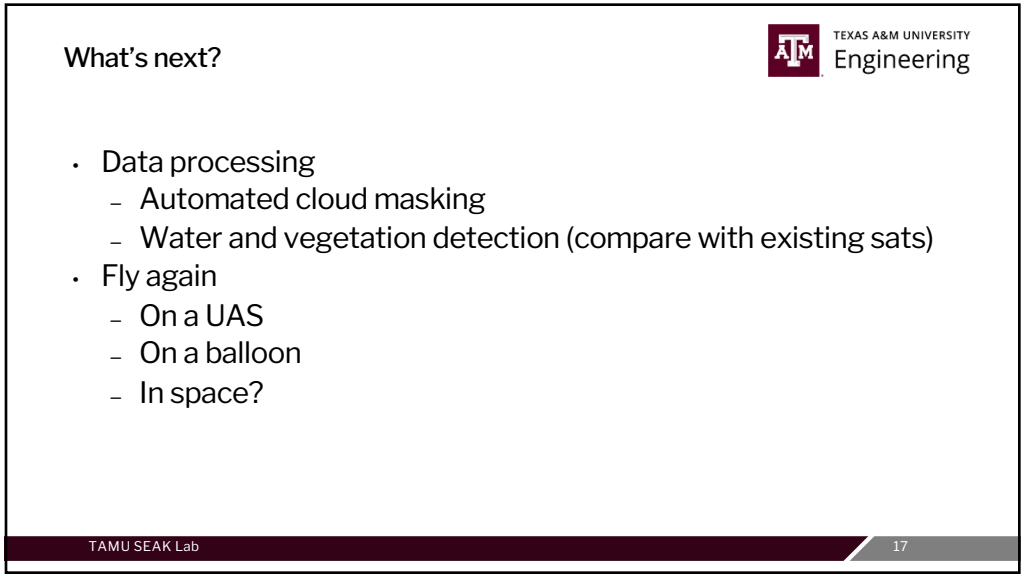
What's next?
TEXAS A&M UNIVERSITY
Engineering
Data processing
Automated cloud masking
Water and vegetation detection (compare with existing sats)
Fly again
On a UAS
On a balloon
In space?
TAMU SEAK Lab
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Questions?

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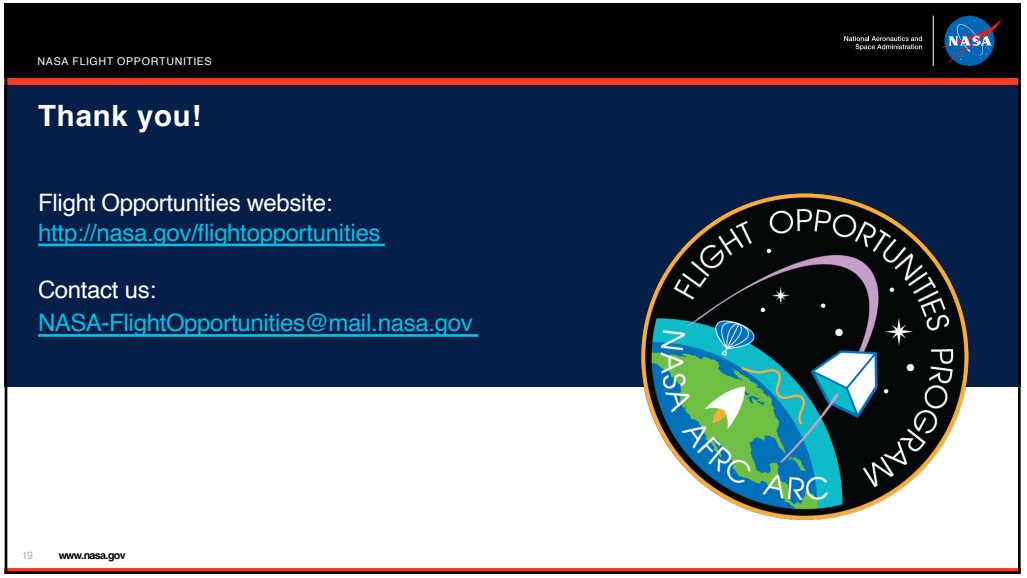
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