WELCOME!

Our Meeting Will Begin Just After 1130

(**Please keep your audio muted to begin meeting**)

San Diego Post

San Diego Post

Society of SAME American Military Engineers

NAVFAC EXWC

Unmanned Aircraft Systems - Program Overview

http://www.same.org/San-Diego

Virtual Conference Rules of Engagement

- **Please mute your microphones during the meeting!**
- View functions (located in top right corner):
  - Speaker view
  - Gallery view
- Use Speaker View during presentation
- Submit questions via the Zoom Chat Function

http://www.same.org/San-Diego

Agenda

1130 – 1145: Welcome, Pledge of Allegiance, & Introductions

1145 – 1215: Keynote Presentation by Dr. Jean Pan – NAVFAC EXWC

1215 – 1225: Question & Answer

1225 – 1230: Meeting Closeout

Society of SAME American Military Engineers

Pledge of Allegiance

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Event Sponsor

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Society of SAME American Military Engineers

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2021-2022
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Dr. Jean Pan

Aircraft Reporting Custodian – NAVFAC EXWC

- Native of Torrance, CA
- B.S. from University of California Berkley
  M.S. from New Mexico State University
  PhD from Indiana University - Plant Sciences/Ecology, Evolution, and Behavior
- Former ecologist for Natural Park Service

http://www.same.org/San-Diego

NAVFAC
Naval Facilities Engineering Systems Command
EXWC Engineering & Expeditionary Warfare Center

From California Least Terns to NAVFAC EXWC's Group 1 and 2 Unmanned Aircraft System (UAS) Program

Dr. Jean Pan
Aircraft Reporting Custodian
Naval Facilities Engineering and Expeditionary Warfare Center (NAVFAC EXWC)

Our Mission

Provide research, development, testing and evaluation and in-service engineering to deliver specialized facility and expeditionary solutions to the warfighter.

Our Vision

Accelerate innovation to enable fleet lethality at sea and ashore.

ENDURING

Science & Technology ⟷ RDT&E — NAVFAC EXWC — Specialized Engineering ⟷ Expeditionary Systems Life Cycle Management

CONTINGENCY

CONUS	OCONUS	COOPERATIVE SECURITY LOCATION	CONTINGENCY LOCATIONS	ADVANCE LOGISTICS SUPPORT SITE/ EXPEDITIONARY ADVANCE BASE

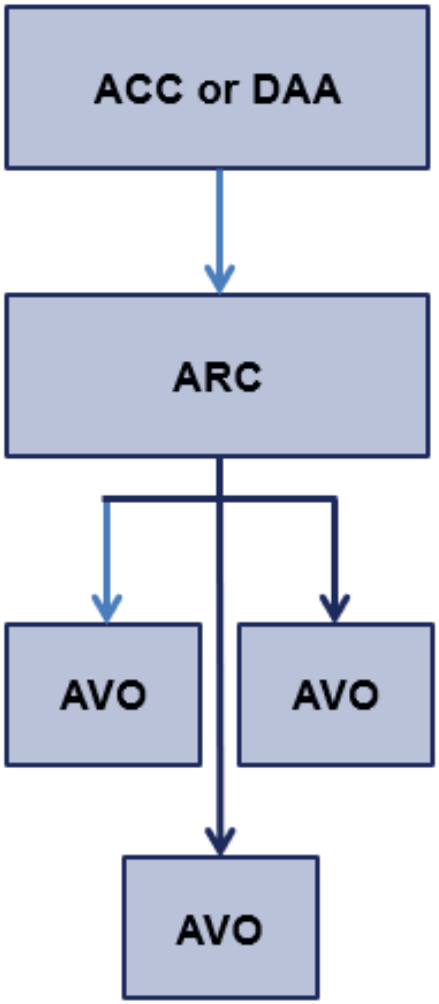
BASES → PLACES

UAS in the Navy

UAS in NAVFAC

- Group 1, 2 (<55 lbs) UAS
  - Primarily commercial-off-the-shelf (COTS)
- Navy public aircraft operations
  - Program established in 2019 per CNAFINST 3710.9

EXWC UAS Program



- **Designated Approving Authority (DAA)**
  - 0-7 or SES who assumes responsibilities of an Aircraft Controlling Custodian, for Group 1 & 2 UAS only, for an entity outside of the Naval Aviation Enterprise (NAE)

Mr. Kail Macias

- **Aircraft Reporting Custodian (ARC)**
  - Lowest echelon of command accepting responsibility for UAS operations Group 1 and 2
  - Typically an 0-5 or Civilian appointed by DAA in writing

Dr. Jean Pan

- **Air Vehicle Operator (AVO)**
  - UAS Crewmembers are appointed by the ARC in writing
  - Meets EXWC AVO requirements

AVOs for each BL

What Can We Do With UAS?

- **Focusing on uses that address:**
  - Situational awareness
  - Personnel safety, resource disturbance (difficult to access areas)
  - Data comparisons
  - Cost efficiencies
- **Use cases**
- **Challenges**

Natural Resources Monitoring: Threatened and Endangered (T&E) Species

- Management of T&E species needed to support testing and training (military readiness)

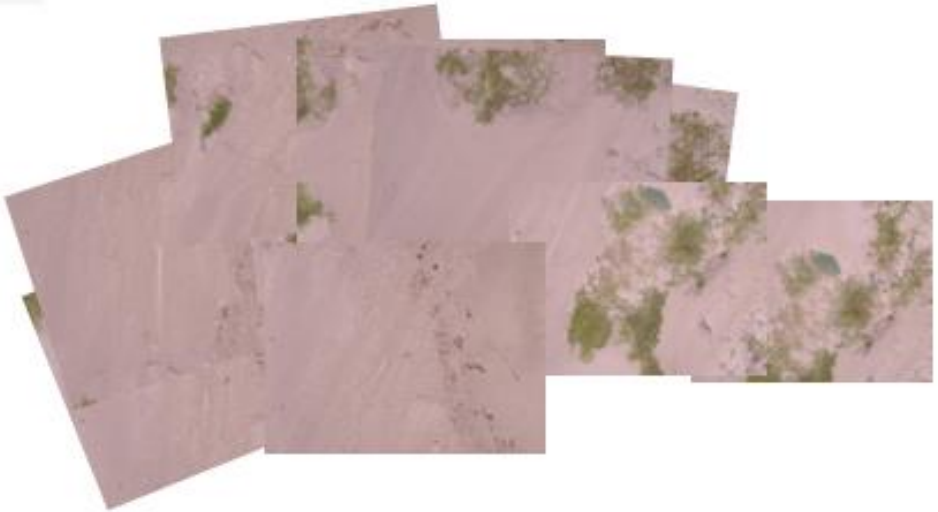
- Timely collection of data needed for adaptive management to protect resources
- Reduce disturbance
- Comparisons between monitoring dates

UAS Workflow

UAS Data Collection → Data Analyses → Information for Decision-making

Data Management

- Data needs
- Sensors
- Sensor resolution



UAS Data Collection

- Monitor nesting colony: California least terns (CLT)
  - Adults: 8-9 in
  - Eggs: <1.5 in

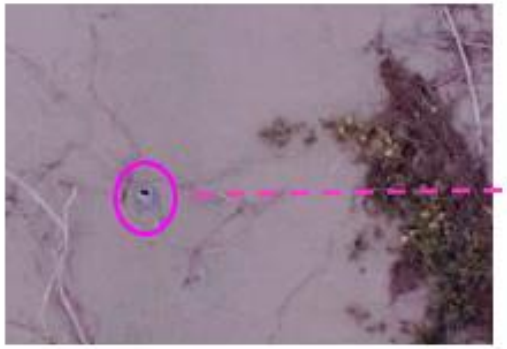
- Questions:
  - Will UAS disturb the birds?
  - Can we see different life stages?

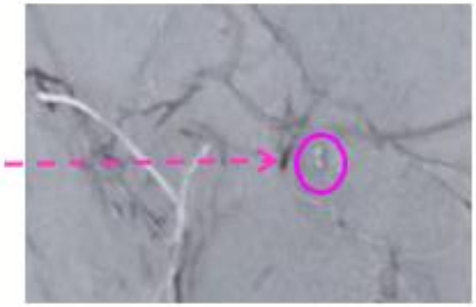
UAS Flight Parameter Testing

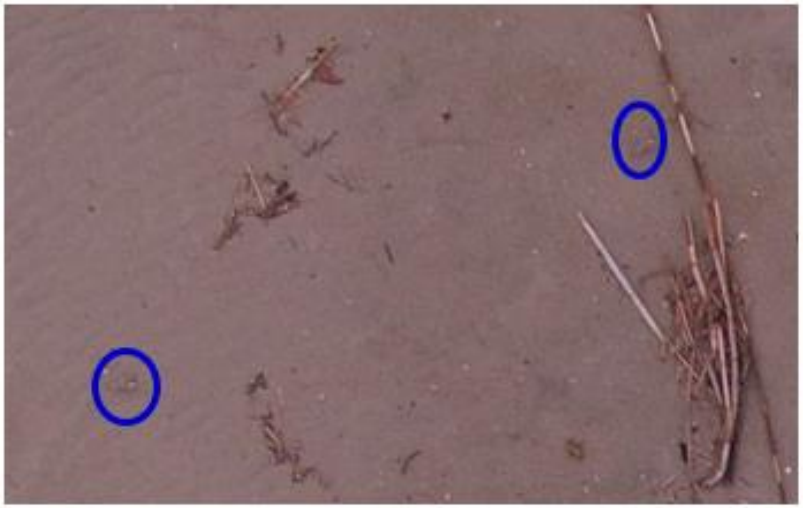
- Tested various altitudes and flight speeds
  - Minimum >75 ft
  - ideally above adult flight altitude (>100 ft)
  - 2-7 mph

CLT Life Stages

- ✓ Adults
- ✓ Fledglings
- ✓ Nests/eggs
- X Chicks





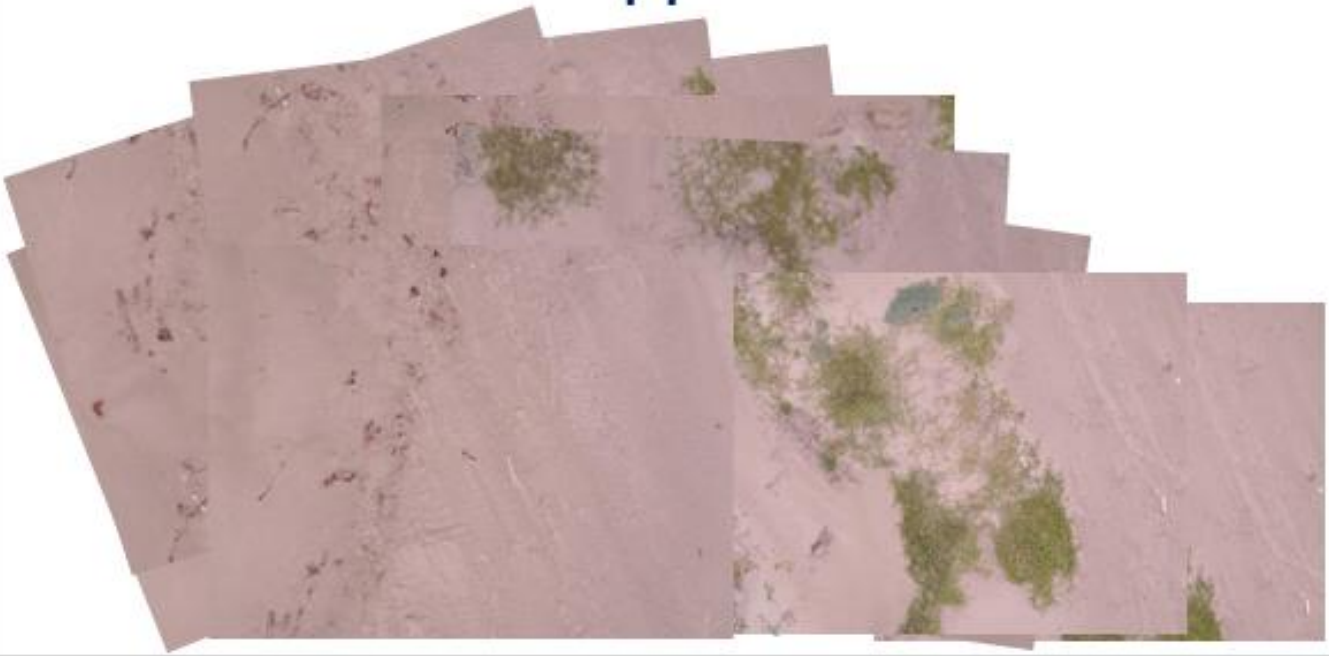


Data Management (1)

- Data transfer
  - micro SD card from UAS
  - use offline computer to burn DVD
  - DVD to command share drive

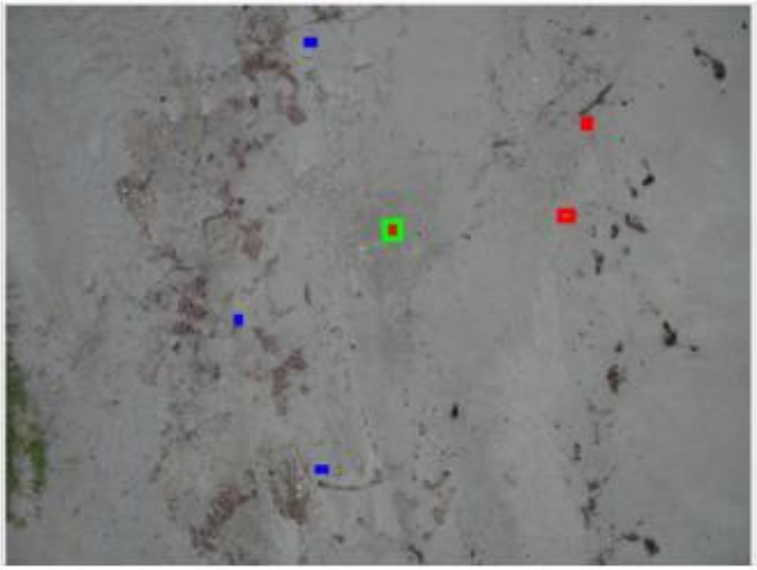
Data Management (2)

- 2017 data (~50 GB)
  - ~700-900 images per day
- 2019 data (~135 GB)
  - >1000 images per day
- Imagery review extremely time consuming; need a more efficient approach



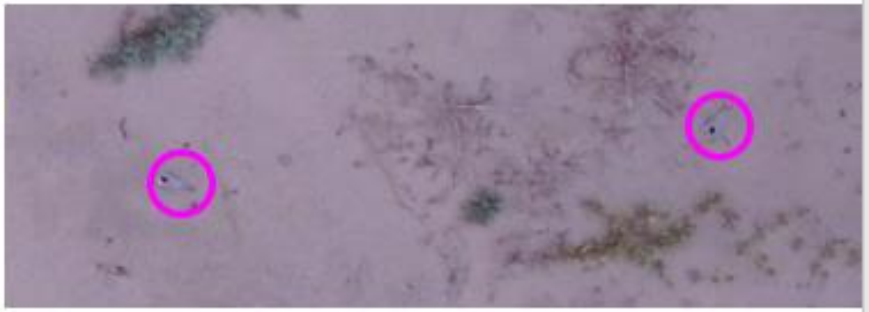
Data Analyses: Automated Target Object Identification

- Machine learning (ML)
  - Computer vision
  - Focused on adult terns
- Used 2017 and 2019 data to train algorithm
  - Human-labeled data
  - Human-verification of putative targets
- Best algorithm:
  - Found ~81% of birds, but had ~30% false positives



Information for Decision-Making

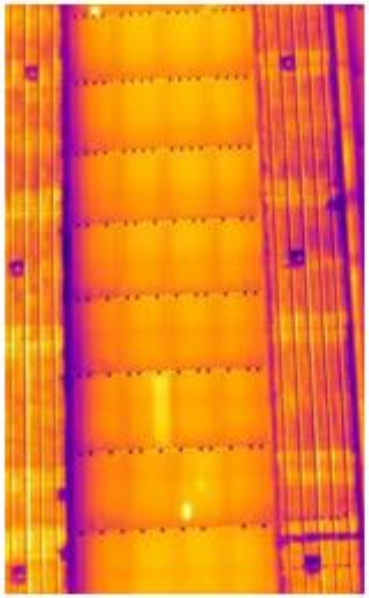
- Incorporating ML with geospatial data
- Monitored for nesting success
  - Identify and count nests
  - Follow nests through nesting season

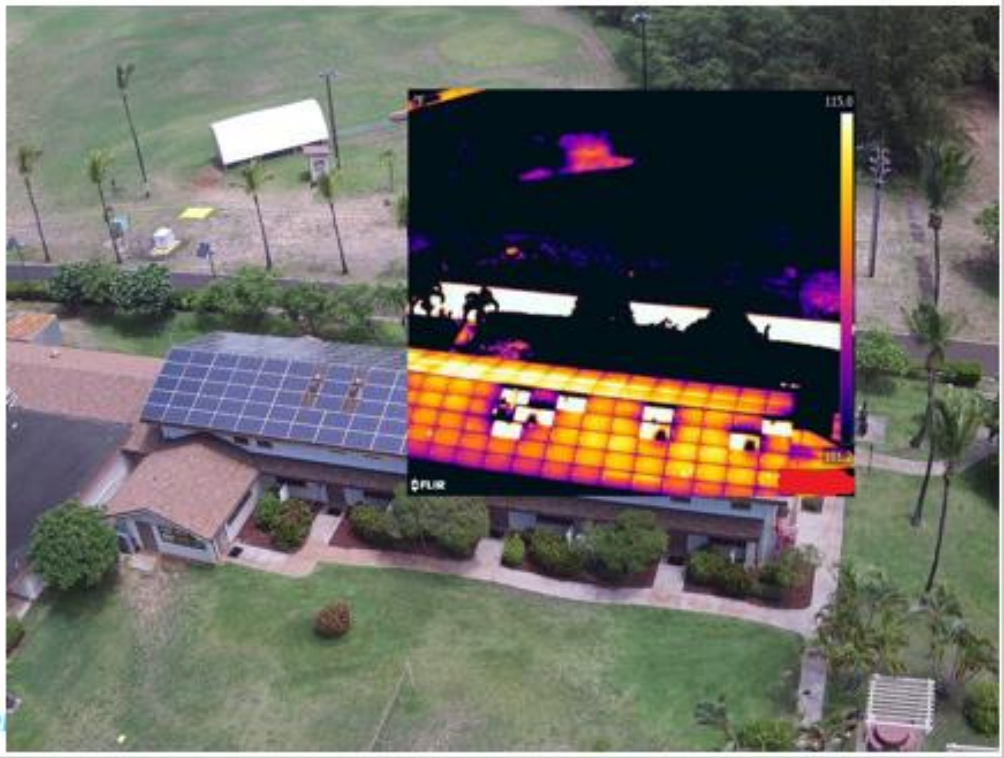


- Submitted proposal to transition this process to all DoD installations with CLT

Energy and Utility Inspections

- Systems are not regularly inspected; some since installation
- Reduced electricity generation
  - Panels for replacement (e.g., damaged, broken, malfunctioning panels)
  - Light availability
- UAS w/ camera and thermal infrared sensor to inspect PV panels





Geospatial Data Analysis

- Planning, infrastructure management, surveying and mapping, digital twins, building information modeling (BIM)
  - High resolution, georeferenced imagery
  - Replace manned aircraft imagery

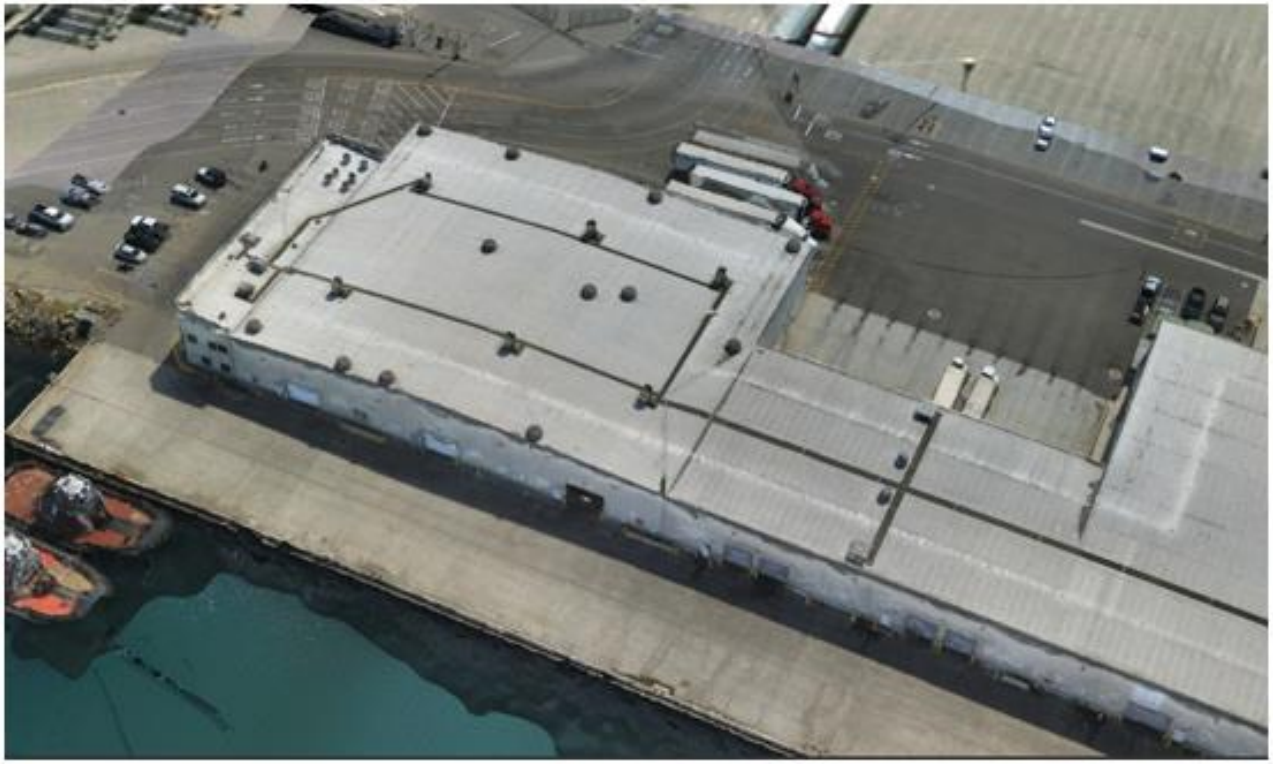
- View of infrastructure on side of building; manned aircraft (4 in) and UAS (0.63 in) imagery
- Details like valves visible on UAS imagery but blurry on manned aircraft imagery

Valve zoomed in

Valve zoomed in

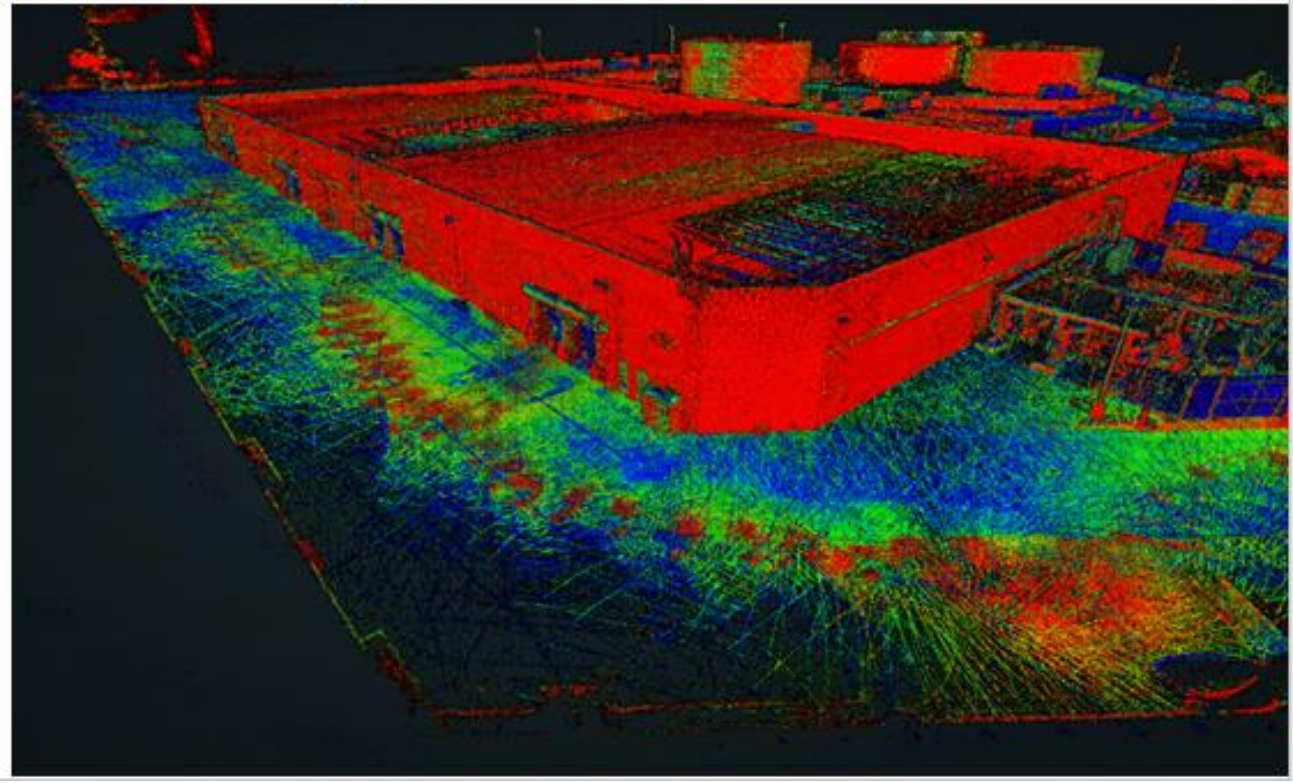
Geospatial Data Analysis

- Planning, infrastructure management, surveying and mapping, digital twins, building information modeling (BIM)
  - High resolution, georeferenced imagery
  - Replace manned aircraft imagery
- 2- and 3-dimensional data analyses
  - imagery



Geospatial Data Analysis

- Planning, infrastructure management, surveying and mapping, digital twins, building information modeling (BIM)
  - High resolution, georeferenced imagery
  - Replace manned aircraft imagery
- 2- and 3-dimensional data analyses
  - Imagery
  - LiDAR



UAS in NAVFAC: Challenges

- FY20 National Defense Authorization Act
  - Prohibits the use of UAS from covered countries
- Alternative sources/platforms

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Reminder to set Zoom to Speaker View

(Moderator will present questions submitted via Zoom chat)

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Announcements

- **SAME Camp Pendleton Day**
  - Thursday, June 17th (1130 – 1230) – Webinar
  - Andrew Baughman (NAVFAC SW) – Energy Resiliency Presentation
- **SAME Young Professional Social**
  - Wednesday, May 26th (1800 1900) – Details still being finalized
  - Sign up by emailing Travis Pital – tpital@pacrimengineering.com
- **SAME July Board Induction & Networking Social**
  - Stay Tuned!

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Announcements

- **SAME 2021 Summer Camps**
  - Army / USMC camps in-person; Navy, USAFA, & Scott Field camps virtual (Hosted by USNA the week of June 28th to July 2nd)
  - Additional info at same.org/stemcamps
  - Mentors needed for all camps. If interested, please contact Allison Cantu (allison.cantu@navy.mil)
- **Interested in Joining our SAME San Diego Chapter?**
  - Contact Melanie Kito (melanie.kito@navy.mil) or Sean Leffler (sean.leffler@eurofinset.com)
- **Need Professional Development Hours?**
  - Contact LT Matt Harvie (sameprograms@gmail.com)

Goals of the 2025 Strategic Plan

- Strengthen Industry-Government Engagement
- Build and Sustain Resilient Communities
- Develop Leaders for the Profession
- Enrich Our Nation's STEM Pipeline
- Prepare Service Members and Veterans for the A/E/C Industry

Our Mission:

Build leaders and lead collaboration among government and industry to develop multidisciplined solutions to national security infrastructure challenges.

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Get Involved Today!