Demonstrating small UAS for Oil Spill Simulations and Environmental Response Management Application (ERMA)

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March 9, 2017

Goals / Science Questions

Provide remote sensing data to support oil spill research and operations

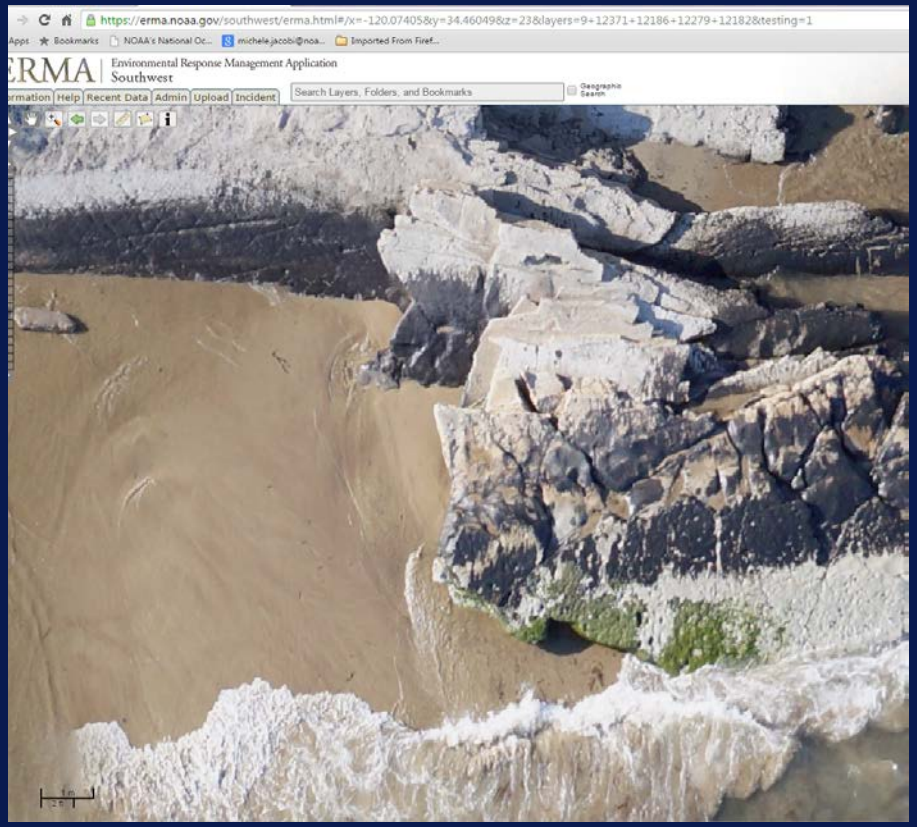
- UAS photography for nearshore response and injury assessment
- UAS photography for open-water floating oil extent and thickness
- Documentation/BMPs for product flow into ERMA

Accomplishments

- Real-world events and several drills and tech demos
  - Refugio oil spill, CA. Working with State, contracted UAS work to fly 1.5cm aerial mosaic. Issues with timing for response, but effective for damage assessment. (add pic)
  - Working with UAS PO during RiverWatch 2016, data (mosaics, individual photos, flightlines) were quickly imported and displayed for situational awareness to those in the field, and those not in the field
  - UAS imagery flown by NOAA partners brought into ERMA for geographical and situational context

Accomplishments: Refugio Beach Oil Spill (2015)

- Original video capture did not provide the resolution desired. Reflew PUMA with a camera to produce a 1.5cm mosaic use for for damage assessment.



Accomplishments

- Value acceptance by science staff towards UAS utility
  - Has created discussions about operational use as well as future research
- Used by Coast Guard and Trustees to improve response and assessment
- Shown successive increase in product speed from planning, through processing, and into viewing in ERMA

Accomplishments:
Work with BSEE for Oil on Water detection

- Working with BSEE to categorize Oil on Water detection using natural color as well as thermal UAS collection
- Thermal shows great promise
  - Currents tests have used uncalibrated sensors
  - Next R&D steps include calibrated sensors for thickness and volume characterization.

UAS Characterization of Oil on Water

- True Color

- Thermal

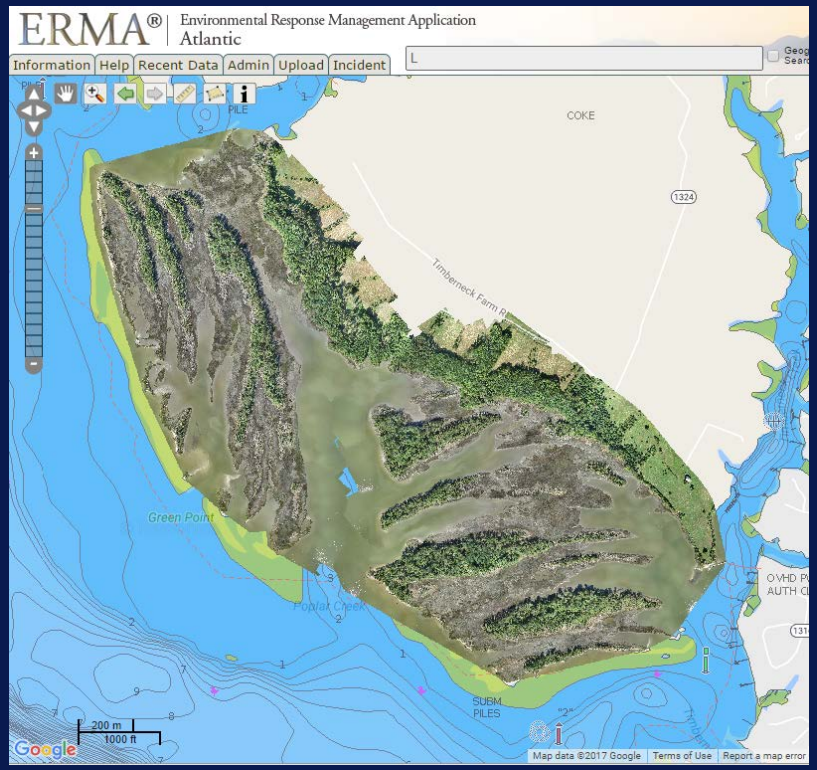
UAS PO Grants

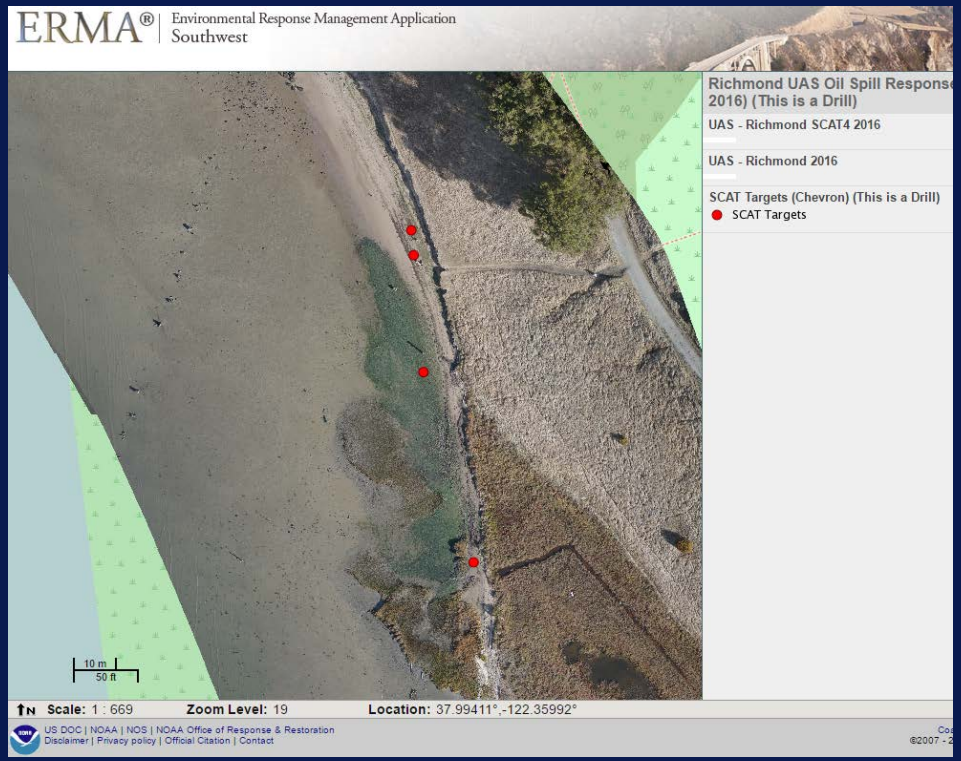
- OR&R was a part of the 2016 “Small Unmanned Aircraft System Mapping Project”
  - with NOS/NGS and NOS/ONMS
- OR&Rs is preparing documentation/BMPs to move UAS imagery into ERMA quickly for expedited use by spill responders
  - Recent proof-of-concept with eBee data

UAS Tests and Drills

eBee data from Catlett Islands, VA

- UAS mosaic for SCAT drill





Future Directions

- Aerial photography -> mosaics is currently working well
  - Further refinement to speed turnaround time
  - Resolution enhancements
  - Planimetric imagery is great, but hemispherical video is useful for reviewing a flight
- Recent work with BSEE shows promise for using UAS with SAR
- Thermal also holds great promise
- Currents characterization with SAR is also of interest

Collaborators

UAS PO

NOAA/NOS/NGS

NOAA/NOS/ONMS

BSEE (Bureau of Safety and Environmental Enforcement)

Coast Guard/Marine Environmental Response

CA Office of Spill Prevention and Response

Key Scientific/Technical Challenges

- Oil spills – not something that happens often
  - Expensive to stage, oil surrogate does not behave exactly like oil
  - Opportunities are rare to work on real-world data
- SAR isn't cheap, platform is different than the shoreline platforms we've used
- Calibrated non-RGB imagery for oil detection remains a challenge to acquire/use