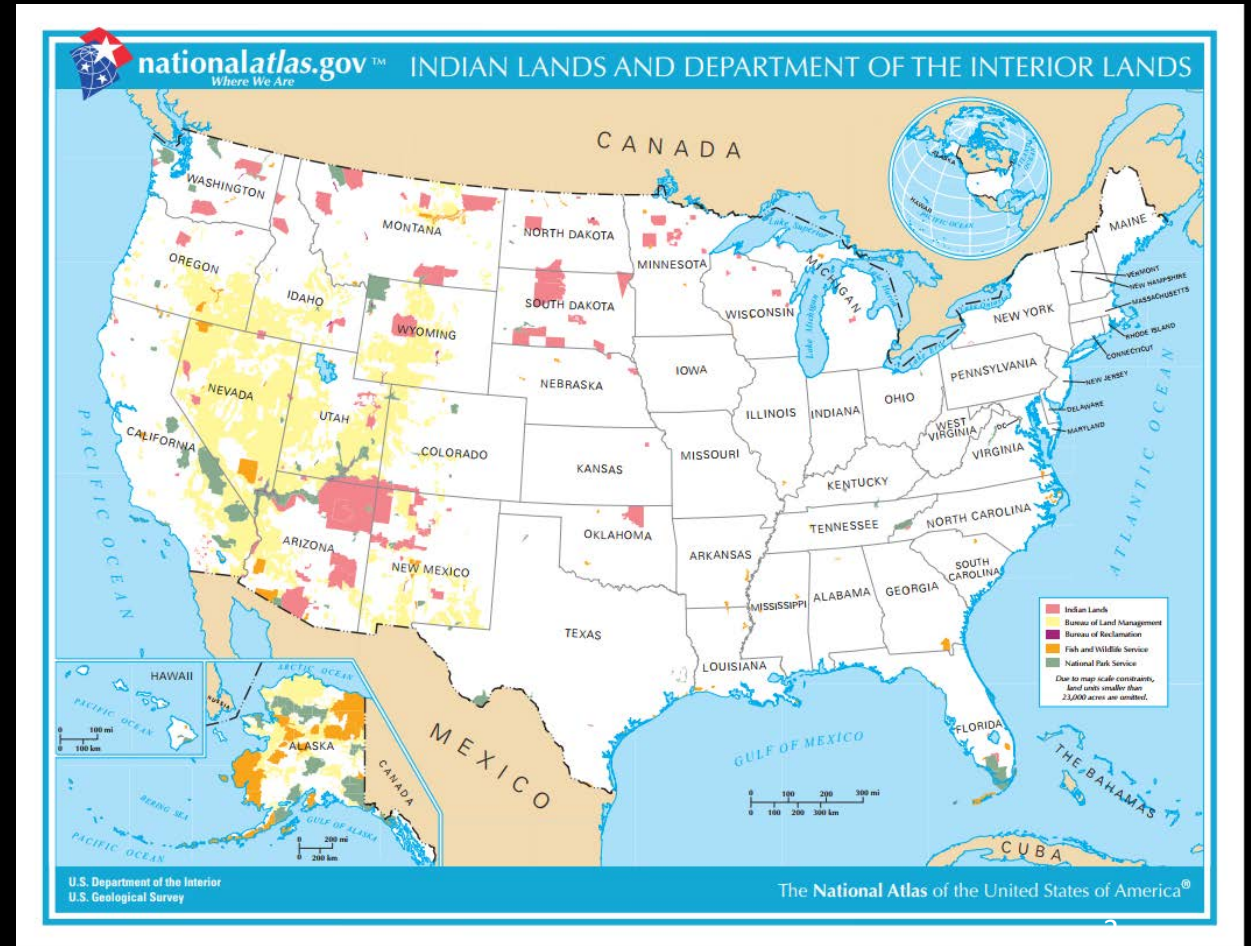




U.S. Department of the Interior Unmanned Aircraft Program

Who We are

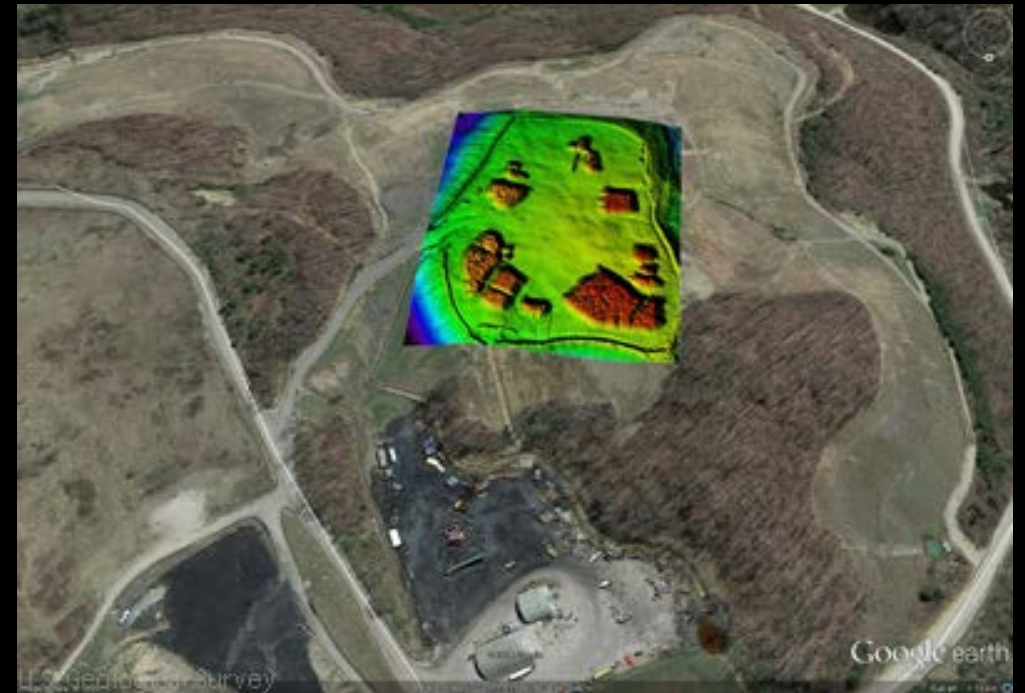
- Bureau of Indian Affairs
- Bureau of Land Management
- Bureau of Ocean Energy Management
- Bureau of Reclamation
- Bureau of Safety and Environmental Enforcement
- National Park Service
- Office of Surface Mining Reclamation and Enforcement
- U.S. Fish and Wildlife Service
- U.S. Geological Survey





Why UAS for DOI?

- ✓ Manage 1 in every 5 acres
- ✓ Diverse mission set
- ✓ Remote areas
- ✓ Sensitive landscapes
- ✓ Threatened / endangered species
- ✓ Public land
- ✓ Public Safety
- ✓ Accessibility, affordability, capability



✓ DATA

- ✓ Resolution
- ✓ Persistence
- ✓ Repeatable
- ✓ Analytics
- ✓ Science
- ✓ Decisions

Sensing

Safety

- ✓ < Air exposure
- ✓ < Ground exposure
- ✓ Assess hazards (fire, flood, landslide, etc.)

- ✓ Acquisition
- ✓ Operations
- ✓ Maintenance
- ✓ Infrastructure
- ✓ Training
- ✓ Replace labor intensive methods

Savings

Service

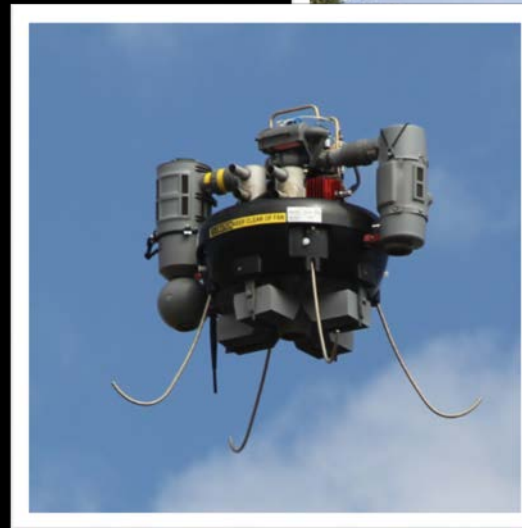
- ✓ Aviation for the masses
- ✓ Responsive
- ✓ Agile
- ✓ Flexible





History of DOI UAS Program

- R/C aircraft
- Tethered Balloons
- First UAS 2009
- Excess DOD aircraft 2010
- FAA Approved 2012
- Blanket COA 2014
- BVLOS agreement 2016
- EVLOS Blanket COA 2018

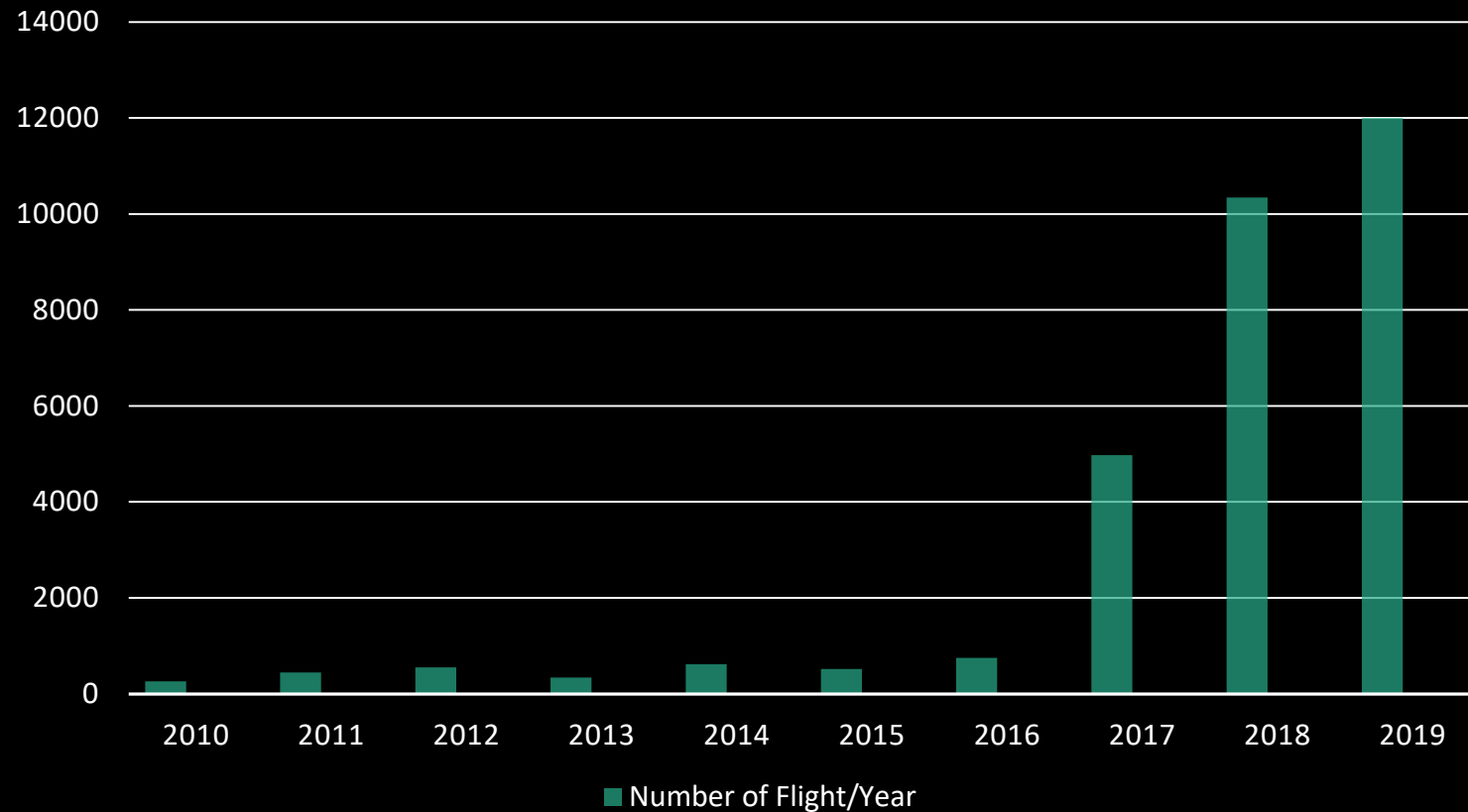




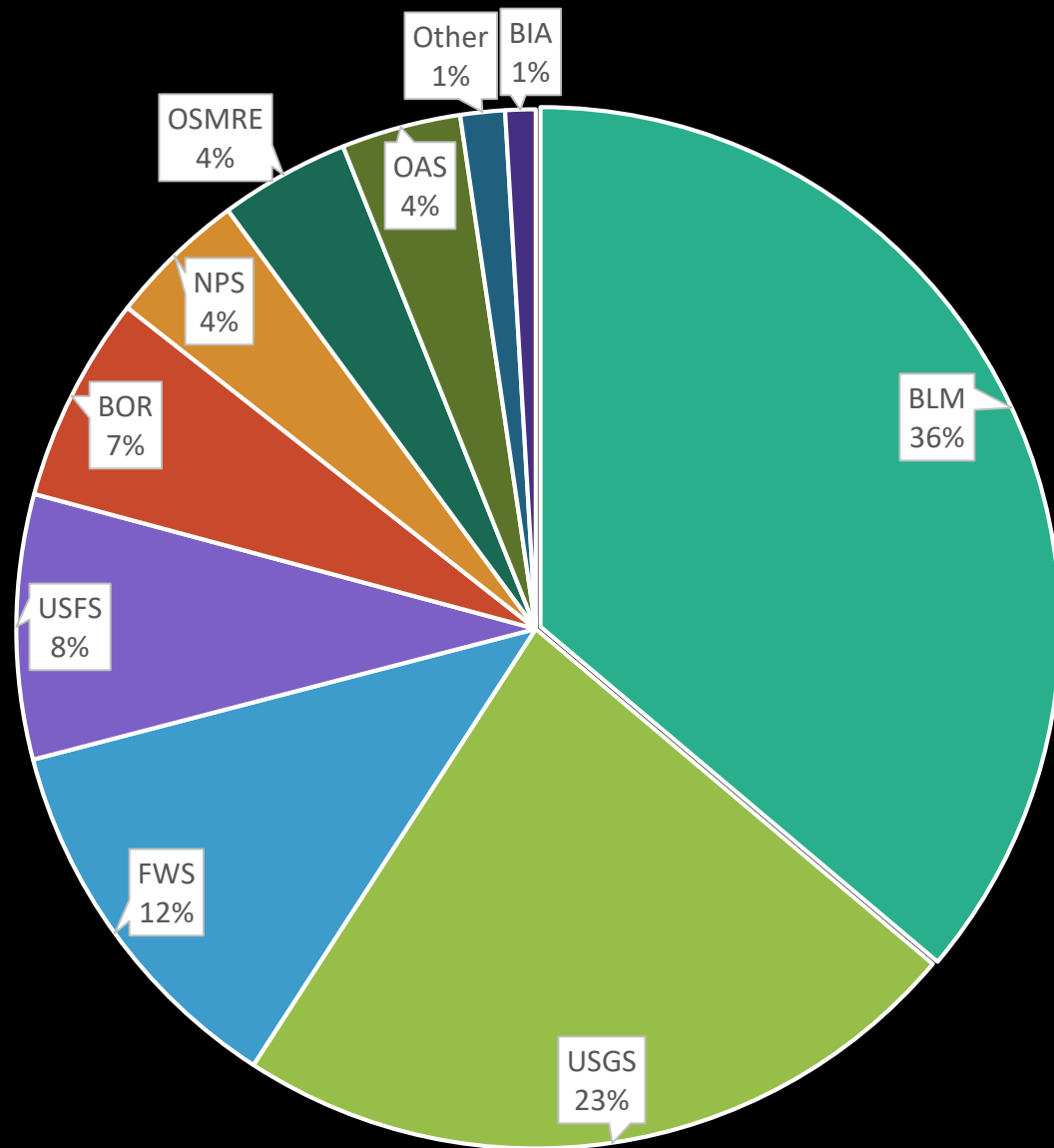
DOI Flight Statistics

- 775 UAS
- 4976 flights FY17
- 10K+ flights FY 18
- 12K+ Flights FY19

Flights Per Fiscal Year




Total Flights FY 19



DOI Master Specification for SUAS



- Developed with input from over 400 SME's across DOI
- Allows for fleet standardization
- Provides data assurance
- Ensures airworthiness and effectiveness
- Aircraft are “typed” according to size/capability

 <div>#5 T1 Rotor</div>	
Flight Performance	
Minimum UAS Requirement	Target UAS Requirements
Platform maximum weight under 55 lbs.	Platform maximum weight under 35 lbs.
Flight duration of 20 minutes with 8lb payload, standard day.	Flight duration of 45 minutes with 10lb payload, standard day.
N/A	Service ceiling 12,000 feet density altitude.
Maximum sustained wind speed capability of 20 knots.	Maximum sustained wind speed capability of 35 knots.
Minimum launch area requirement of 30 feet by 30 feet.	Minimum launch area requirement of 10 feet by 10 feet.
Minimum recovery area requirement of 30 feet by 30 feet.	Minimum recovery area requirement of 10 feet by 10 feet.
Vertical take-off and landing (VTOL).	N/A
N/A	Noise level of 60 dB at 100 feet (AGL) at hover with maximum payload.
Operating temperature range of 10–110 degrees Fahrenheit.	Operating temperature range of negative 40–110 degrees Fahrenheit.
N/A	Water proof capable.
Command and Control	
Minimum UAS Requirement	Target UAS Requirements
Communication range (RX/TX) C2 of 1 Miles.	Communication range (RX/TX) C2 of 4 to 6 Miles.
Transmit video up to 1 Miles.	Transmit video range of 4 to 6 Miles.
Electric, Gas, or Turbine power supply.	Power supply of electric, or non-aviation fuel.
N/A	Sense and avoid capable
Uplink control frequency that is a secure digital data frequency hopping link at 2.4 GHz or 5.8 GHz or 900 MHz ISM Band, WPA2 or 128, 192, or 256 bit AES encryption (FIPS compliant).	N/A
Downlink frequency that is a secure digital data link at 2.4 GHz and or 5.8 GHz ISM Bands and or 900mhz, w/FIPS compliant WPA2 or 128, 192, or 256 bit AES encryption (FIPS compliant).	N/A
Loss of Link (LOL) capability: return to launch or land now.	Loss of Link (LOL): land at a specified location
GPS capable of USA satellite constellations.	GPS capable of using all three satellite constellations at the same time: USA (GPS), Russian (GLONASS), and



DOI Fleet Selection Process

- Aircraft demonstrations/industry collaboration
- Site visits to vendors
- RFI's
- Limited purchase for testing
- Airworthiness/cybersecurity review
- Field trials
- Approve for use
- Purchase solicitation





DJI Government Edition Development

- Custom Firmware
- Custom Software
- Custom Applications
 - M600P
 - Mavic Pro/Mavic 2
 - Matric 210
 - P4 RTK
 - All new enterprise aircraft coming on line
- Requires regular red teaming of proposes solutions.



Cameras & Sensors



Point & Shoot, MILC and DSLR Cameras



High Definition Video



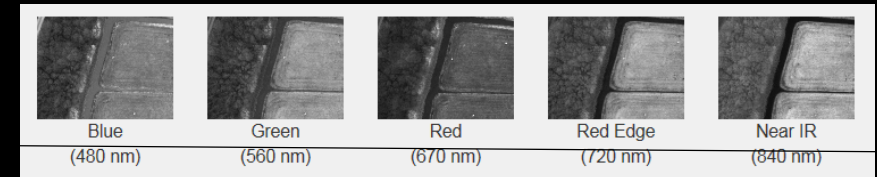
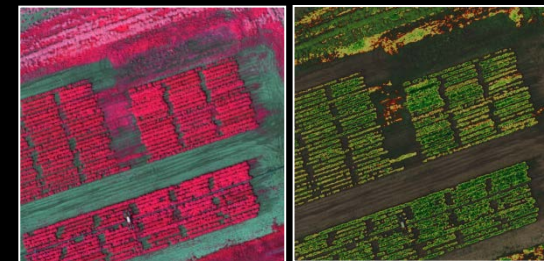
Gas Monitor



Thermal Sensors



Multispectral Sensor



Remote Sensing Data



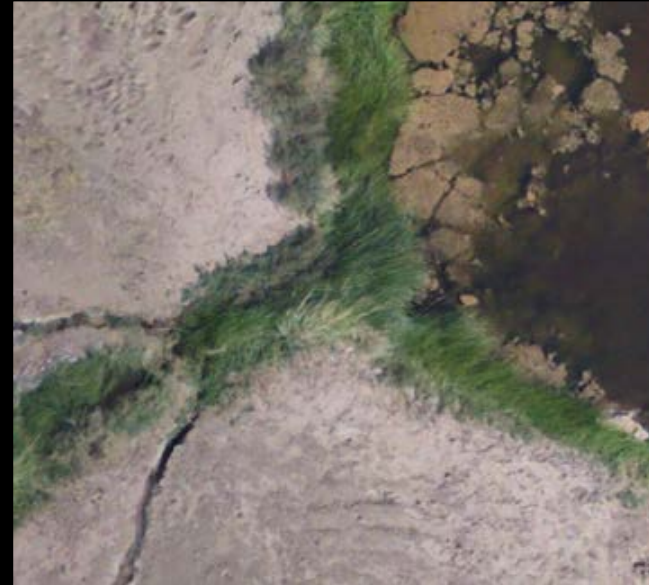
Landsat 8 (30 meter)



NAIP 2010 (1 meter)



UAS at 400 ft (5 cm)



UAS at 200 ft (2.5 cm)

Wildland Fire



- Demonstrations in 2015
- CWN contract development
- Contract awarded spring 2018
- Aircraft deployed all season
- Adding capability for 2019
- Managed airspace



National CWN Flight Statistics FY18

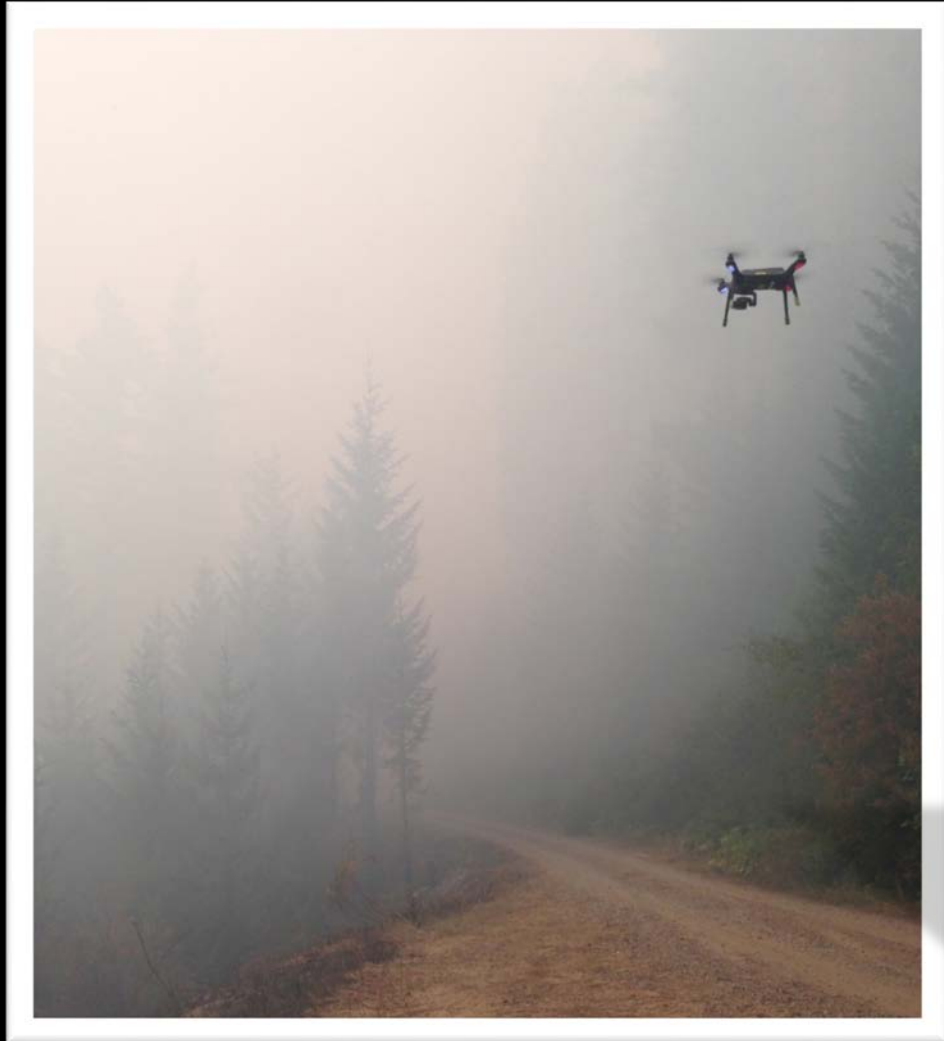


Call When Needed Fire

- Insitu Scan Eagle
 - 5 fires
 - 48 Flights/330 Flight Hours
- Bridger Aerospace Silent Falcon
 - 10 Fires
 - 35 Flights/46 Flight Hours
- Pathways 2 Solutions Bramor C4eye
 - 1 Fire
 - 3 Flights/ 5 Hours
- **Total Flights: 86**
- **Total Hours: 382**



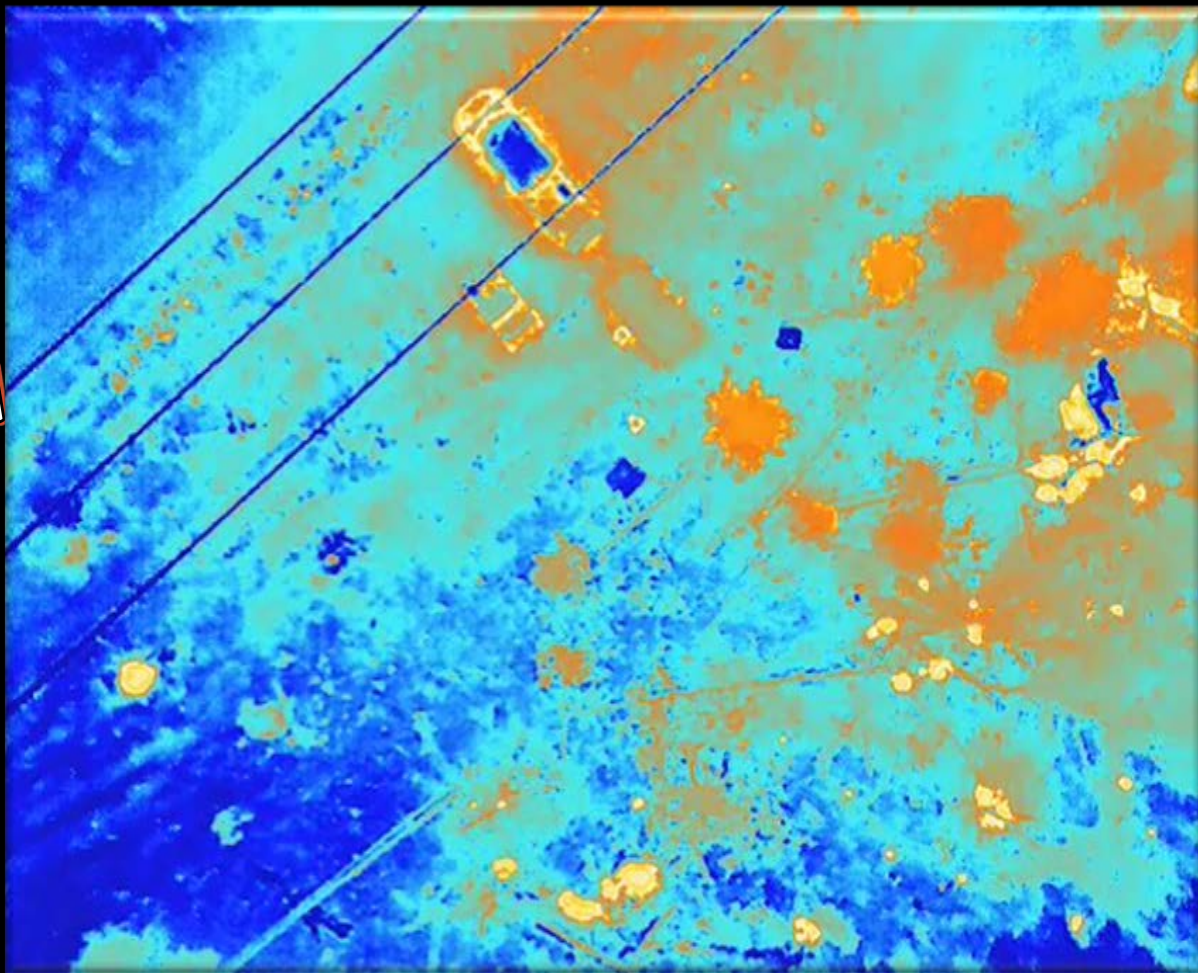
Filling Gaps





Game-Changing Results - Today

*.....in the Firefighter UAS Operator's Own Words**



One of 707 DOI UAS flights on 71 fires in 2017

**BLM:
\$50M
saved**

North Umpqua Fire - 2017

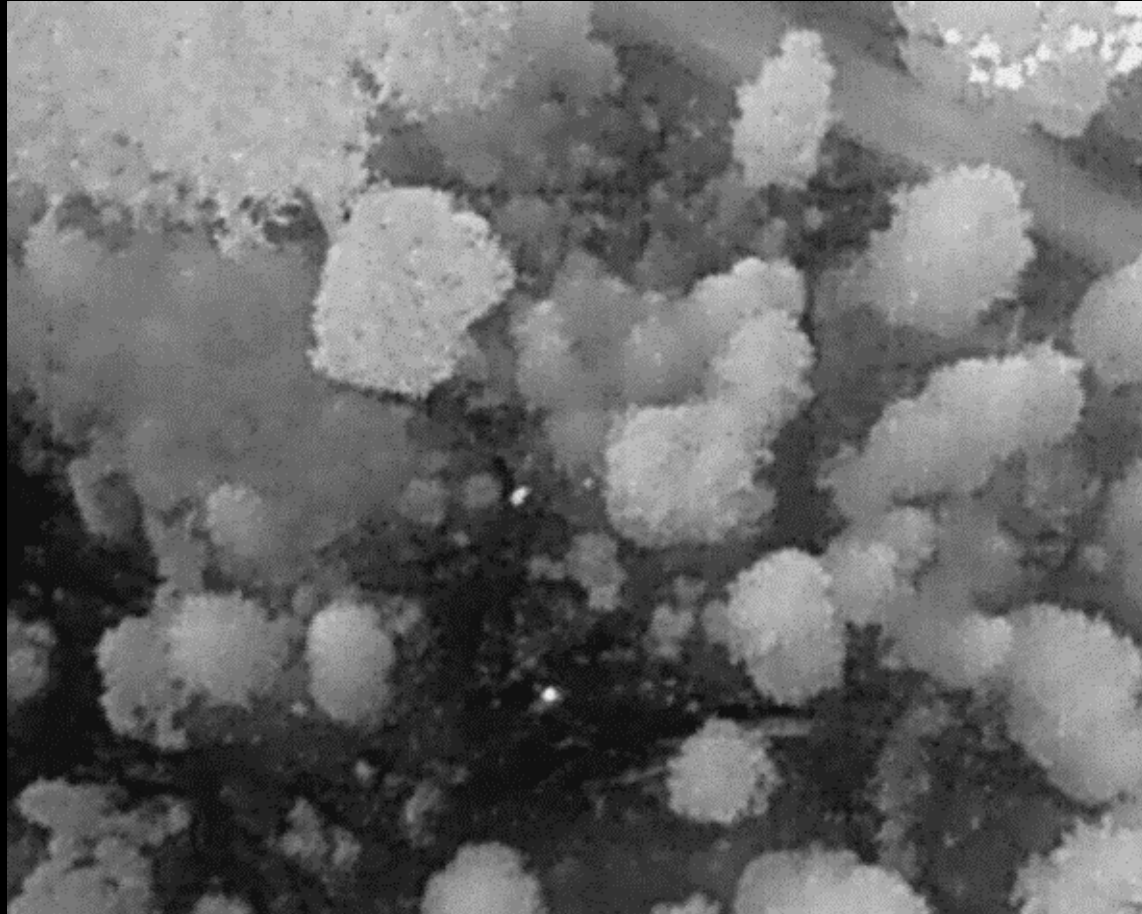


Actual Visual Conditions



**Narrated by BLM firefighter and certified DOI UAS Operator*

Spot Fire Detection





UAS for Aerial Ignition

- Initially developed by Univ. Of Nebraska Lincoln
- DOI approved use for live fire testing in 2016
- Much collaboration with manufactures
- Payload approved Sep. 2018
- First 8 units on order
- Looking to scale



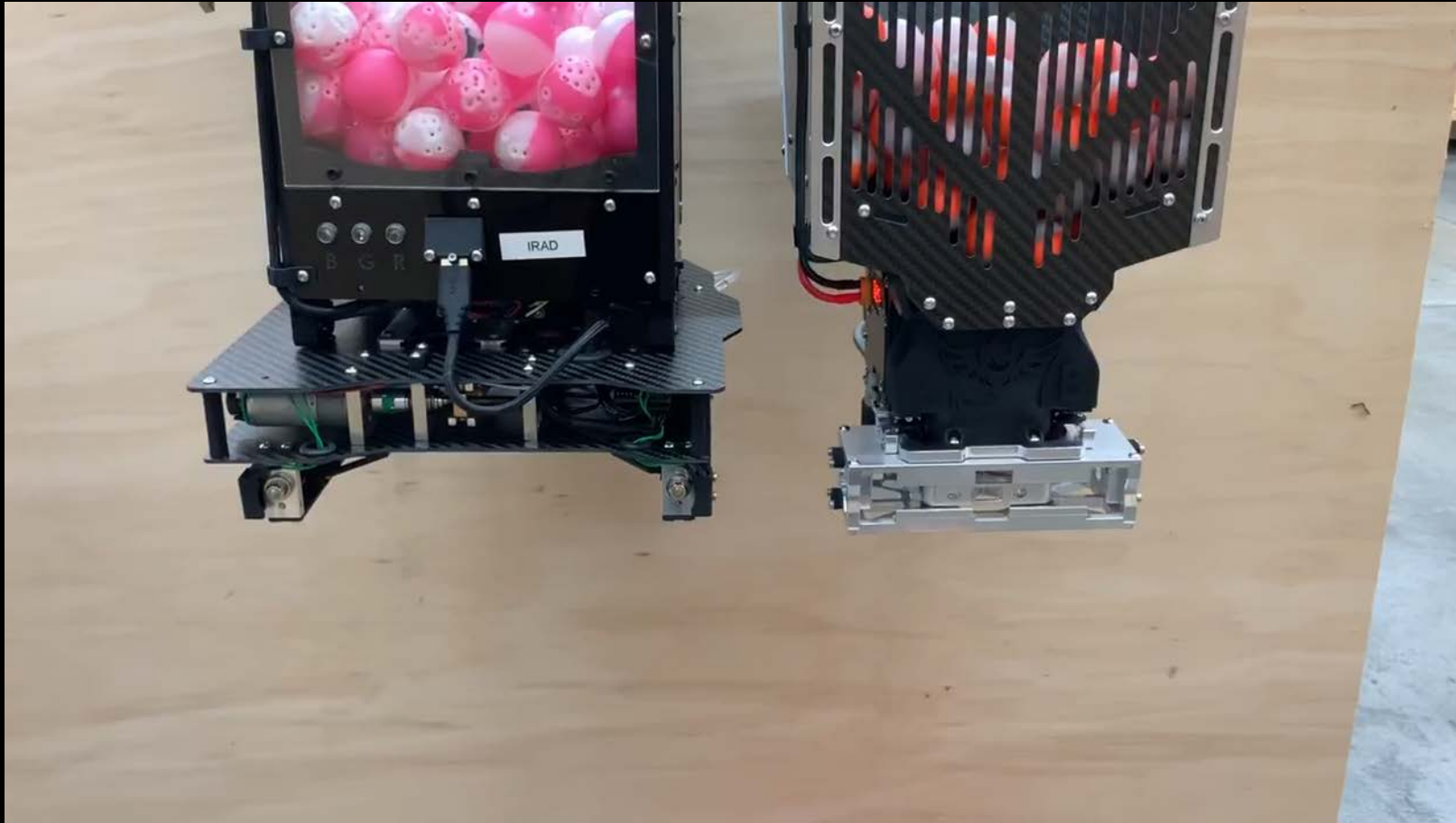
Ignis Payload



- PSD-135 flights
- 39.2 hrs Flight Time
- 12000 Premo balls dropped on live operations



Ignis 2.0



Sheridan Fire PSD Missions



Z30 Camera



Cargo Delivery

Test Objectives:

- Field test the equipment under actual conditions.
 - Interaction between drone, release mechanism, and payload.
 - Deployment of the parachute from an operating drone.
 - Viability of the parachute to control the descent of the equipment package.
 - Evaluate the characteristics of the parachute.
 - Evaluate the ability to accurately and safely deliver the equipment.



Salmon Survey Proof of Concept (IDFG/OAS)



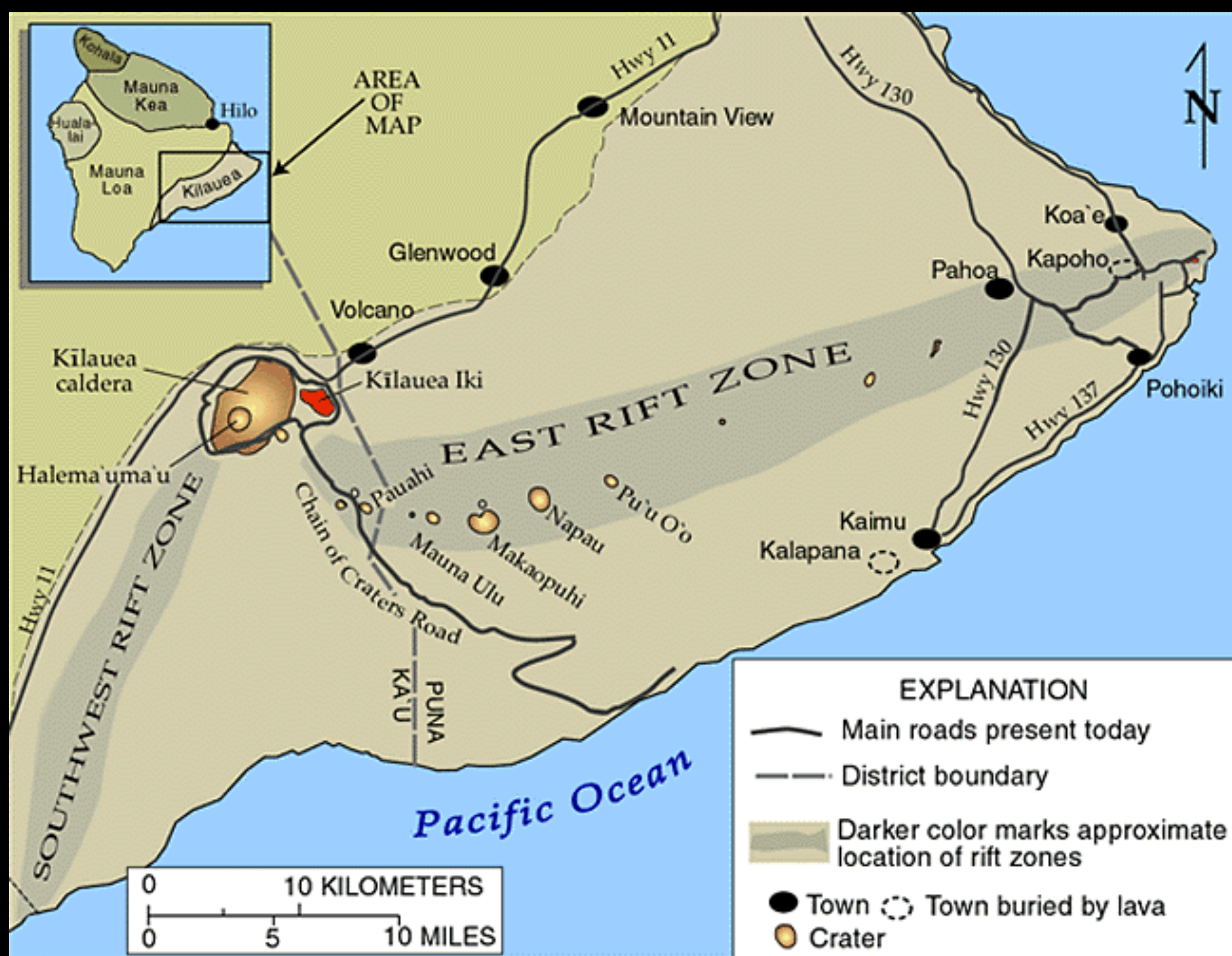
Resource Management





Kilauea

May-September 2018



Kilauea Summit Working Conditions

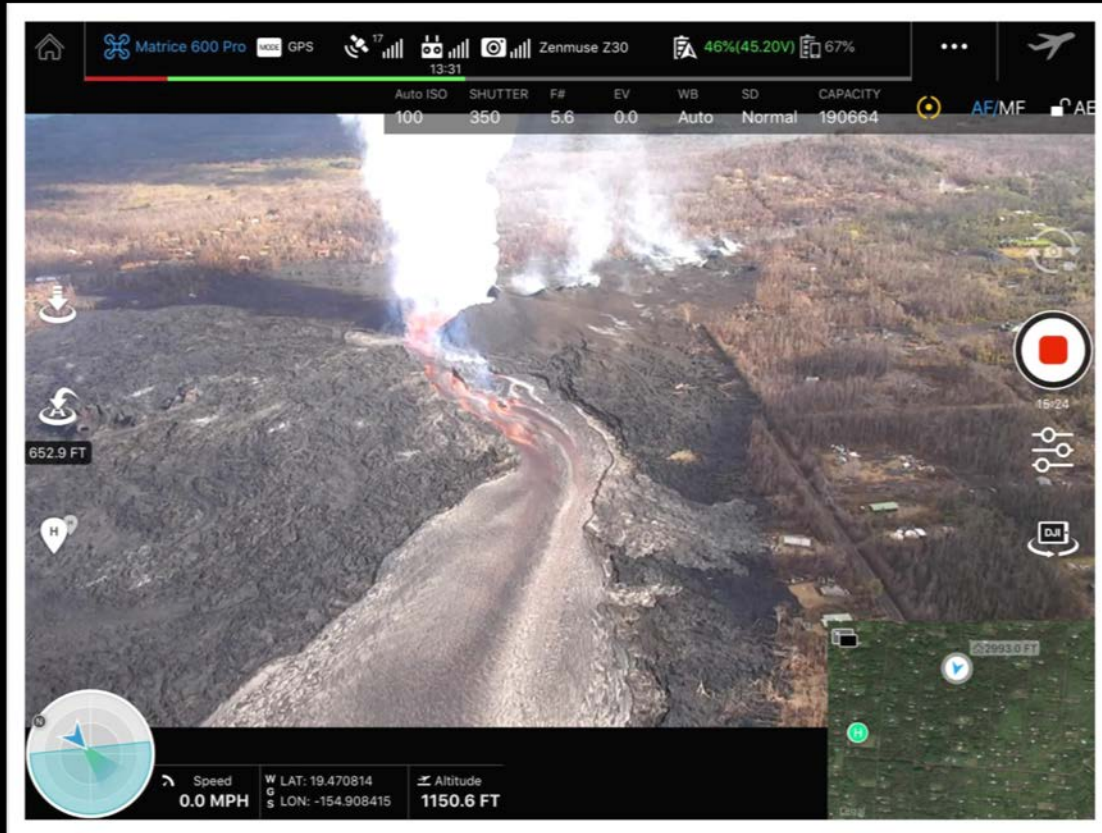


Kilauea, September 9, 2018

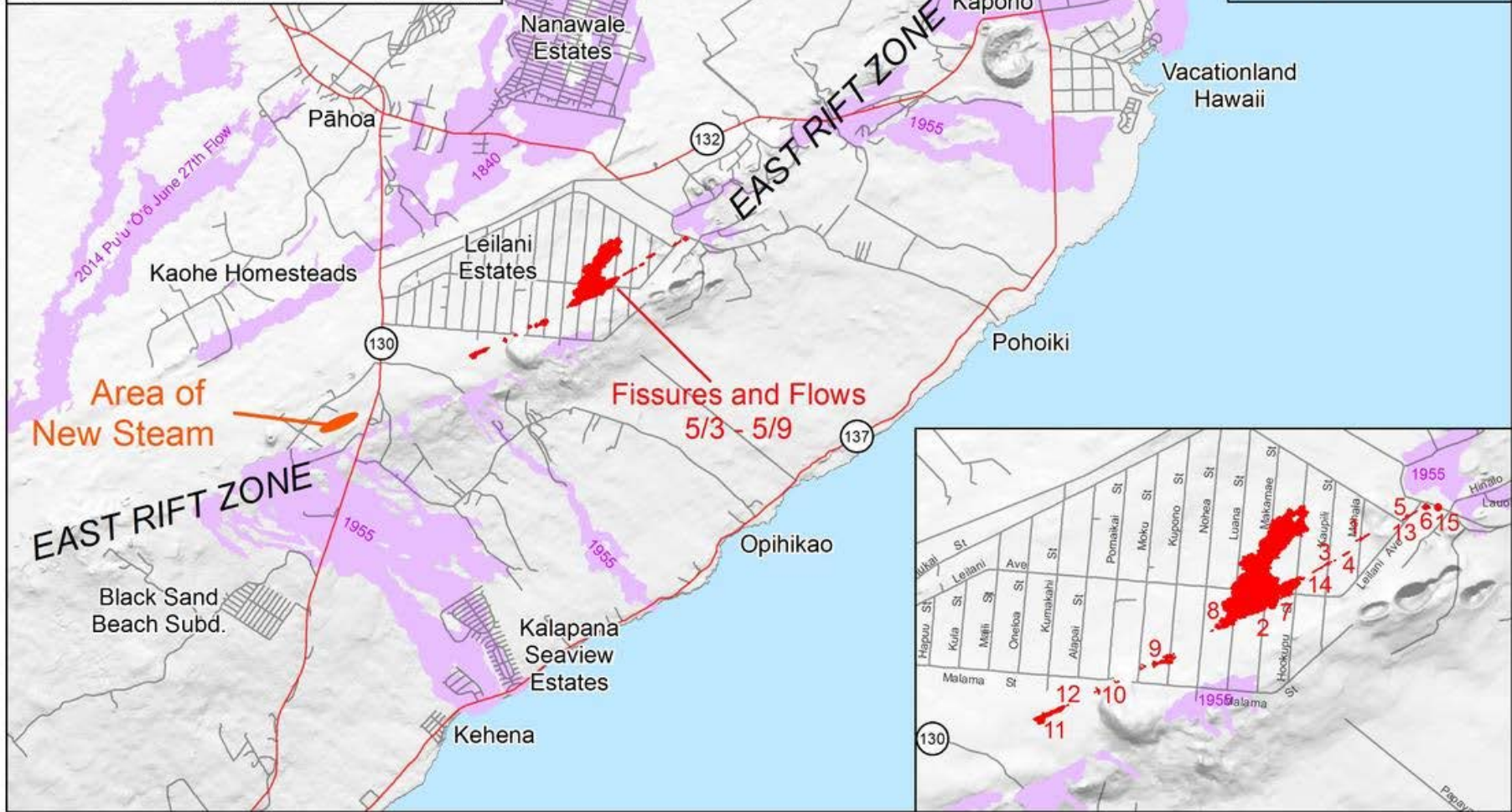
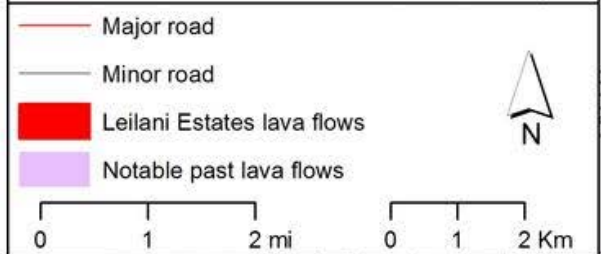




Lower East Rift Zone (LERZ)

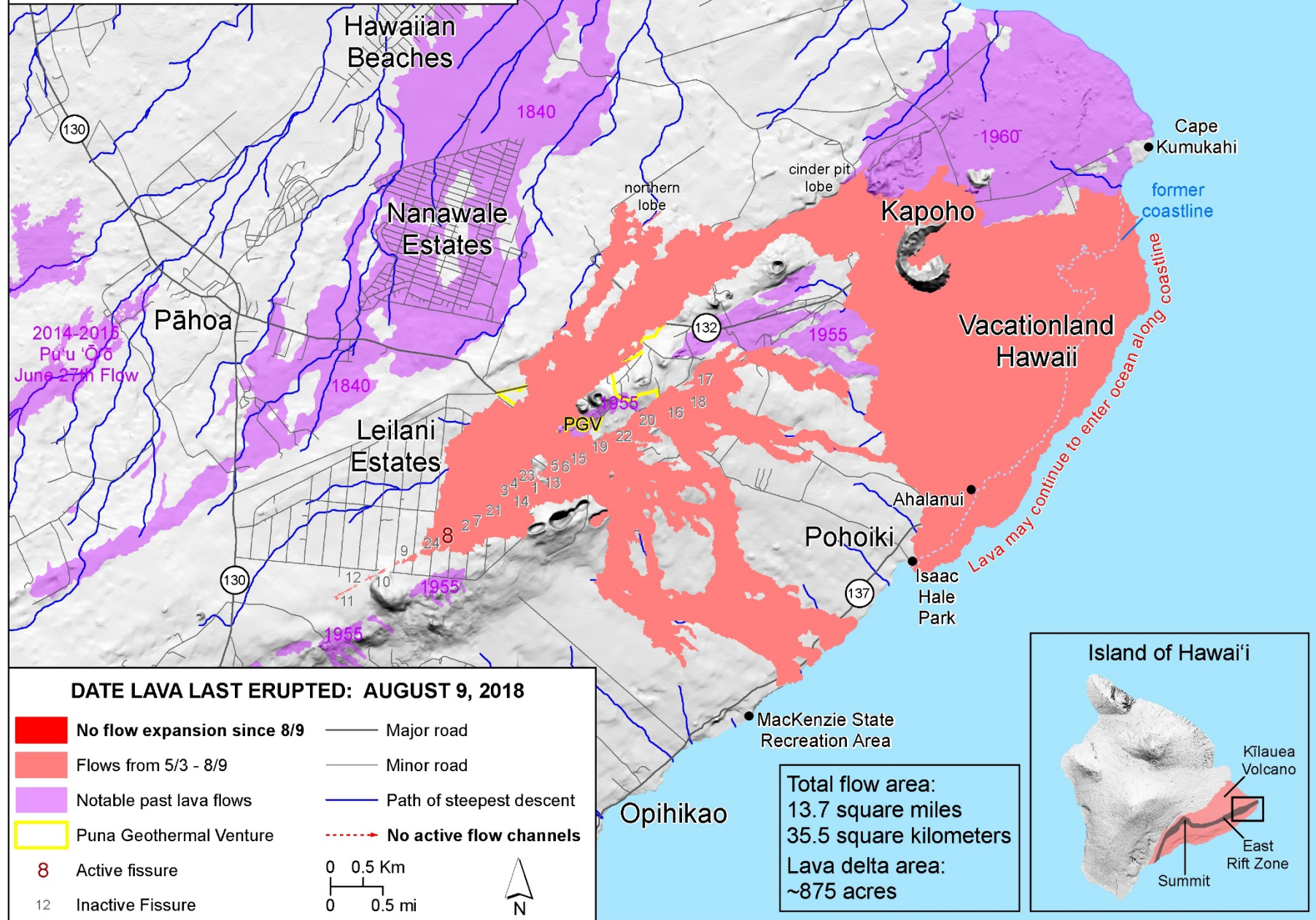


USGS Kīlauea Volcano
science for a changing world East Rift Zone
 Map Updated 5:30 pm, May 9



Kīlauea Volcano - East Rift Zone

Updated 12:00 pm, August 14, 2018



Fissure 8, June 29, 2018



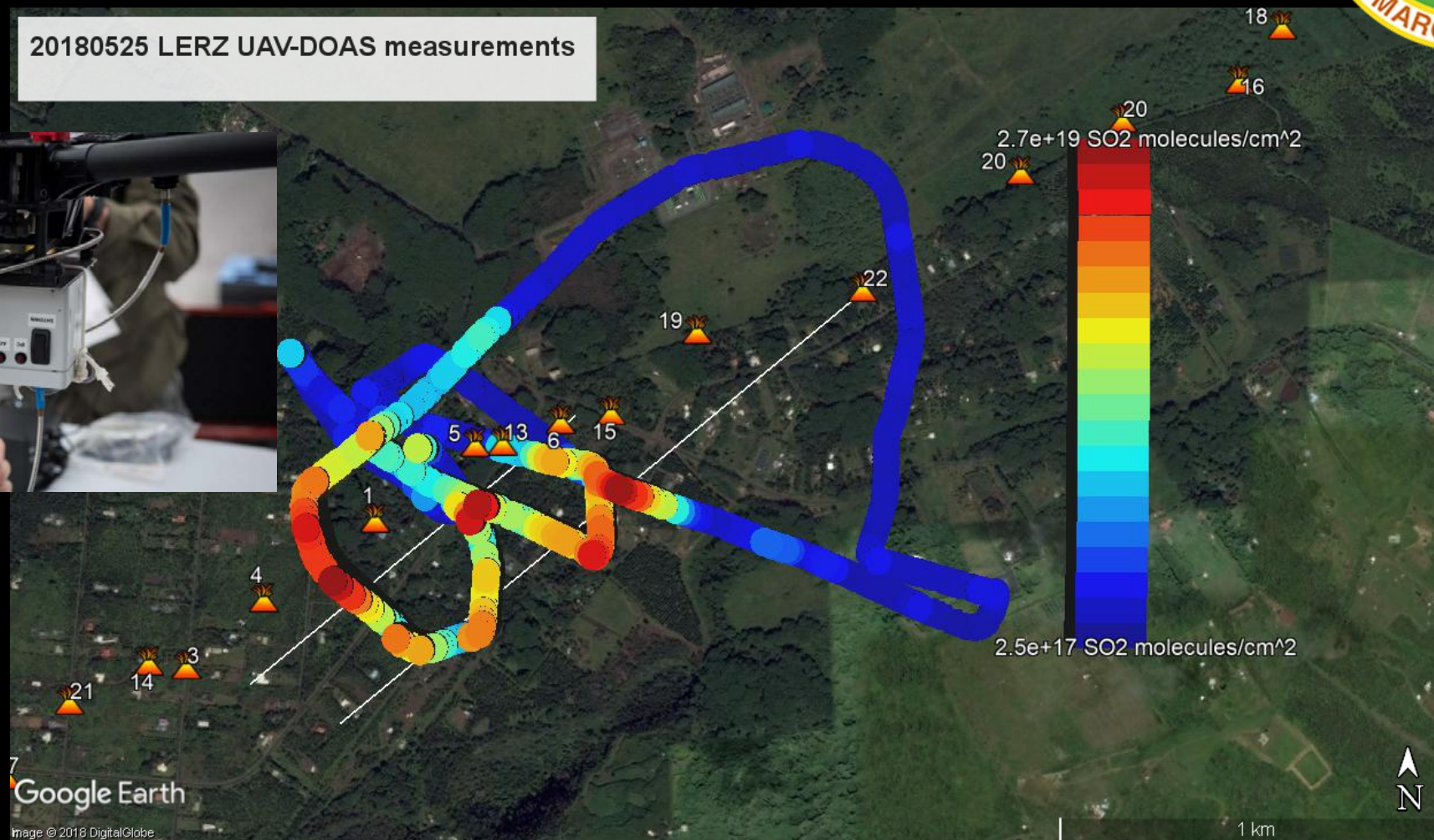
Fissure 8, August 17, 2018



Gas Monitoring Data



20180525 LERZ UAV-DOAS measurements



Kilauea Rescue





Discussion?

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Bradley_Koeckeritz@ios.doi.gov

[Doi.gov/aviation/uas](https://doi.gov/aviation/uas)

208-433-5091