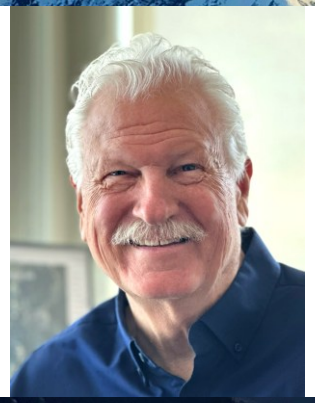
HOW DO I CHOOSE THE RIGHT DATA COLLECTION PLATFORM?

ALASKA GEOSUMMIT 2025
Anchorage, Alaska
APRIL 9-11



Ron Chapple
VP Global Strategic Solutions
NV5

STORYTELLING – WHAT IS THE BEST TOOL?

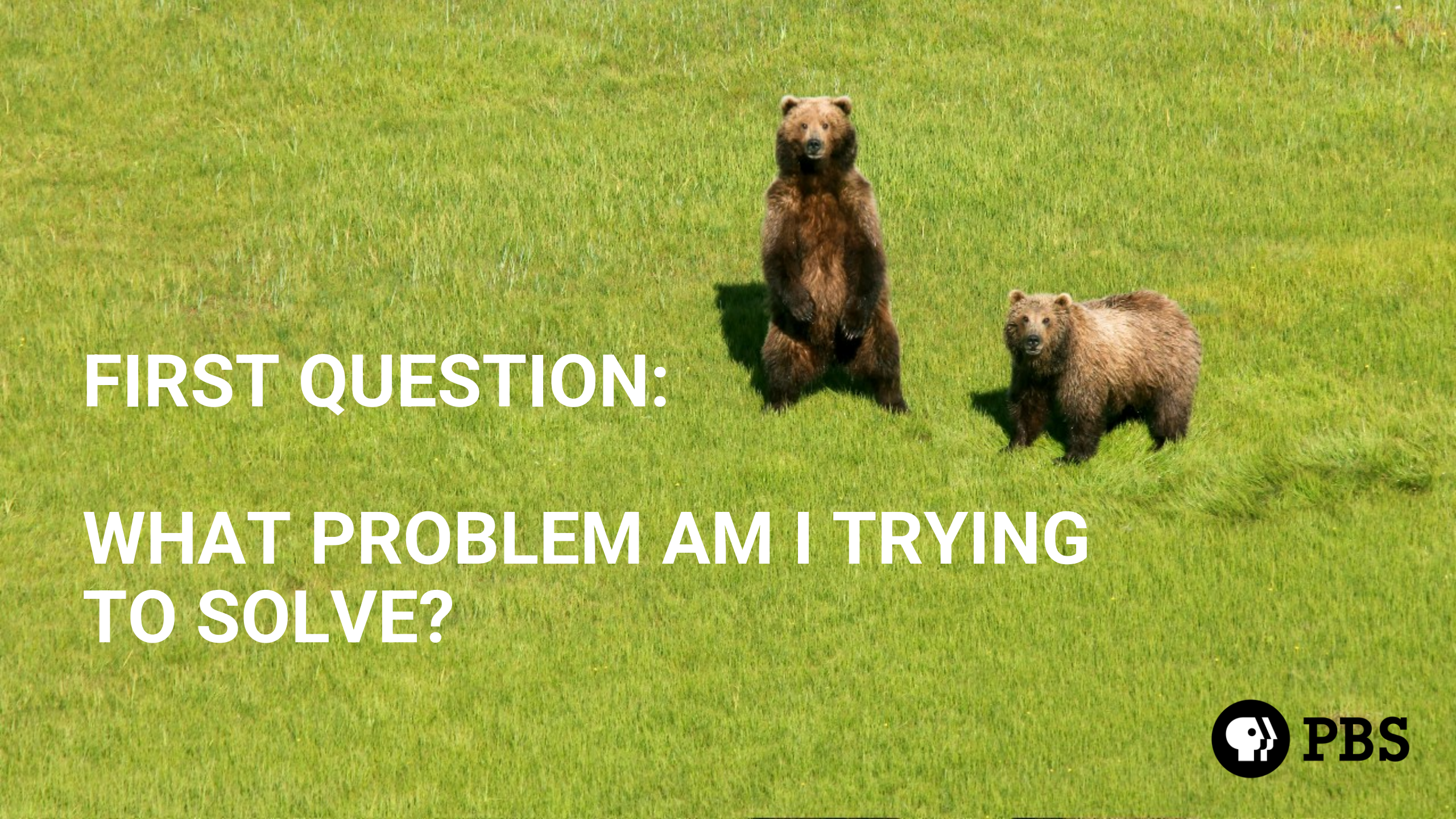
From the Arctic Circle to Patagonia

ARCTIC CIRCLE

NATIONAL GEOGRAPHIC

Pulitzer Prize for Explanatory Journalism

Emmy


FIRST QUESTION:
WHAT PROBLEM AM I TRYING TO SOLVE?
PBS

FOCUS ON SOLUTIONS

Think about the end-to-end requirements.

Law of the Tool: “When all you have is a hammer everything looks like a nail.”


I asked AI to design the ideal
aircraft of the future…
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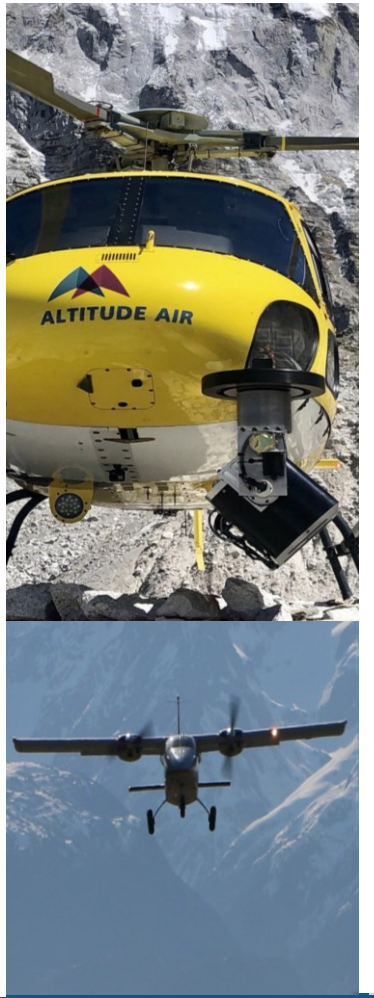
Data Acquisition Options

Mobile

Terrestrial

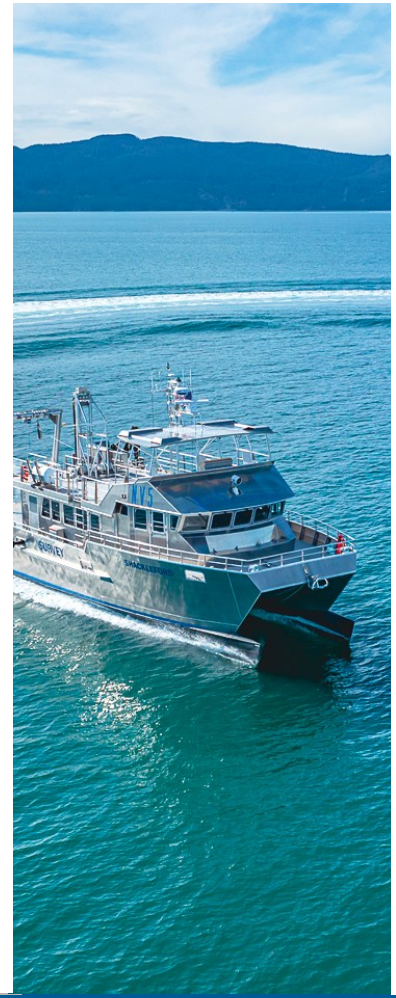
Robot

Fixed | Rotary



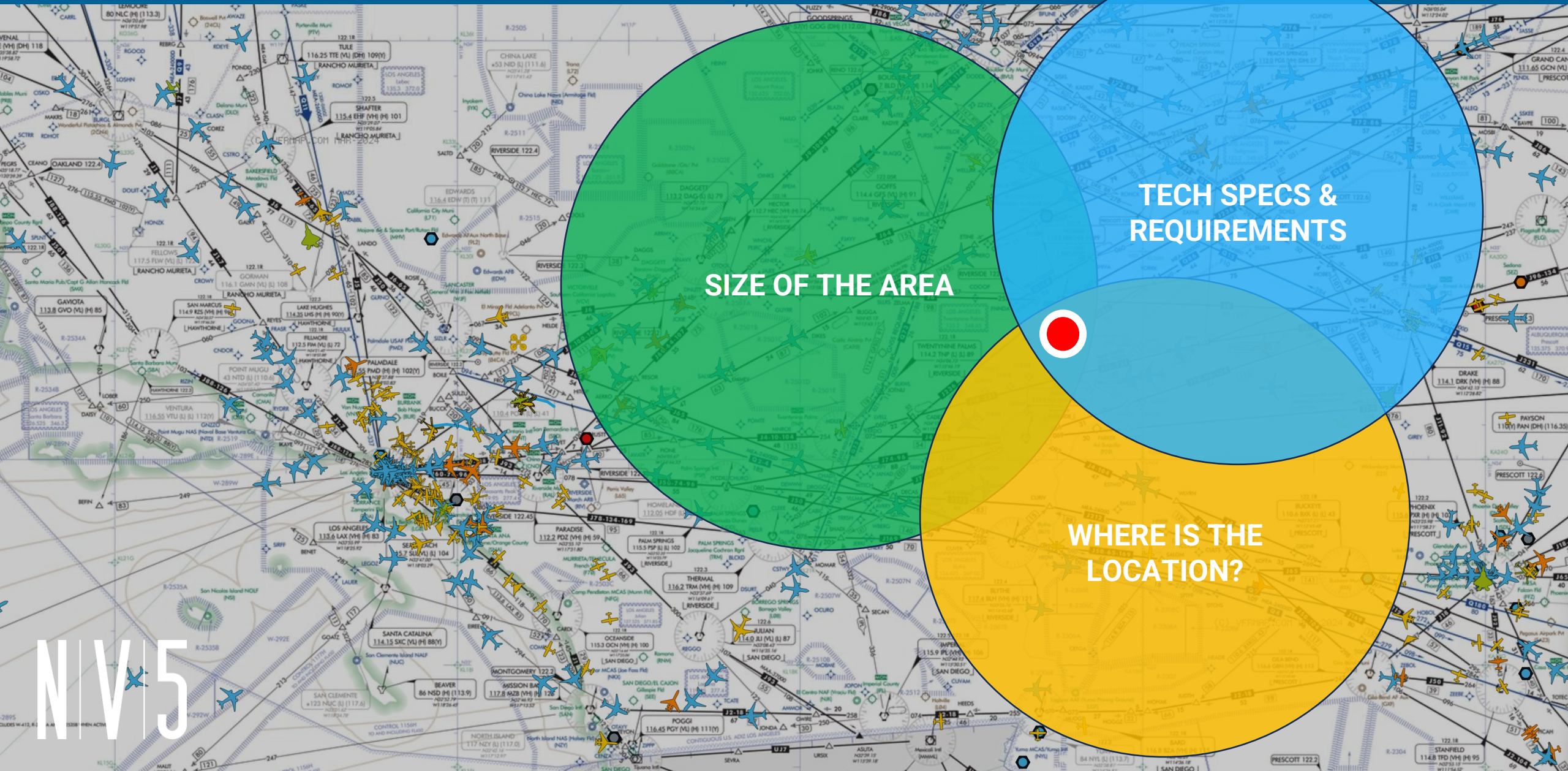
Backpack

Marine



UAS

Choosing a Platform: Primary Drivers



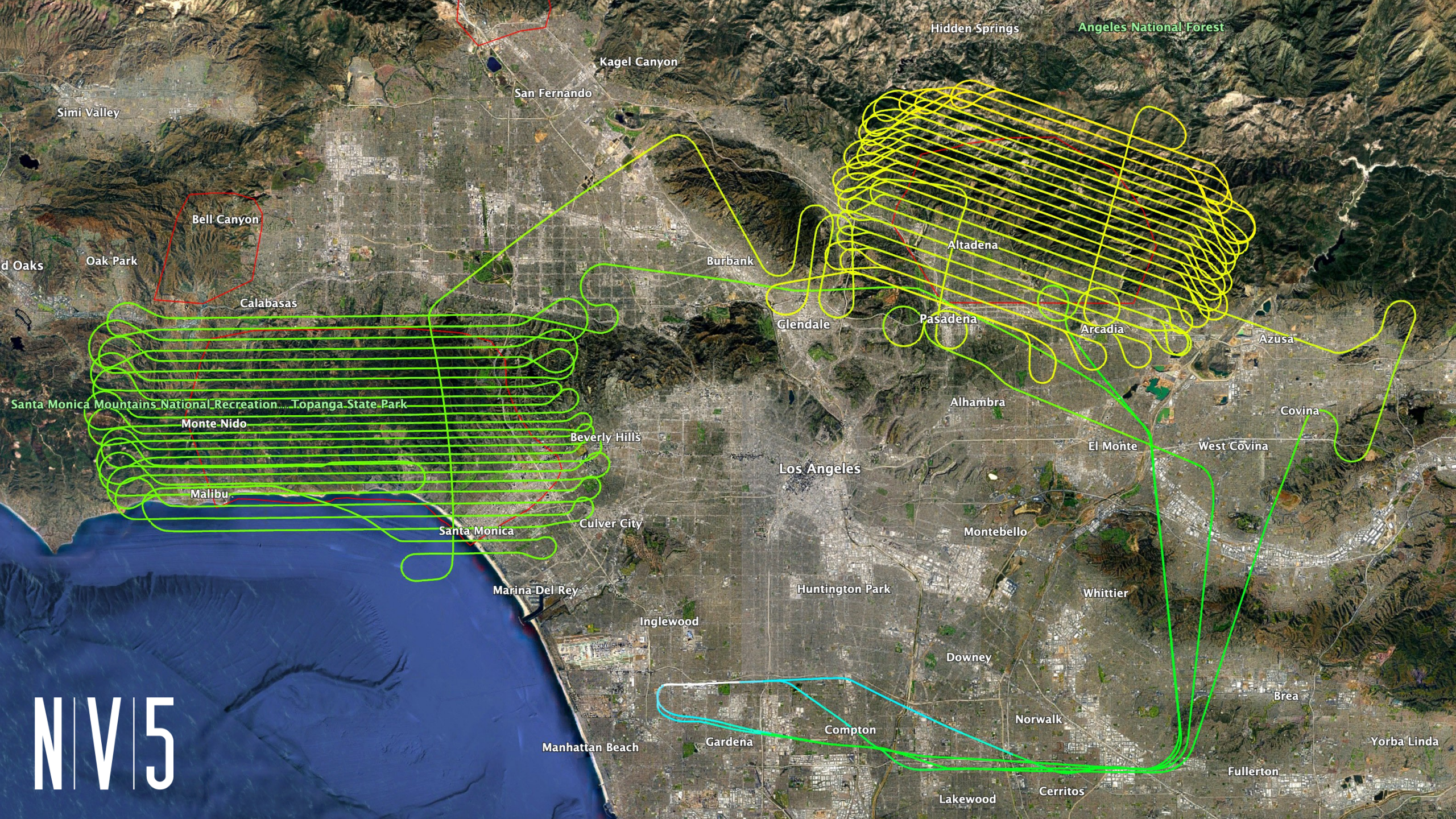
EXAMPLE: Los Angeles Wildfire Survey

Complex Airspace: 7,000’ AGL (Fly above the Temporary Flight Restriction)

Data Requirements: Lidar: 16 PPSM (points per square meter)
Imagery: None

Aircraft: Cessna C208 Caravan

Sensor Package: Riegl 1560ii-s


Hidden Springs
Angeles National Forest
Kagel Canyon
San Fernando
Simi Valley
Bell Canyon
Oak Park
Burbank
Altadena
Calabasas
Glendale
Pasadena
Arcadia
Azusa
Santa Monica Mountains National Recreation... Topanga State Park
Monte Nido
Beverly Hills
Alhambra
Covina
El Monte
West Covina
Los Angeles
Malibu
Culver City
Santa Monica
Montebello
Marina Del Rey
Huntington Park
Whittier
Inglewood
Downey
Brea
Norwalk
Compton
Gardena
Manhattan Beach
Yorba Linda
Fullerton
Cerritos
Lakewood
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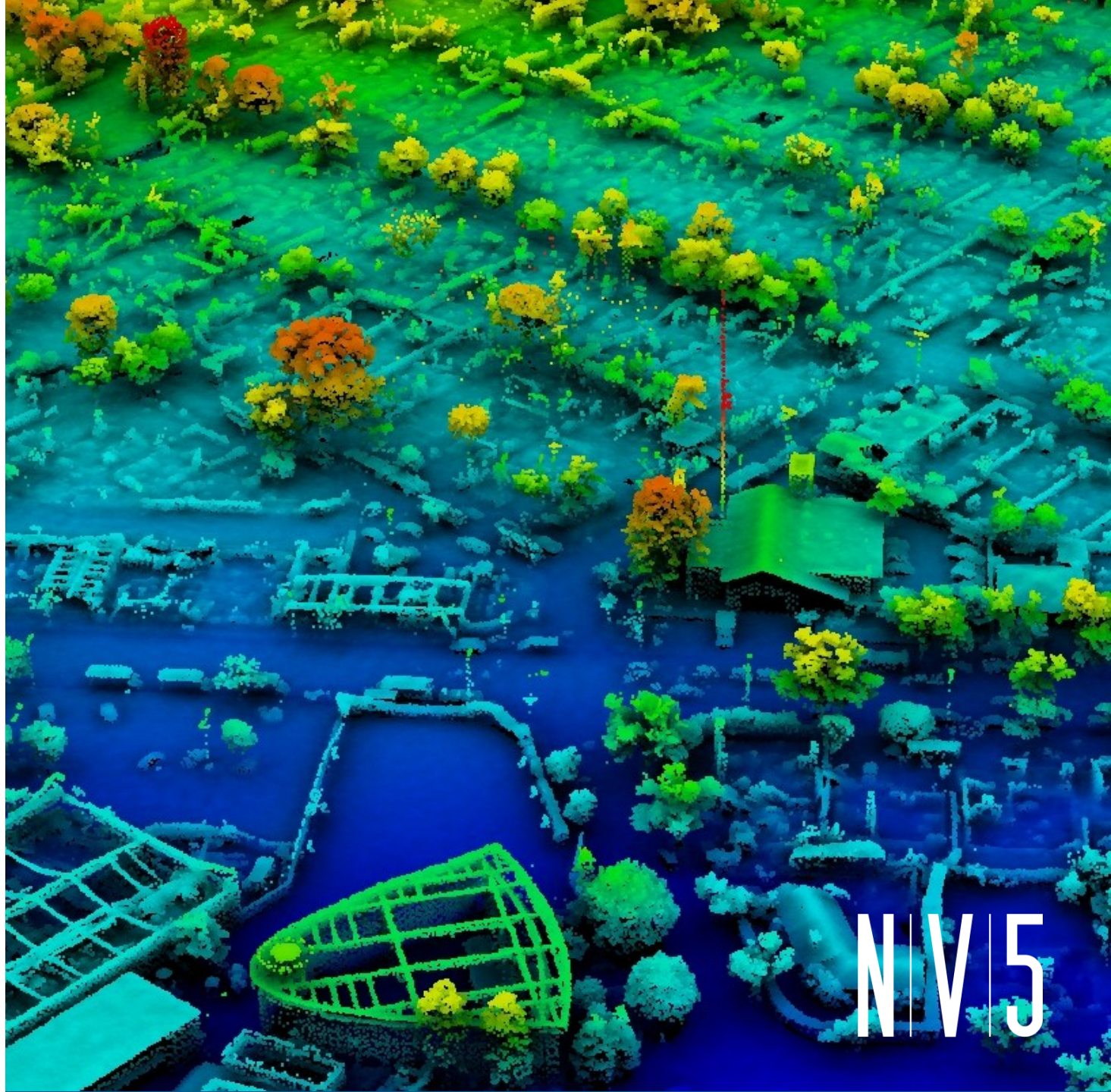
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Satellite Considerations

- Public data vs commercial “on request” tasking
- High repeat frequency. Hours to days depending on tasking.
- Linear or small areas can be challenging or not cost effective
- Competitive landscape
- Need analytic software or service provider (NV5 ENVI Suite)

PRO
Lower cost
High repeat frequency

CON
Low resolution compared to earthbound (30—50cm)
Better for larger and wide areas

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FAA: Manned Aircraft: § 91.119 Minimum safe altitudes

Except when necessary for takeoff or landing, no person may operate an aircraft below the following altitudes:

(a) ***Anywhere.*** An altitude allowing, if a power unit fails, an emergency landing without undue hazard to persons or property on the surface.

(b) ***Over congested areas.*** Over any congested area of a city, town, or settlement, or over any open air assembly of persons, an altitude of 1,000 feet above the highest obstacle within a horizontal radius of 2,000 feet of the aircraft.

(c) ***Over other than congested areas.*** An altitude of 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure.

(d) ***Helicopters, powered parachutes, and weight-shift-control aircraft.*** If the operation is conducted without hazard to persons or property on the surface—

(1) A helicopter may be operated at less than the minimums prescribed in paragraph (b) or (c) of this section, provided each person operating the helicopter complies with any routes or altitudes specifically prescribed for helicopters by the FAA; and

(2) A powered parachute or weight-shift-control aircraft may be operated at less than the minimums prescribed in paragraph (c) of this section.

Fixed Wing Considerations

- What is the proximity of the nearest airport with fuel service?
- How many sites and are they close together?
- What is the size of each site?
- Is the site linear (pipeline, road, electric transmission, coastline, railroad) or a wide area?
- What are the weather conditions?
- Is the AOI within a restricted zone?

PRO

Low cost for wide area coverage
Multiple payloads
Fast mobilization

CON

Weather dependent
Minimum altitude restrictions

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Helicopter Considerations

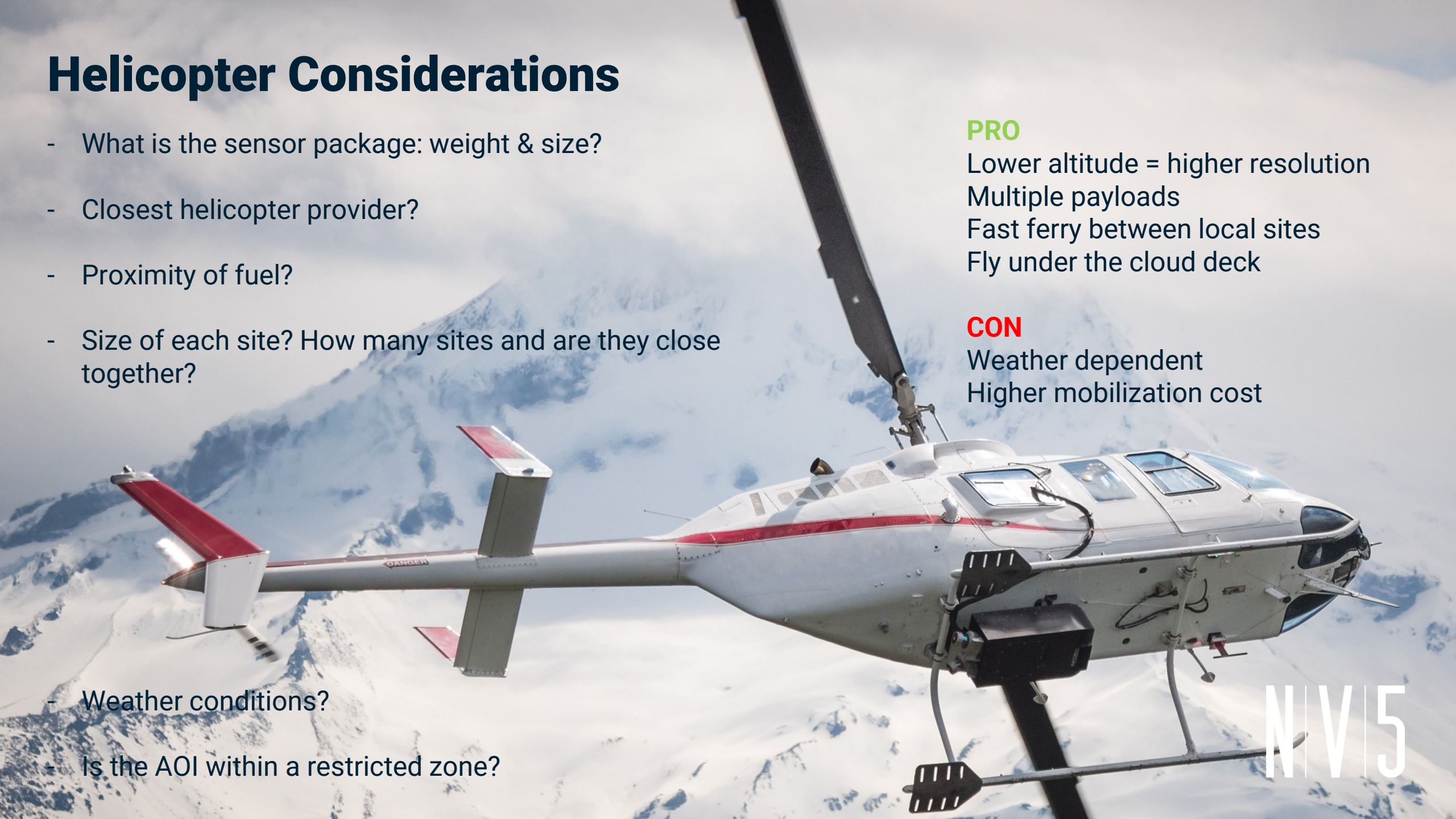
- What is the sensor package: weight & size?
- Closest helicopter provider?
- Proximity of fuel?
- Size of each site? How many sites and are they close together?
- Weather conditions?
- Is the AOI within a restricted zone?

PRO

Lower altitude = higher resolution
Multiple payloads
Fast ferry between local sites
Fly under the cloud deck

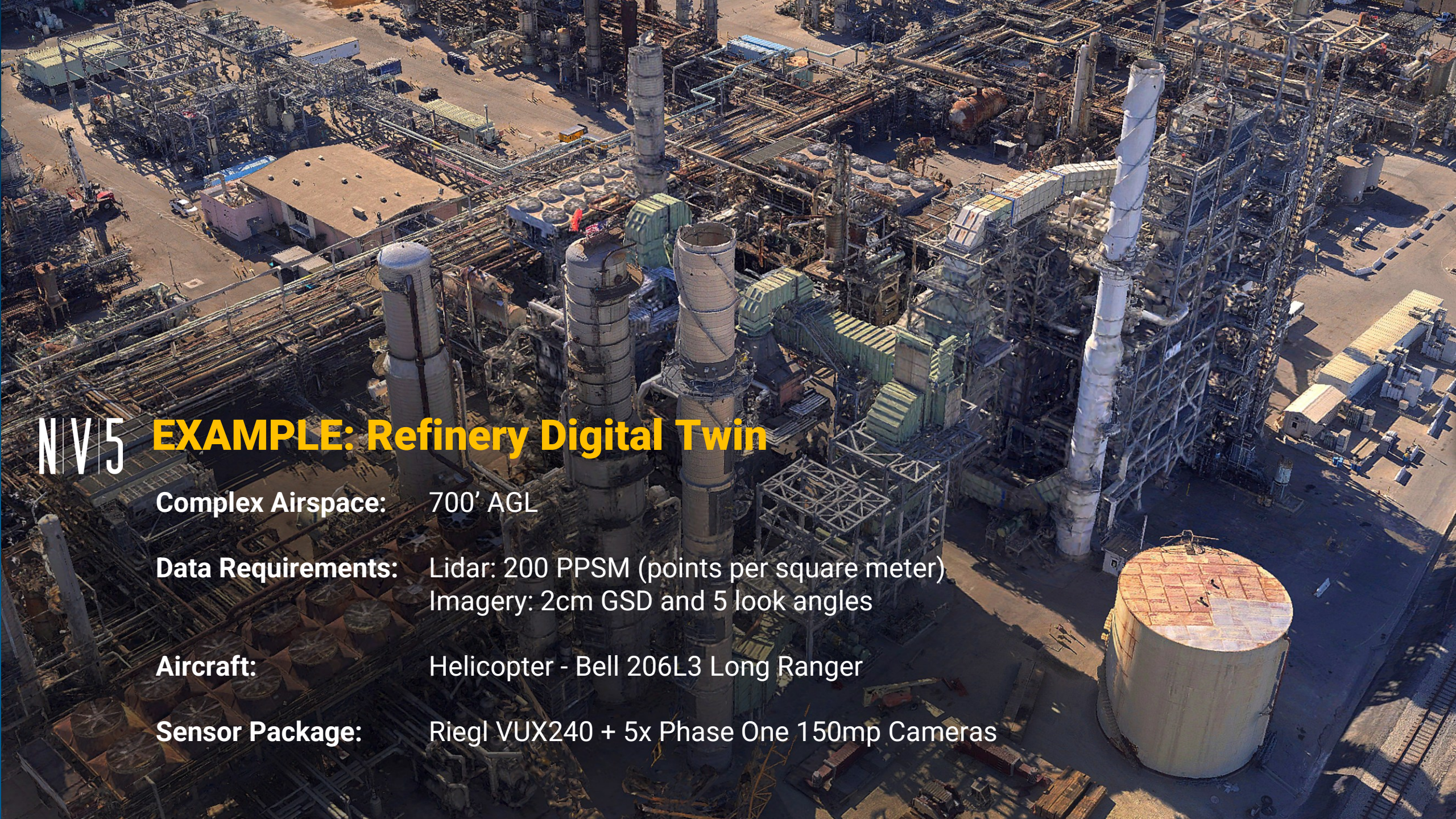
CON

Weather dependent
Higher mobilization cost




Multi-sensor
payloads

Multi-sensor payloads



EXAMPLE: Refinery Digital Twin

Complex Airspace: 700’ AGL

Data Requirements: Lidar: 200 PPSM (points per square meter)
Imagery: 2cm GSD and 5 look angles

Aircraft: Helicopter - Bell 206L3 Long Ranger

Sensor Package: Riegl VUX240 + 5x Phase One 150mp Cameras

UAS Considerations

- Can I safely get a crew to the site?
- How many sites and proximity to each other?
- What is the size of each site?
- Is the site linear or a wide area?
- What are the weather conditions?
- Are permits needed?

PRO
Lower altitude = higher resolution
Lower cost
Inspection grade imagery

CON
Not practical for long linear or wide area sites.
Weather dependent
Mobilization cost, depending on location

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Mobile Mapping

- What is the terrain?
- How many sites and proximity to each other?
- What is the size of each site?
- Is the site linear or a wide area?
- What are the weather and ground conditions?
- Are permits needed?

PRO
Extreme resolution
Lower cost

CON
Requires a vehicle and two crew (driver, operator)
Weather dependent
Mobilization cost, depending on location

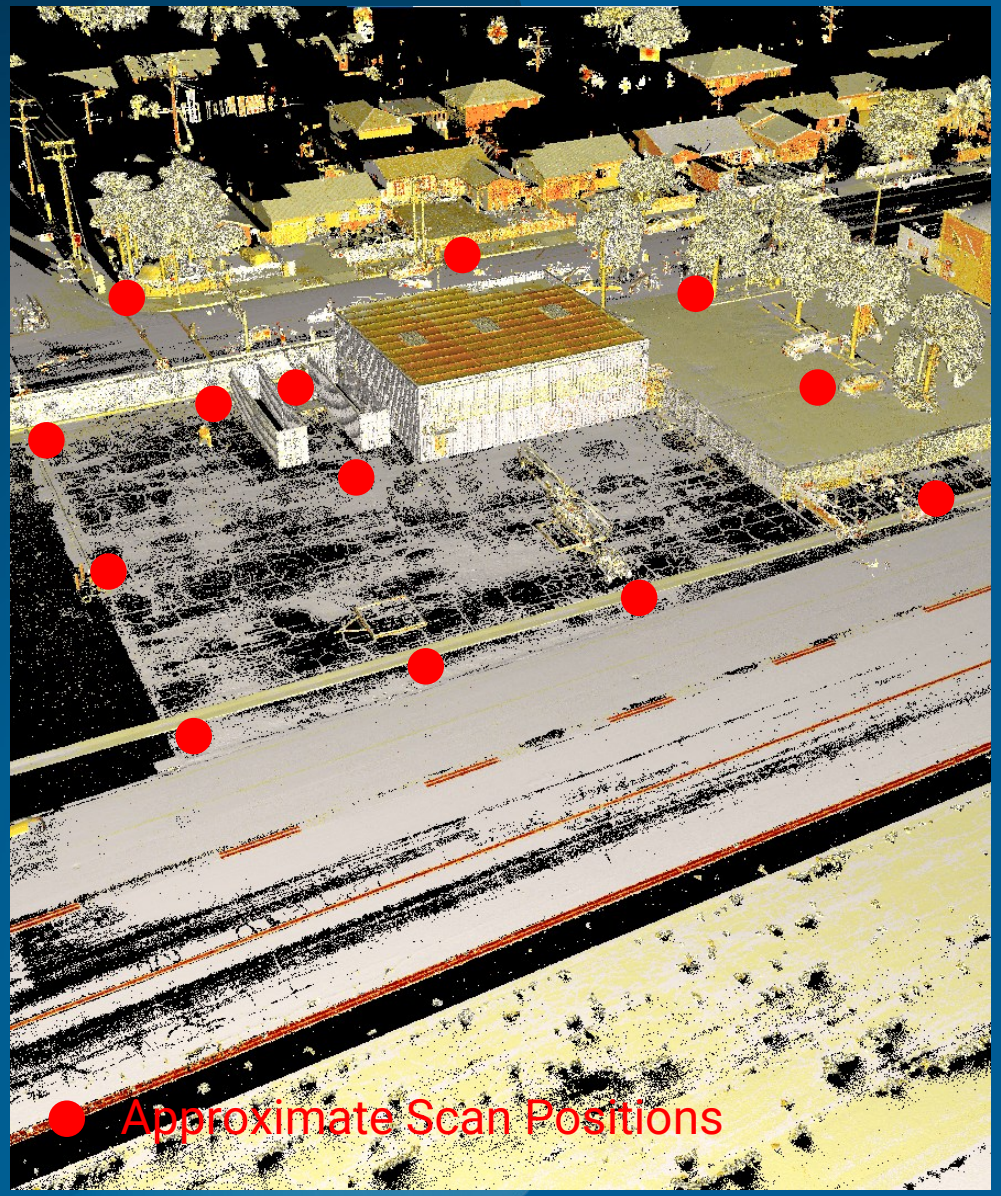
Terrestrial Lidar: Static and Backpack

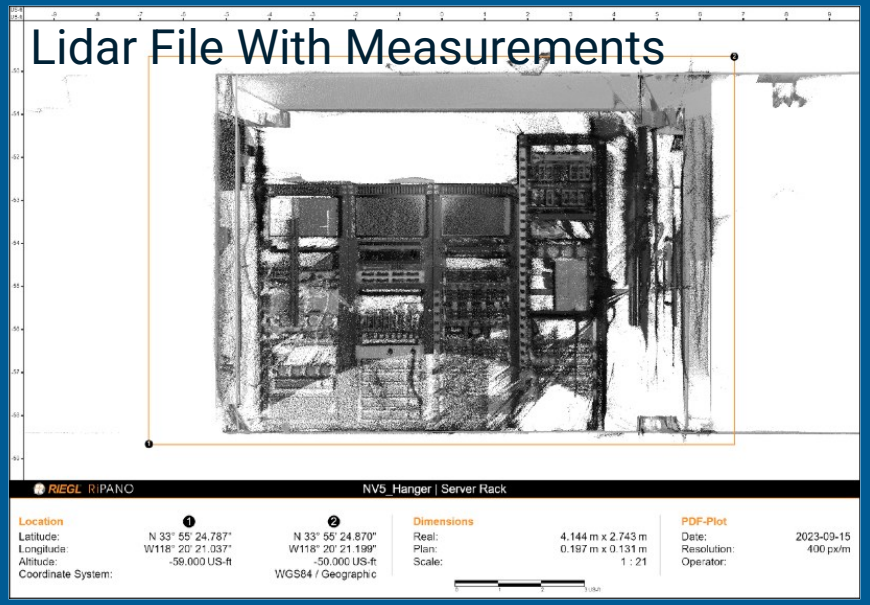
- Can I safely access all lidar positions?
- Safety protocol and training?
- How many sites and are they close together?
- What is the size of each site in square footage?
- Is the site linear (pipeline, road, railroad) or a wide area?
- What are the weather conditions? Hot, cold, windy?

PRO
Confined spaces
Lower cost
Onboard processing

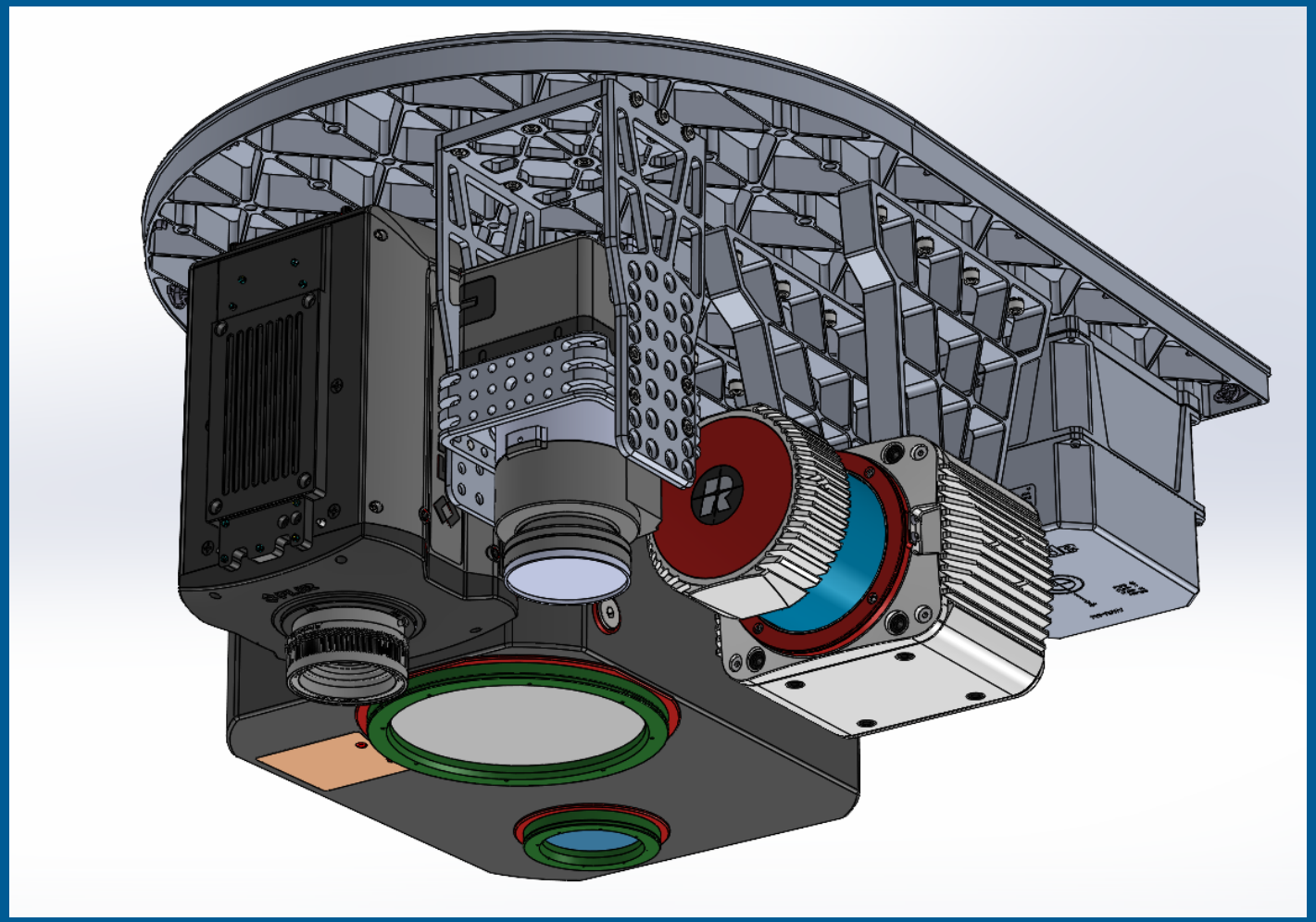
CON
Not practical for long linear or wide area sites.
Physically demanding

Terrestrial Lidar: Workflow Sample





Multi-sensor payloads




NO SMOKING
FASTEN SEATBELT
12.5 HZ
FLIR Research Studio
X8501sc SLS 00182 - GigE
72%
N|V|5
Kenai Peninsula

OTHER OPTIONS: Hydrographic Survey


Hawai‘i Volcanoes National Park
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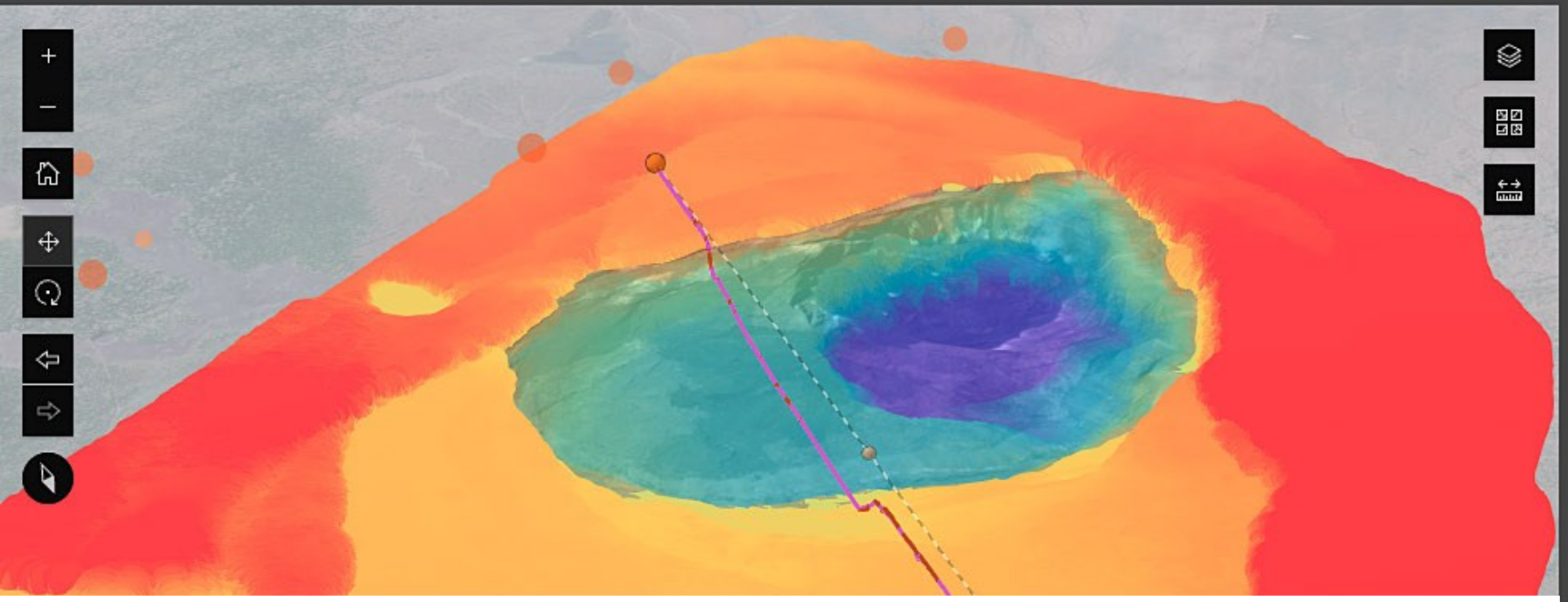
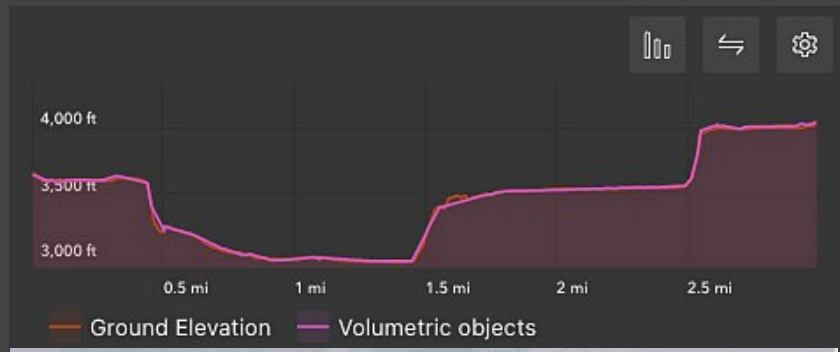
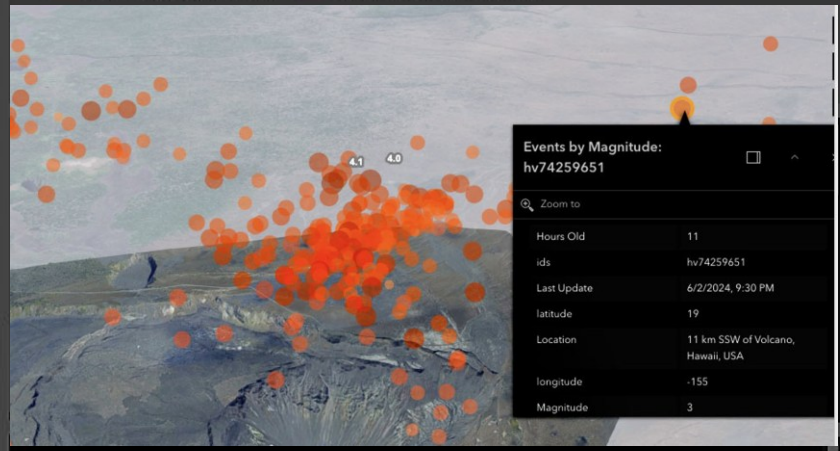
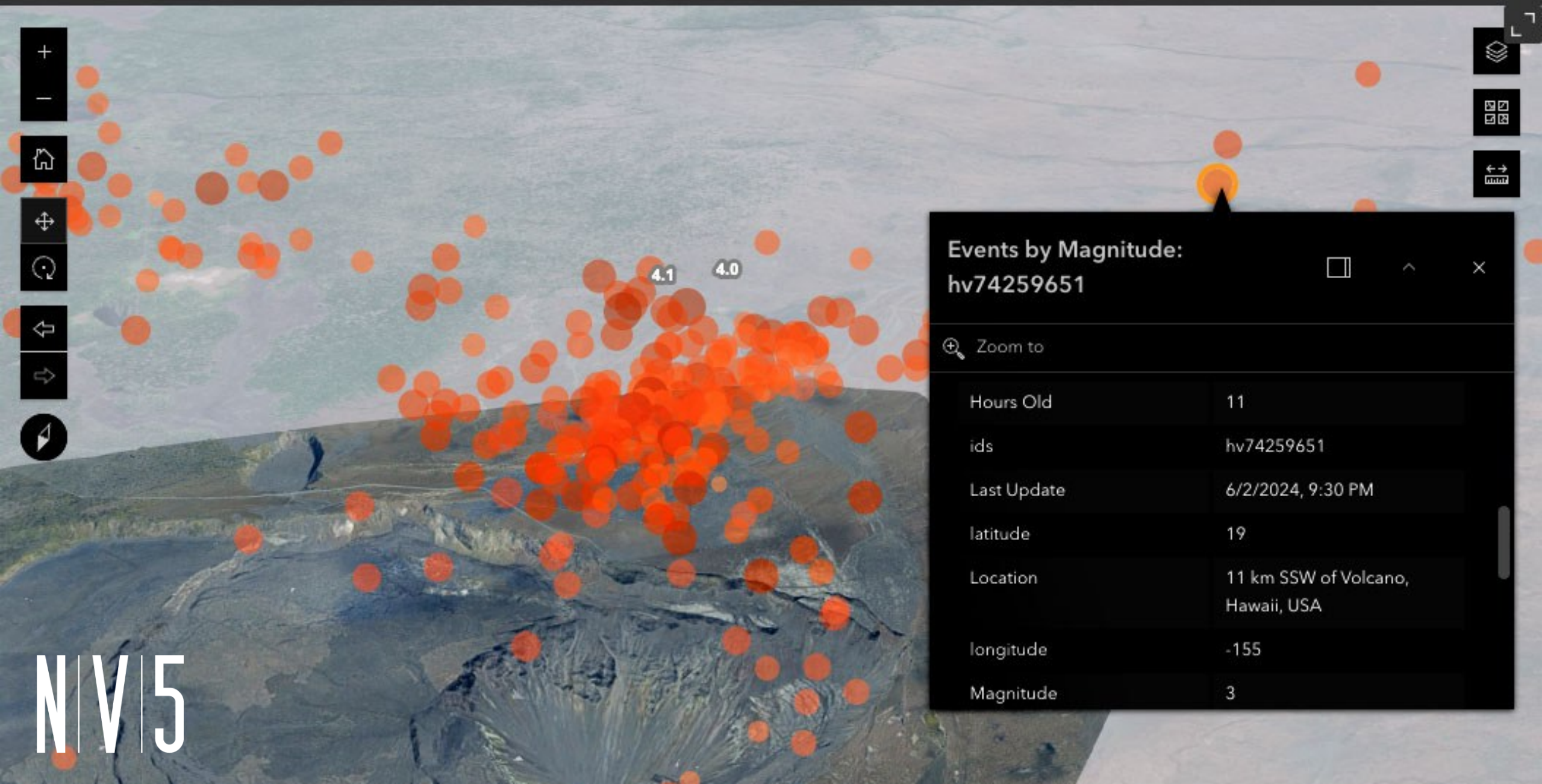
NV5 KĪLAUEA VOLCANO







KĪLAUEA VOLCANO



Future Thoughts

- More multi-sensor payloads
- Onboard “edge computing”
- Real-time delivery
- Increased resolution and improved tools will drive satellite data
- Large scale fully autonomous data collection is 10-15 years out
- Lots of “noise” in the market proposing new solutions
- Beware of shiny toys. Focus on the solution.
- Gaming and geospatial sectors will continue to merge
- New opportunity for new jobs not yet imagined

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