L3HARRIS™

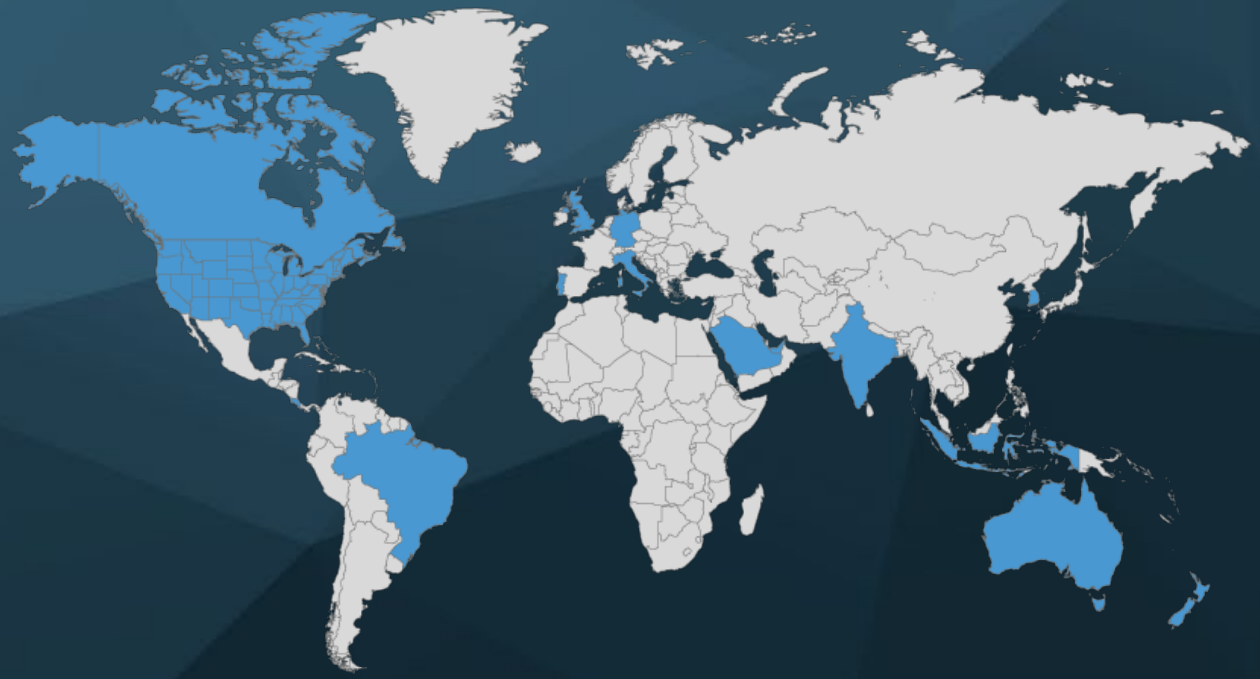
EFFECTIVELY USE GEOSPATIAL DATA IN THE DISASTER MANAGEMENT CYCLE

JULY 8, 2021

J.P. METCALF | Sales Engineer

L3HARRIS

L3Harris Technologies is an agile global aerospace and defense technology innovator, delivering end-to-end solutions that meet customers' mission-critical needs.



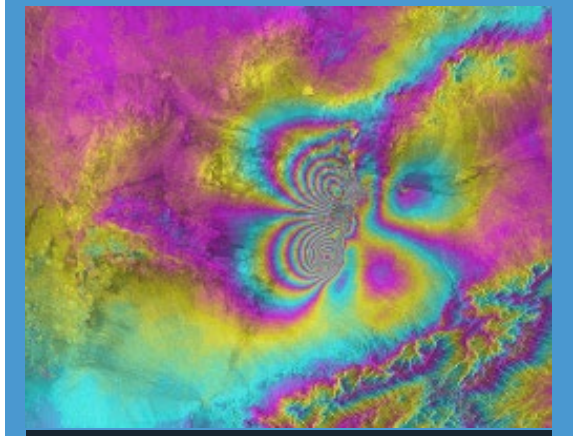
~400
LOCATIONS

CUSTOMERS IN
~130
COUNTRIES

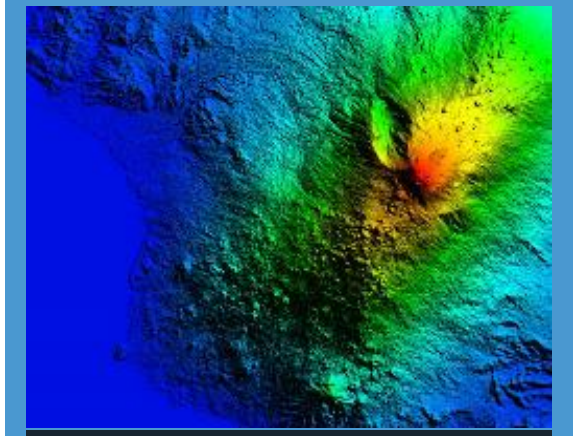
LOCATIONS IN
~30
COUNTRIES

~48K
EMPLOYEES

Geospatial Solutions



Commercial geospatial analytics



Off-the-shelf and custom geospatial products/services

Data and imagery

Machine learning technologies

Introduction

J.P. Metcalf

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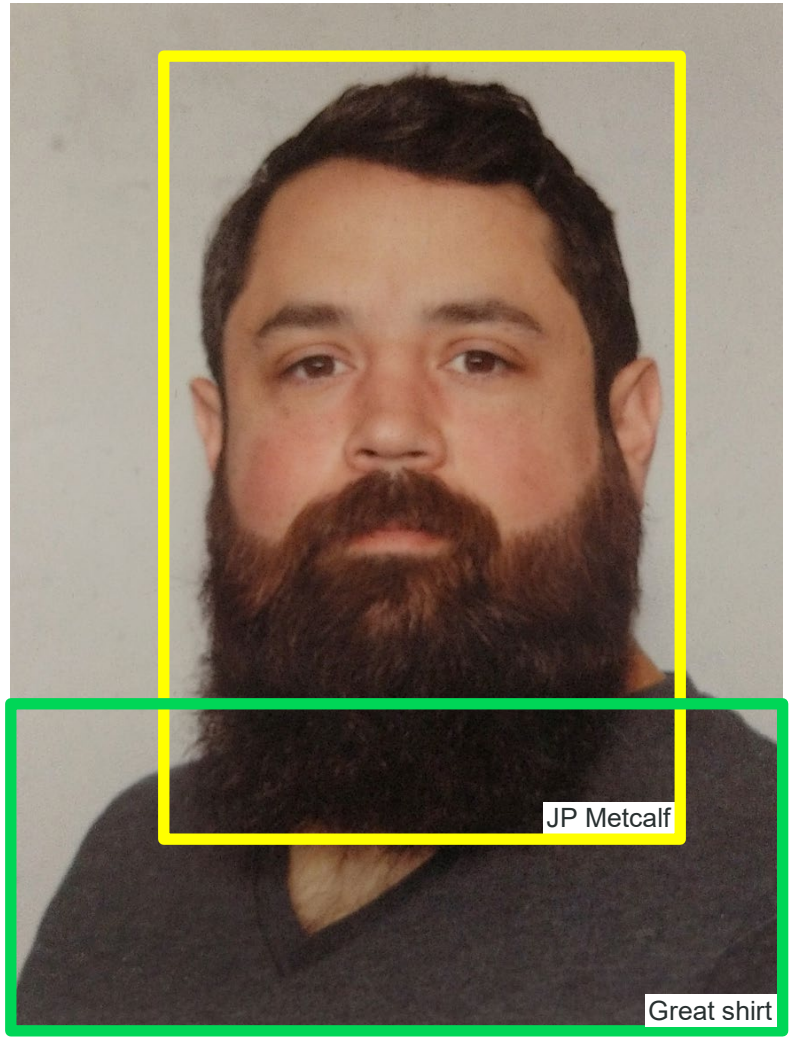
L3Harris Geospatial

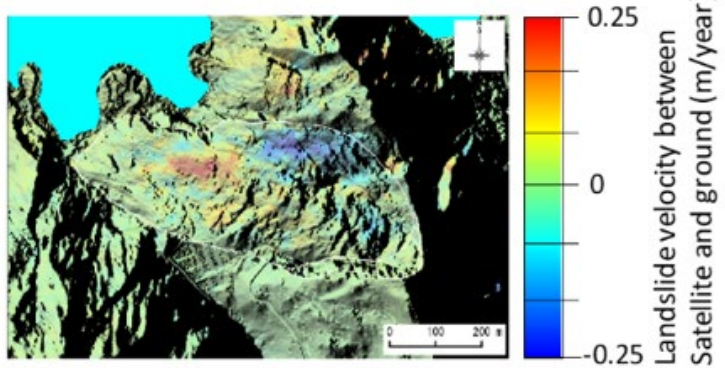
JP.Metcalf@L3Harris.com



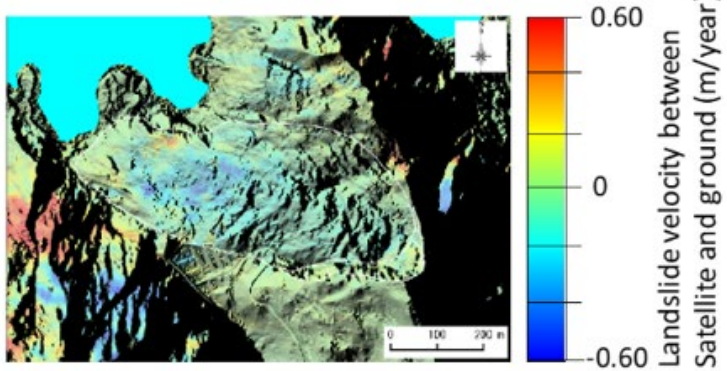
Agenda

- Introduction
- 2020: A Year in Review for Disasters
- The Disaster Management Cycle
  - Mitigate
  - Prepare
  - Respond
  - Recover
- Case Studies
- Disaster Management Website
- Questions

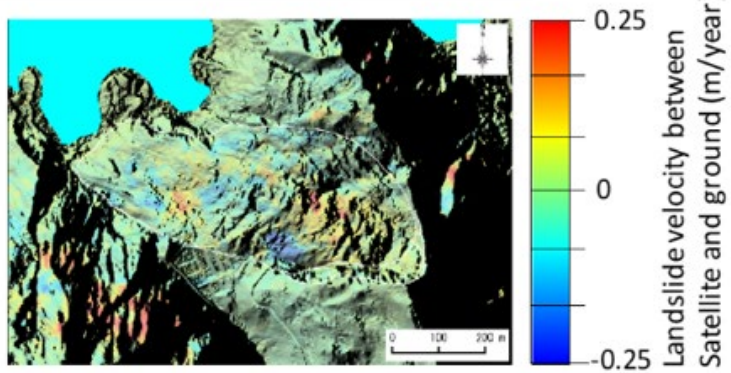
Maximum displacement rate = 0.6cm/year
(October 2014 – December 2015)



Period1: October 2014 – April 2015

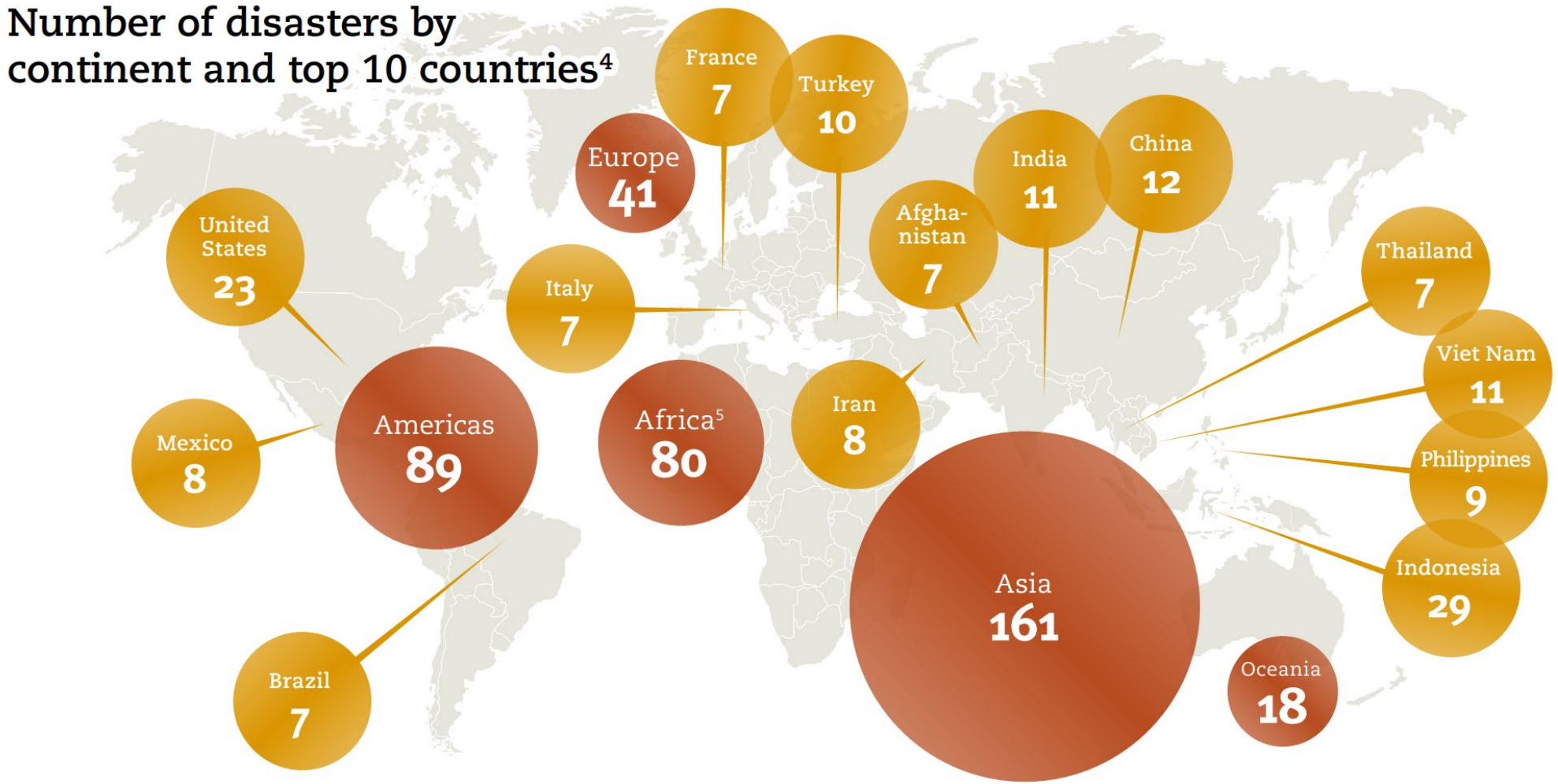


Period2: April 2015 – July 2015



Period3 : July 2015 – December 2015

Occurrence of Non- COVID Disasters in 2020

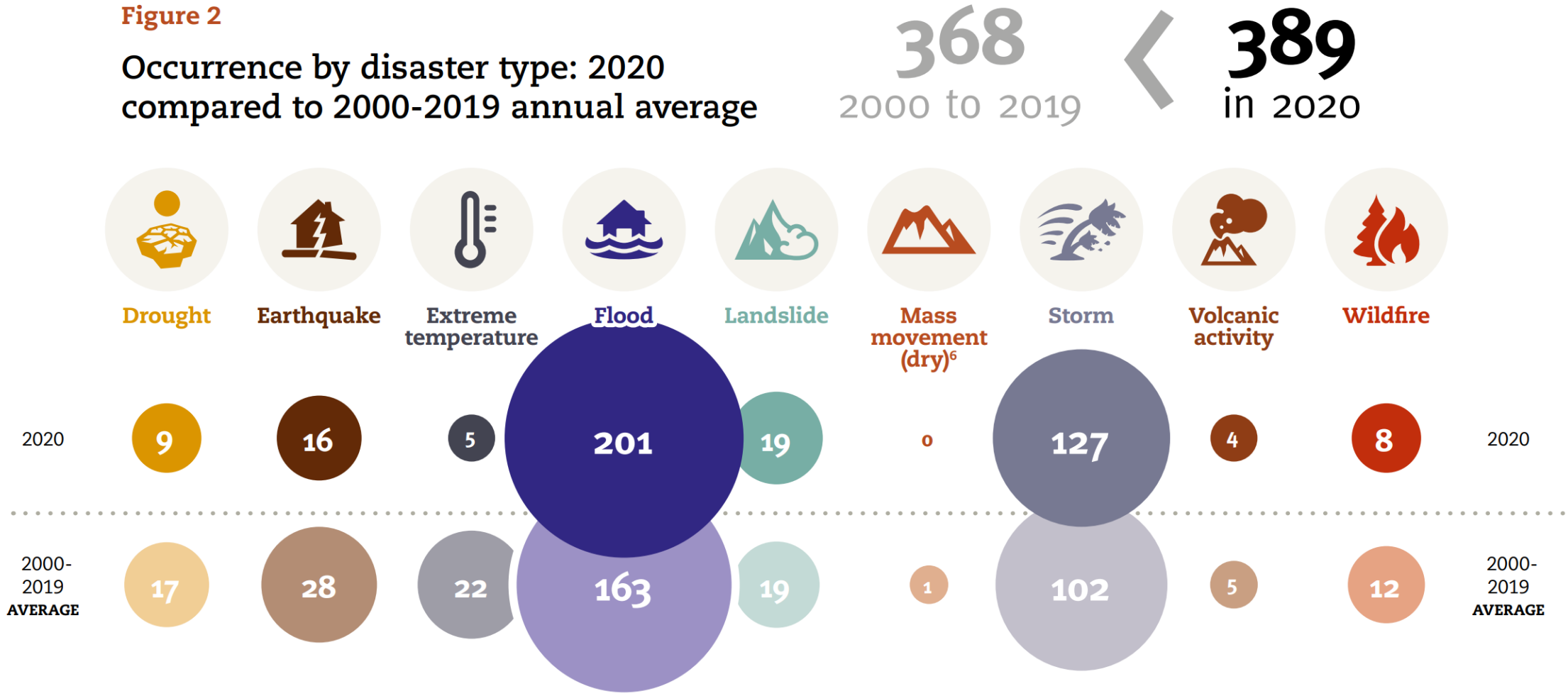


Source: https://www.undrr.org/publication/2020-non-covid-year-disasters

Occurrence by Disaster Type

Figure 2

Occurrence by disaster type: 2020 compared to 2000-2019 annual average



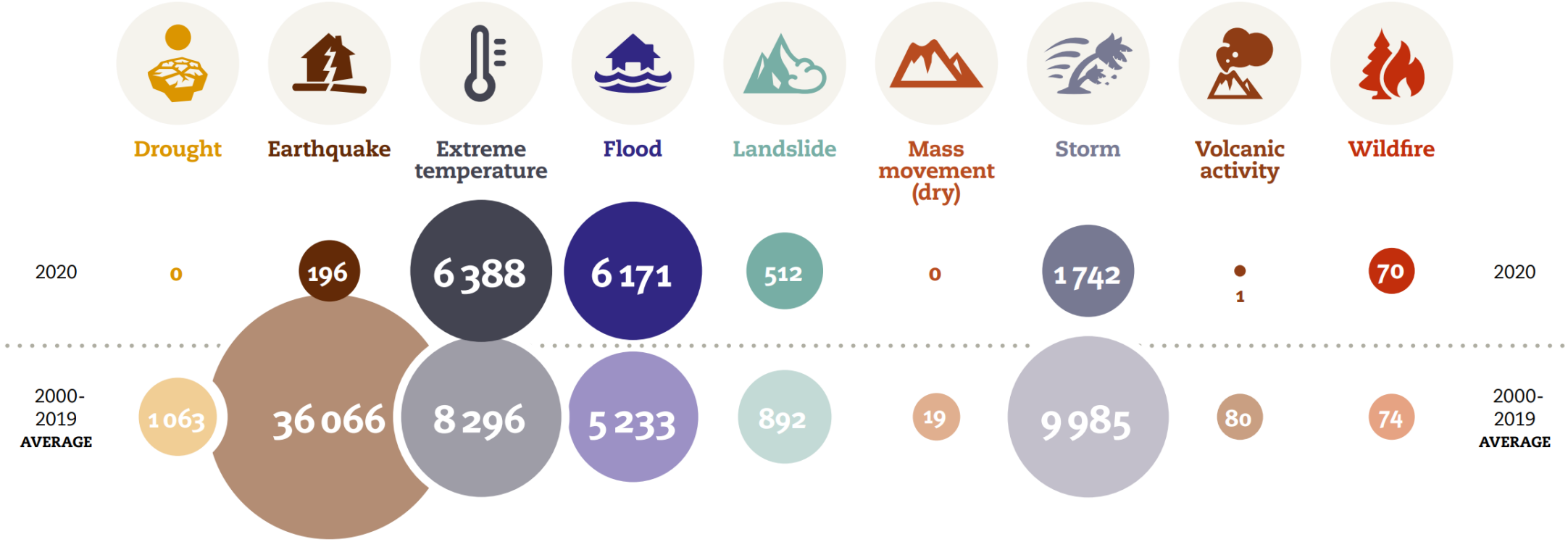
Source: https://www.undrr.org/publication/2020-non-covid-year-disasters

Number of Deaths by Disaster Type

Figure 4

Number of deaths by disaster type: 2020 compared to 2000-2019 annual average

61,709 2000 to 2019 › 15,080 in 2020



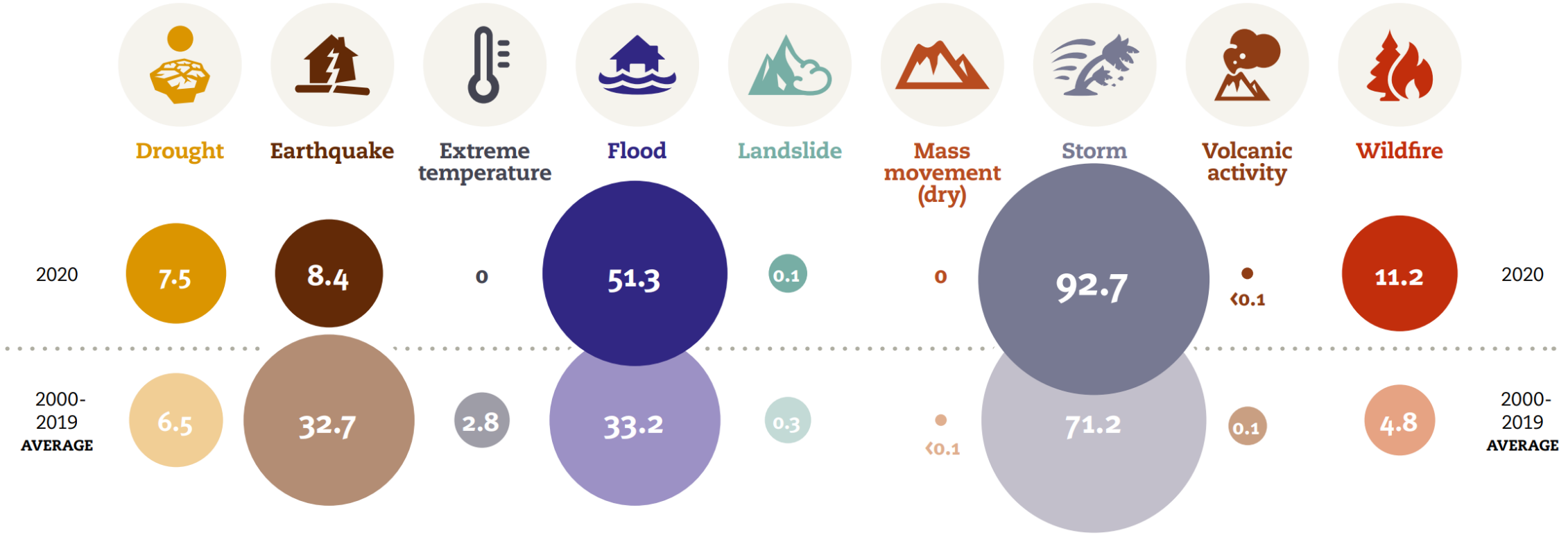
Source: https://www.undrr.org/publication/2020-non-covid-year-disasters

Economic Losses by Disaster Type

Figure 8

Economic losses (billion US$) by disaster type: 2020 compared to 2000-2019 annual average[9]

151.6 2000 to 2019 < 171.3 in 2020



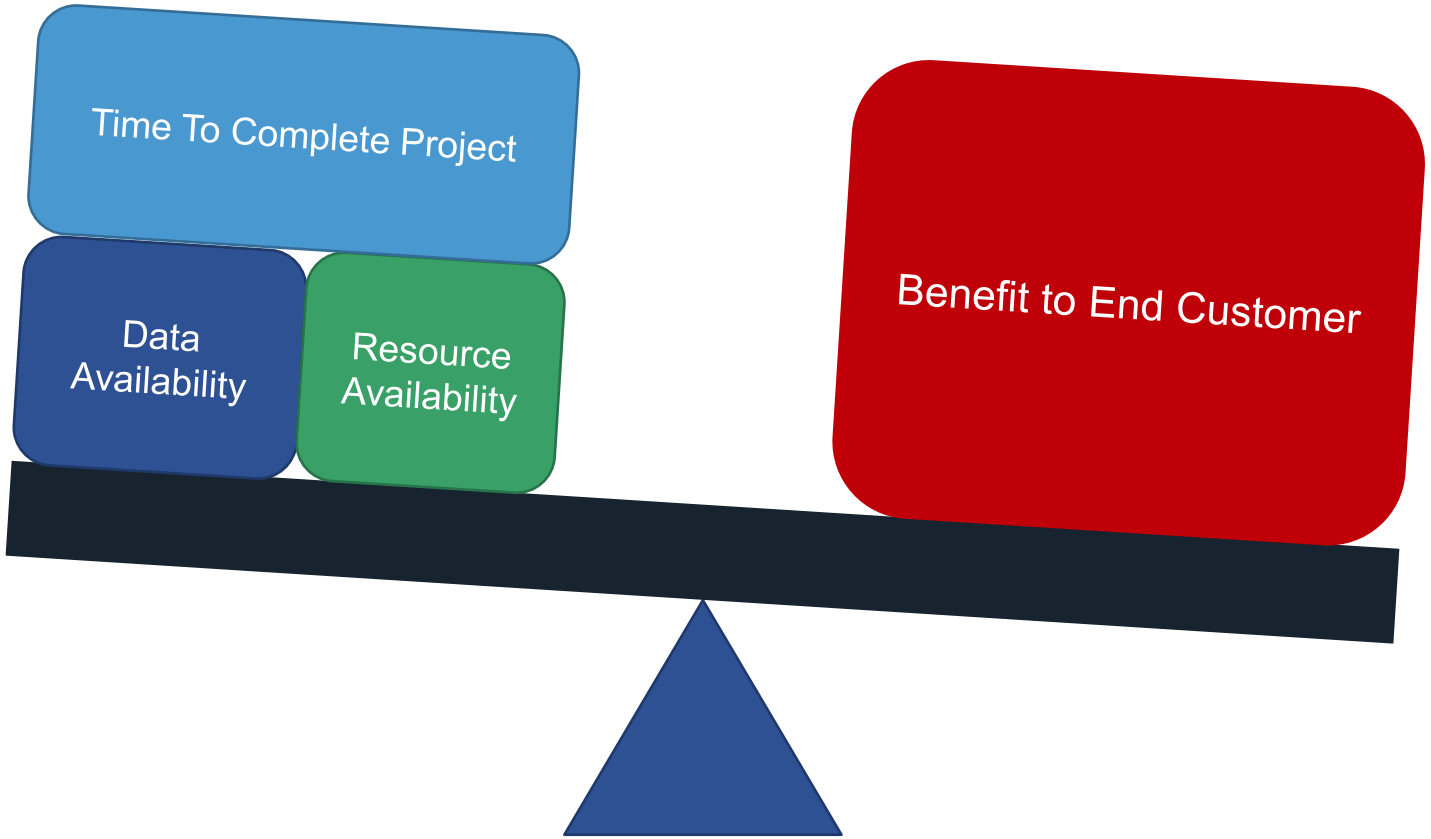
Source: https://www.undrr.org/publication/2020-non-covid-year-disasters

The Disaster Management Cycle

Preparation For An Event That May Occur

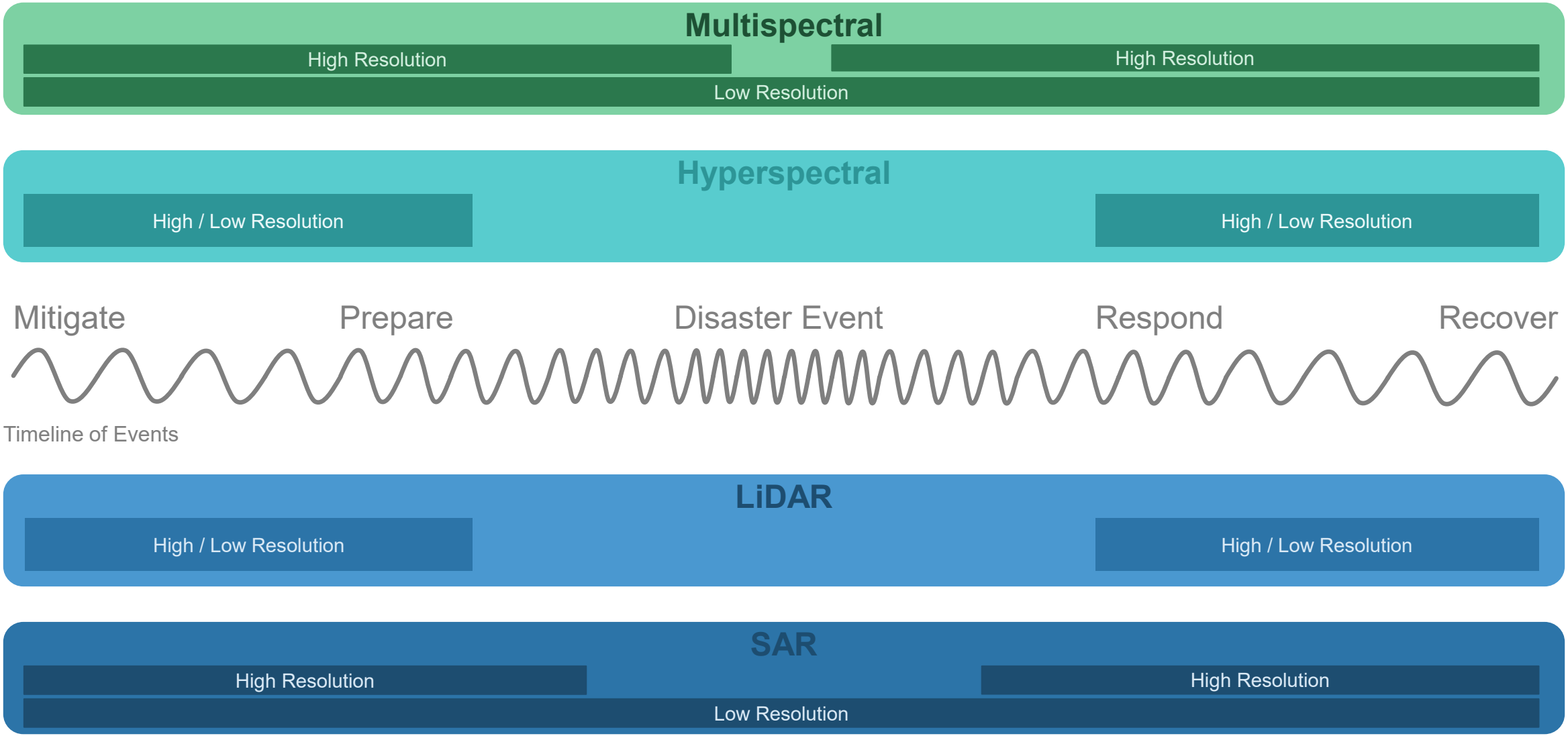
Responding To An Event That Has Occurred

System Variables

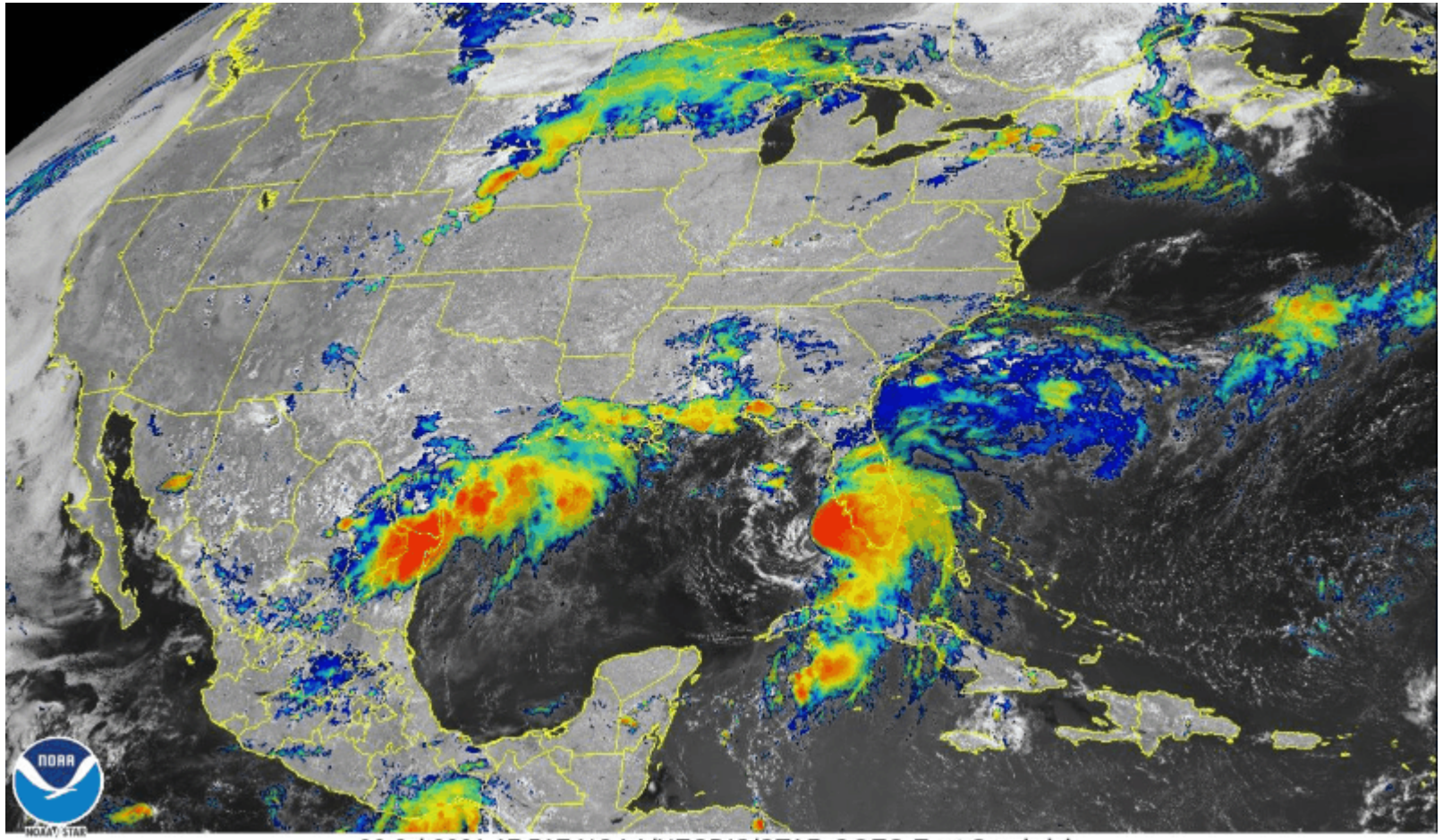


Time To Complete Project

Data Availability



Latest GOES-East CONUS



06 Jul 2021 17:51Z NOAA/NESDIS/STAR GOES-East Sandwich

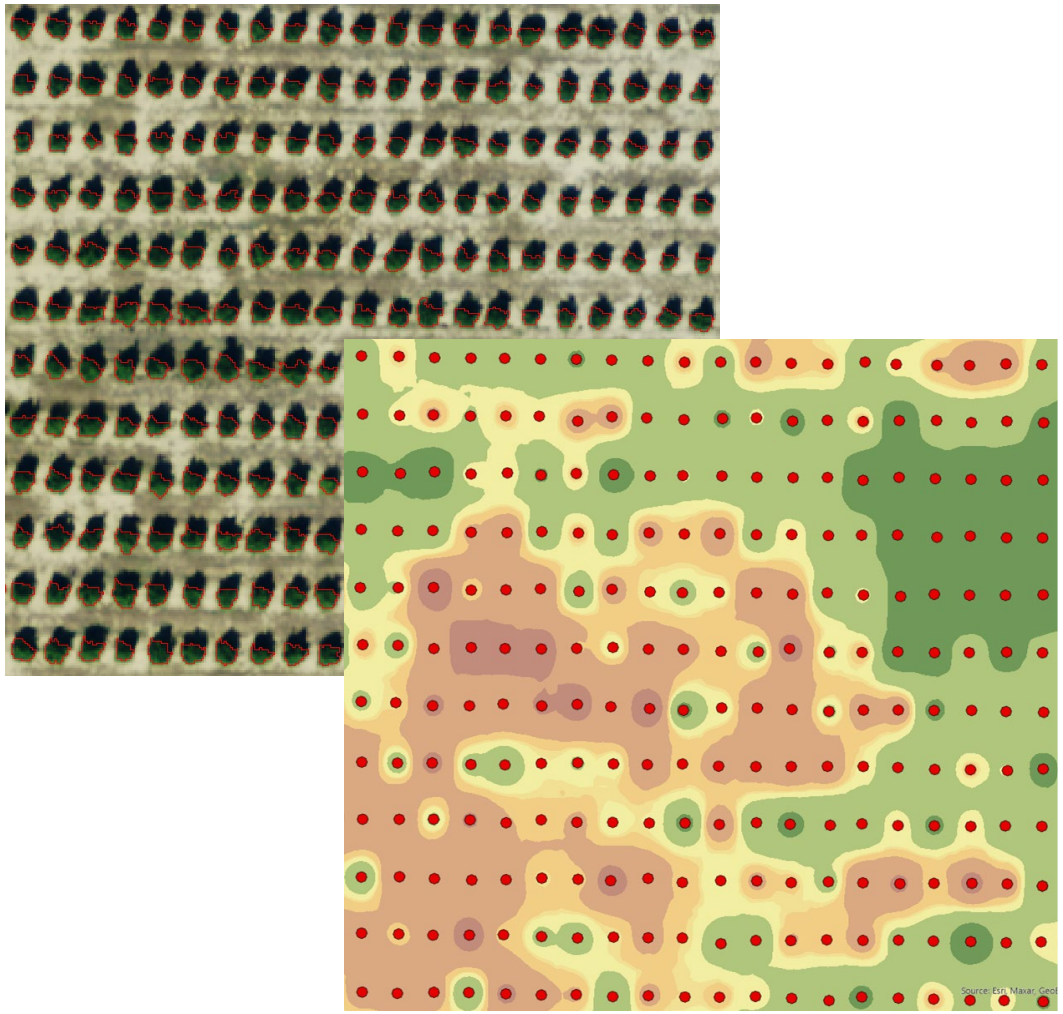
https://www.star.nesdis.noaa.gov/GOES

Disaster Mitigation

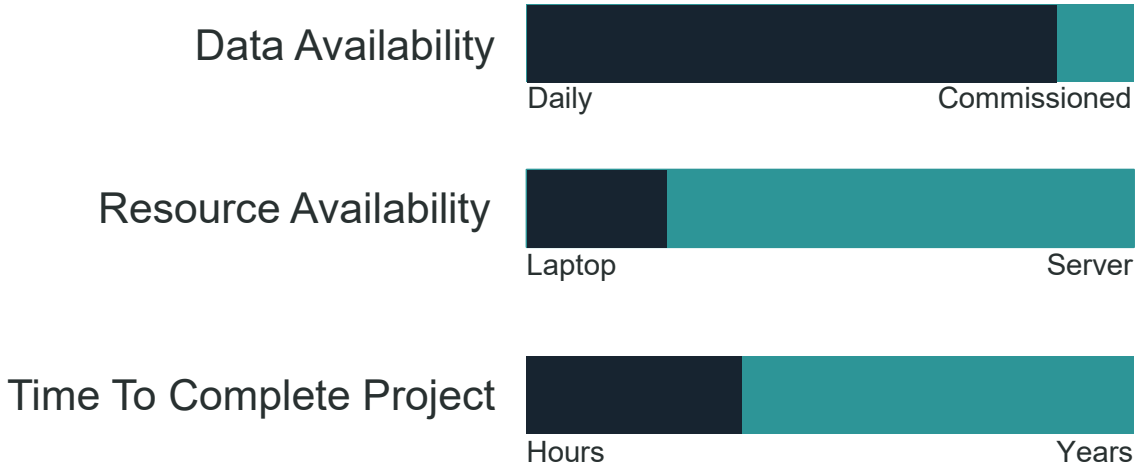
L3Harris Geospatial solutions are used to:

- Inventory assets in areas prone to disasters
- Perform vulnerability analysis to identify hazard zones, fault lines and land subsidence
- Evaluate risks to population centers and infrastructure
- Make effective land use planning and design decisions
- Undertake hazard-specific control activities such as reducing fire fuel around structures
- Understand changes over time to landscapes, population centers and more

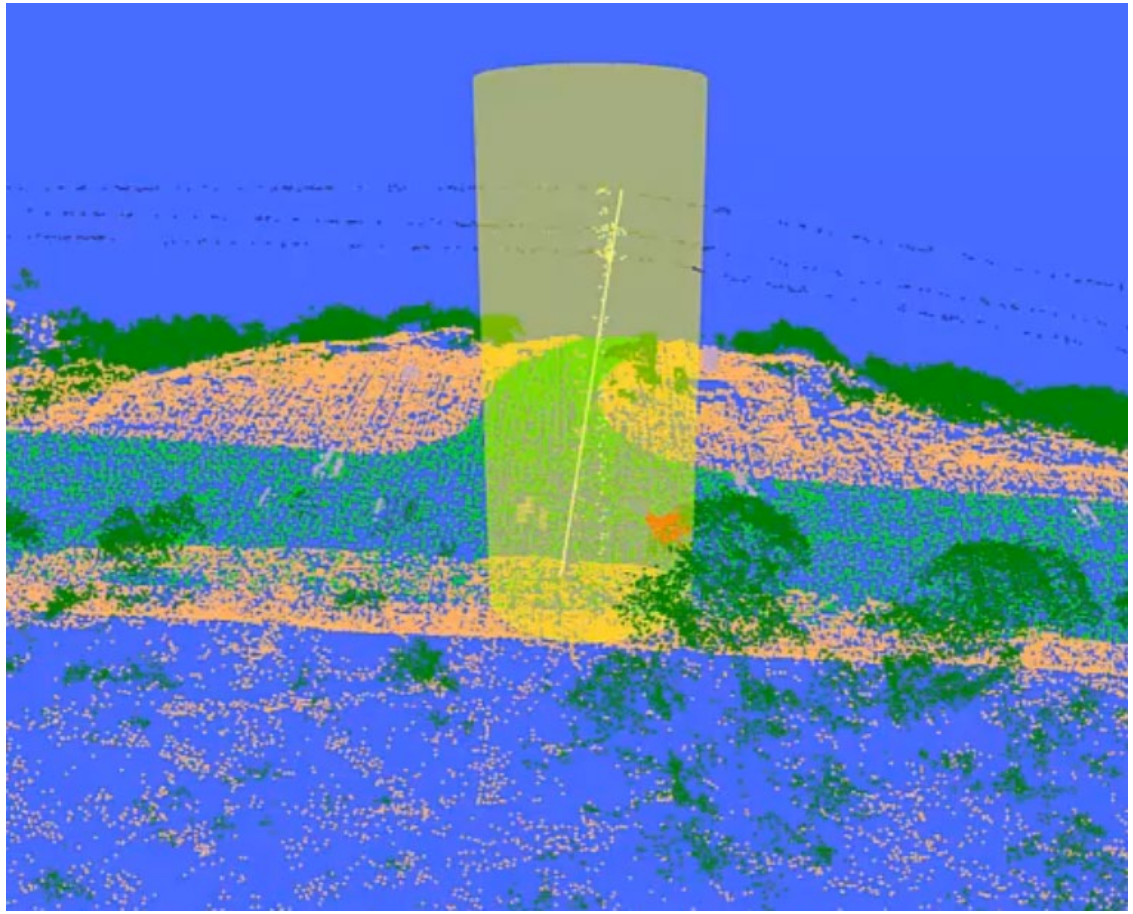
Early Warning Signs of Crop Failure

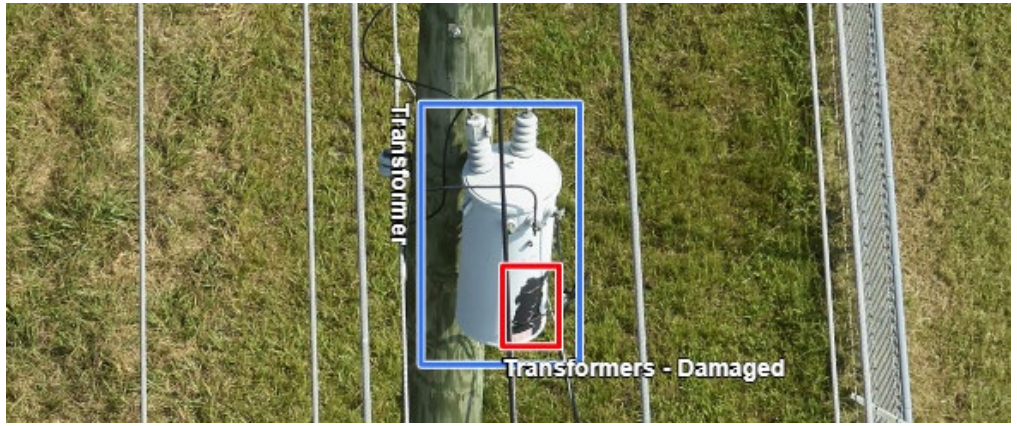


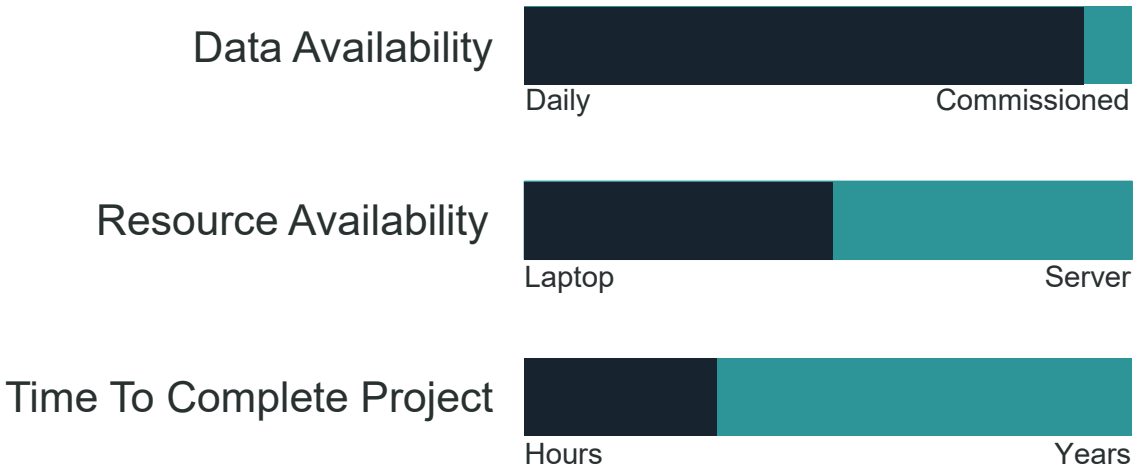
Keep an eye on scale of the project



Power Utilities Monitoring

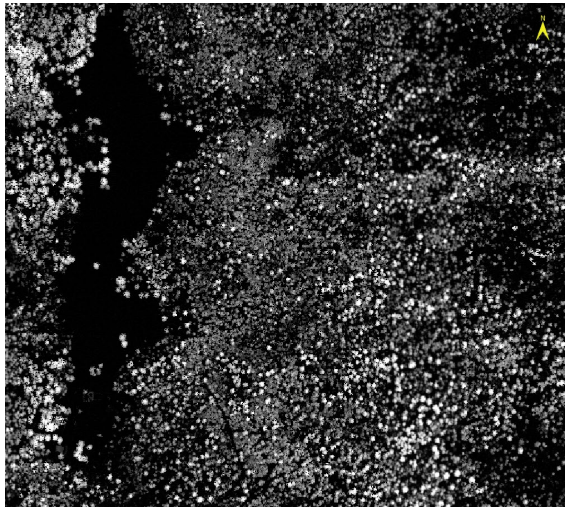






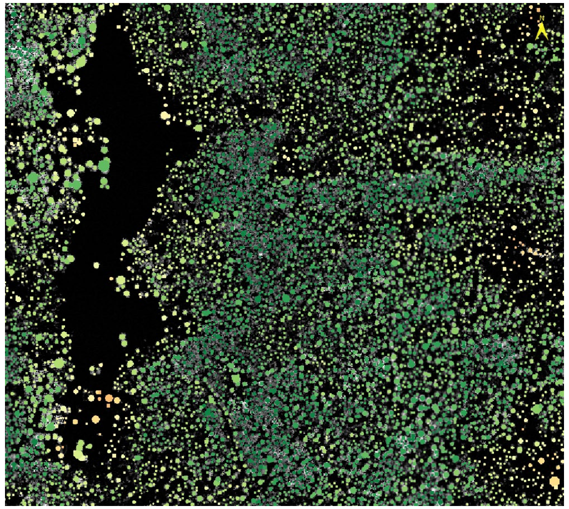
Forest Inventory

DSM – DEM = Canopy Layer



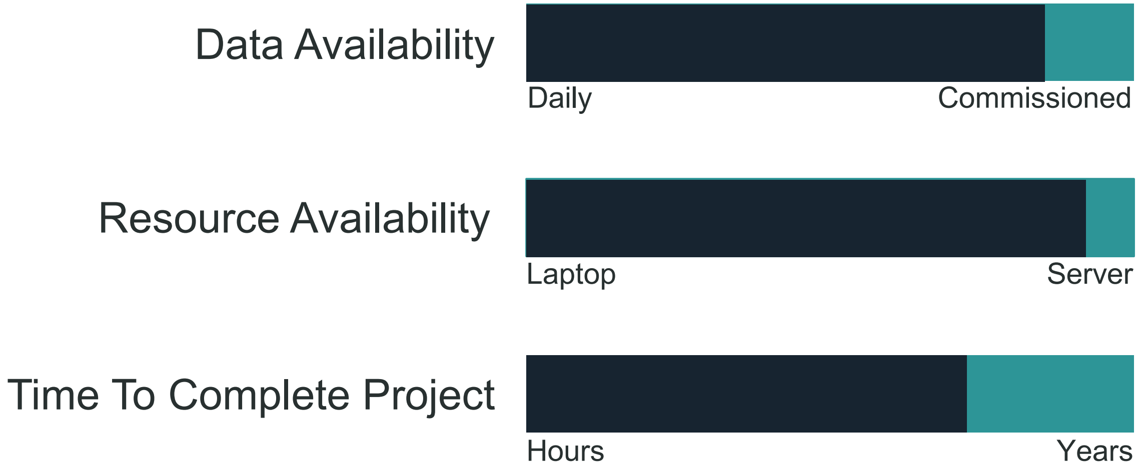
0 Meters ← - - - - - - - - → 15 meters

Tree Location Colored By NDVI

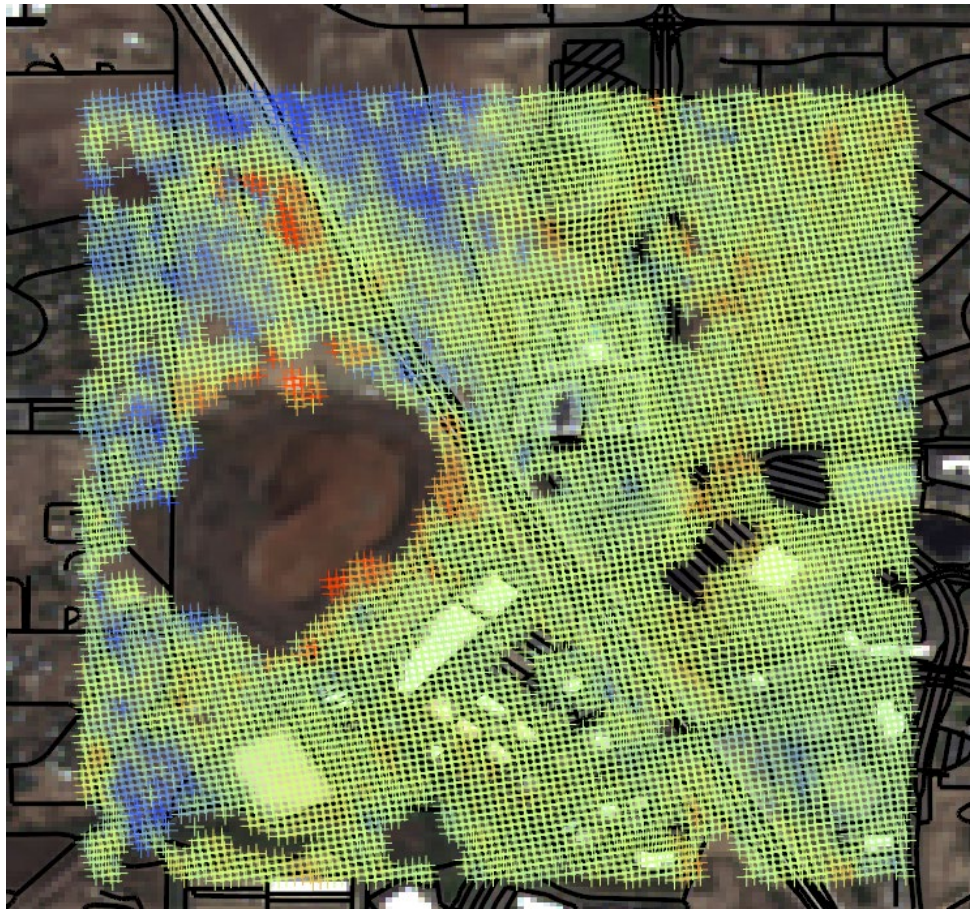


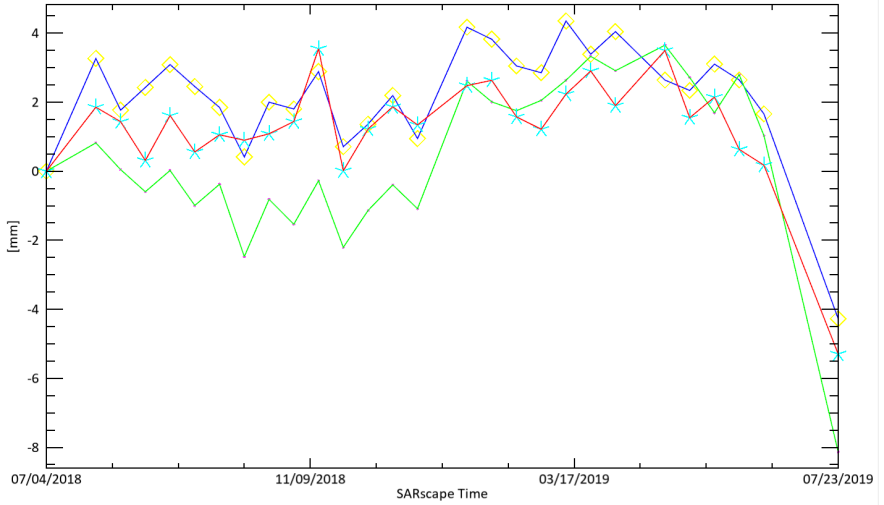
0 NDVI ← - → .35 NDVI ← - → .7 NDVI

What data do you have available and how much compute power?



Monitoring Subsidence





Data Availability

Resource Availability

Time To Complete Project

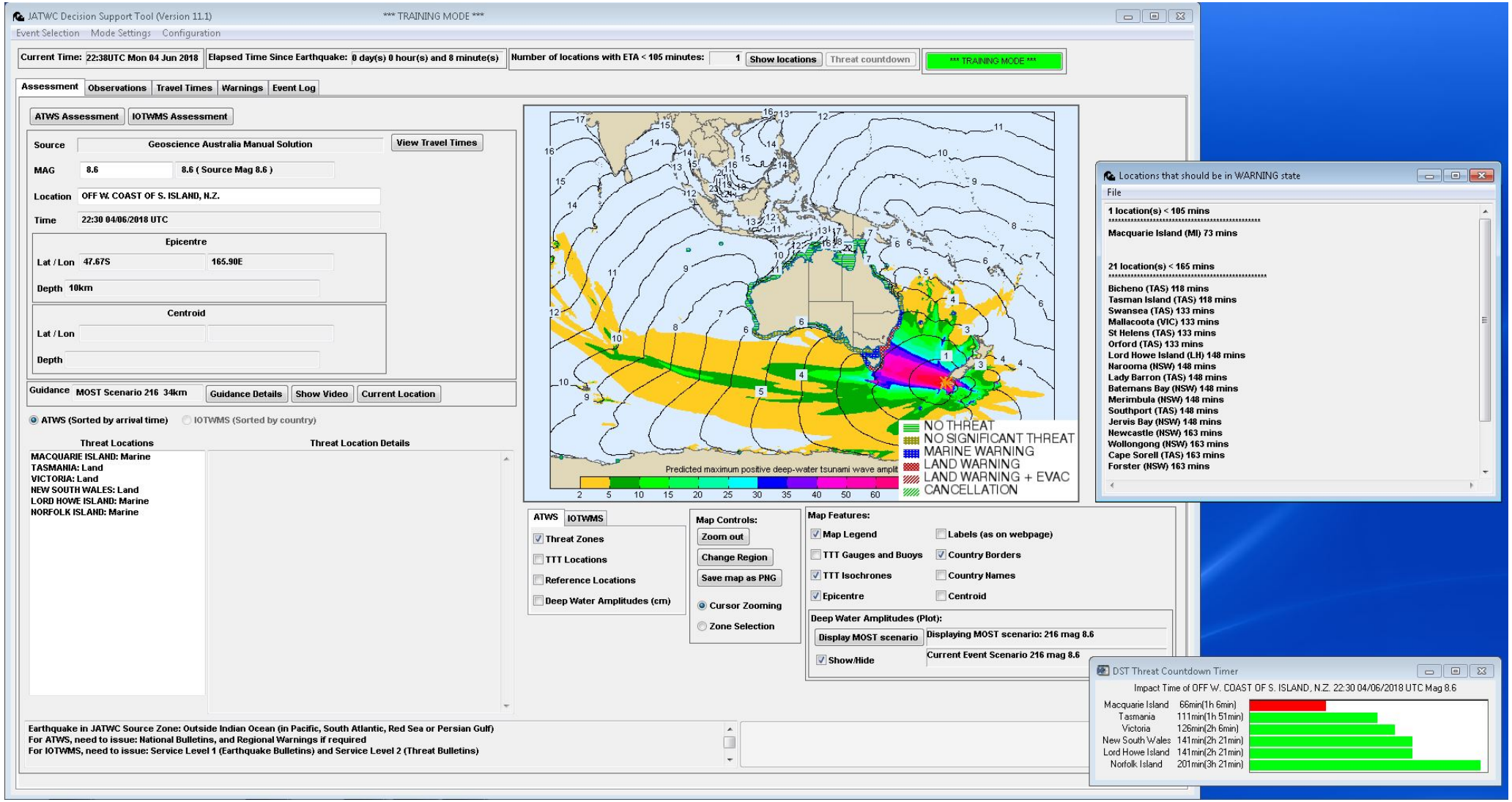
Disaster Preparation

Prepare for disasters by using L3Harris Geospatial solutions to:

- Analyze imagery to detect early stages of drought, hurricanes, floods and volcanic eruptions
- Monitor land displacement and deformation for potential landslide activity
- Map low-lying areas that may be prone to flooding and inundation
- Map the quickest evacuation routes to safety
- Develop hazard models to understand impacts of a disaster
- Design disaster warning systems

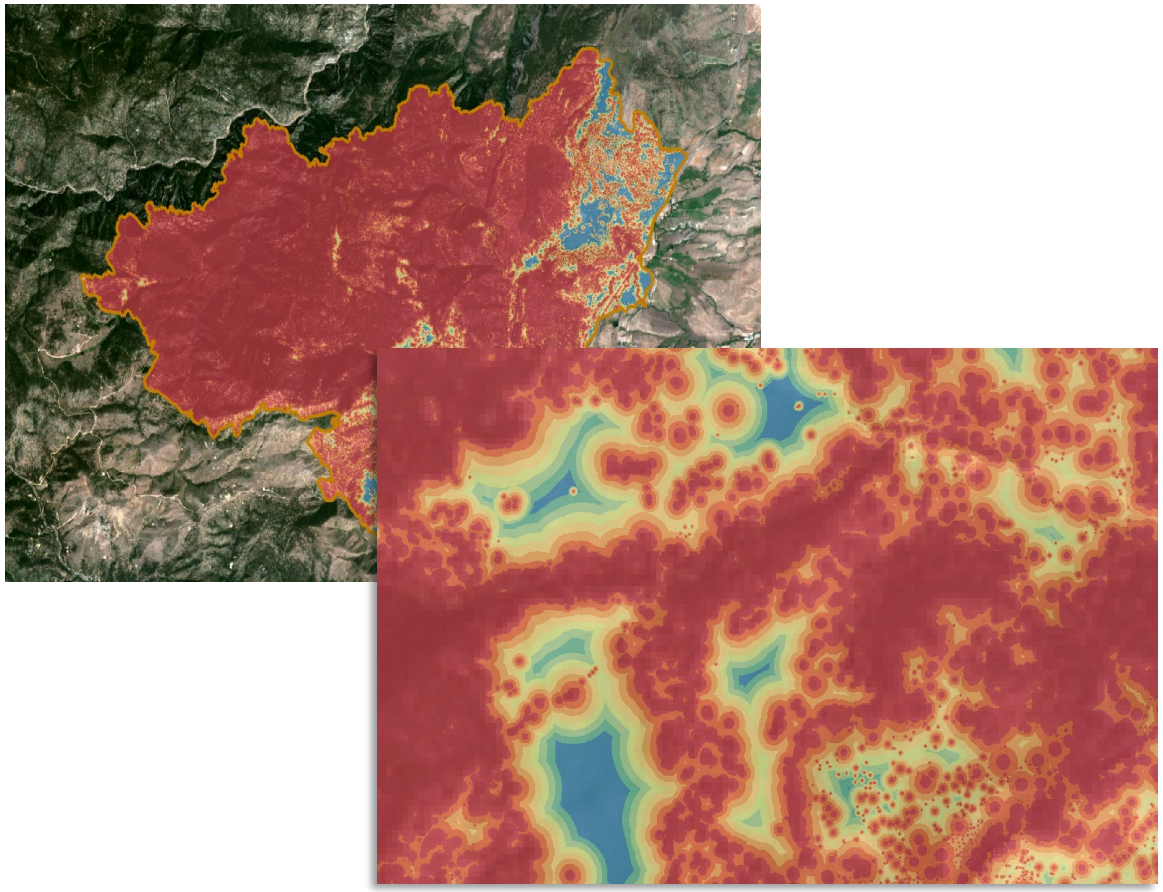
https://www.l3harrisgeospatial.com/Industry-Solutions/Disaster-Management

Tsunami Detection



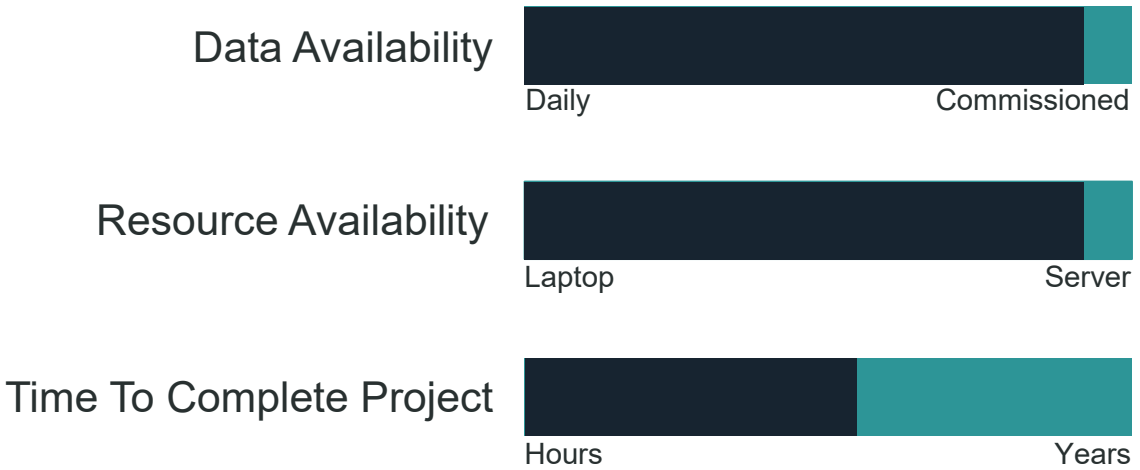
https://www.l3harrisgeospatial.com/Learn/Case-Studies/Case-Studies-Detail/ArtMID/10204/ArticleID/23543/IDL-Programming-Language-is-Engine-Behind-Australian-Tsunami-Decision-Tool

Fire Safety Zones

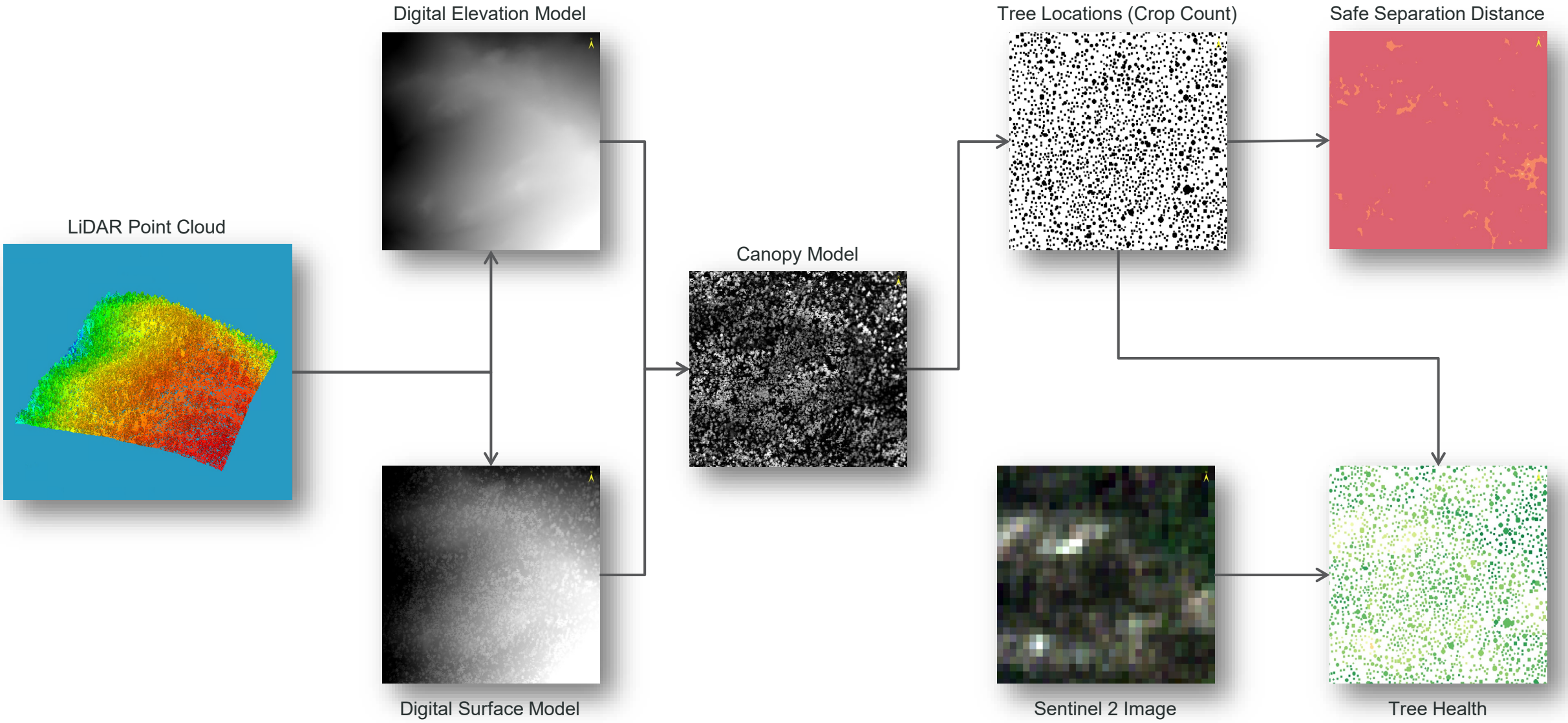


1x Vegetation Height — 8x Vegetation Height

What data do you have available and how much compute power?



Generalized Workflow



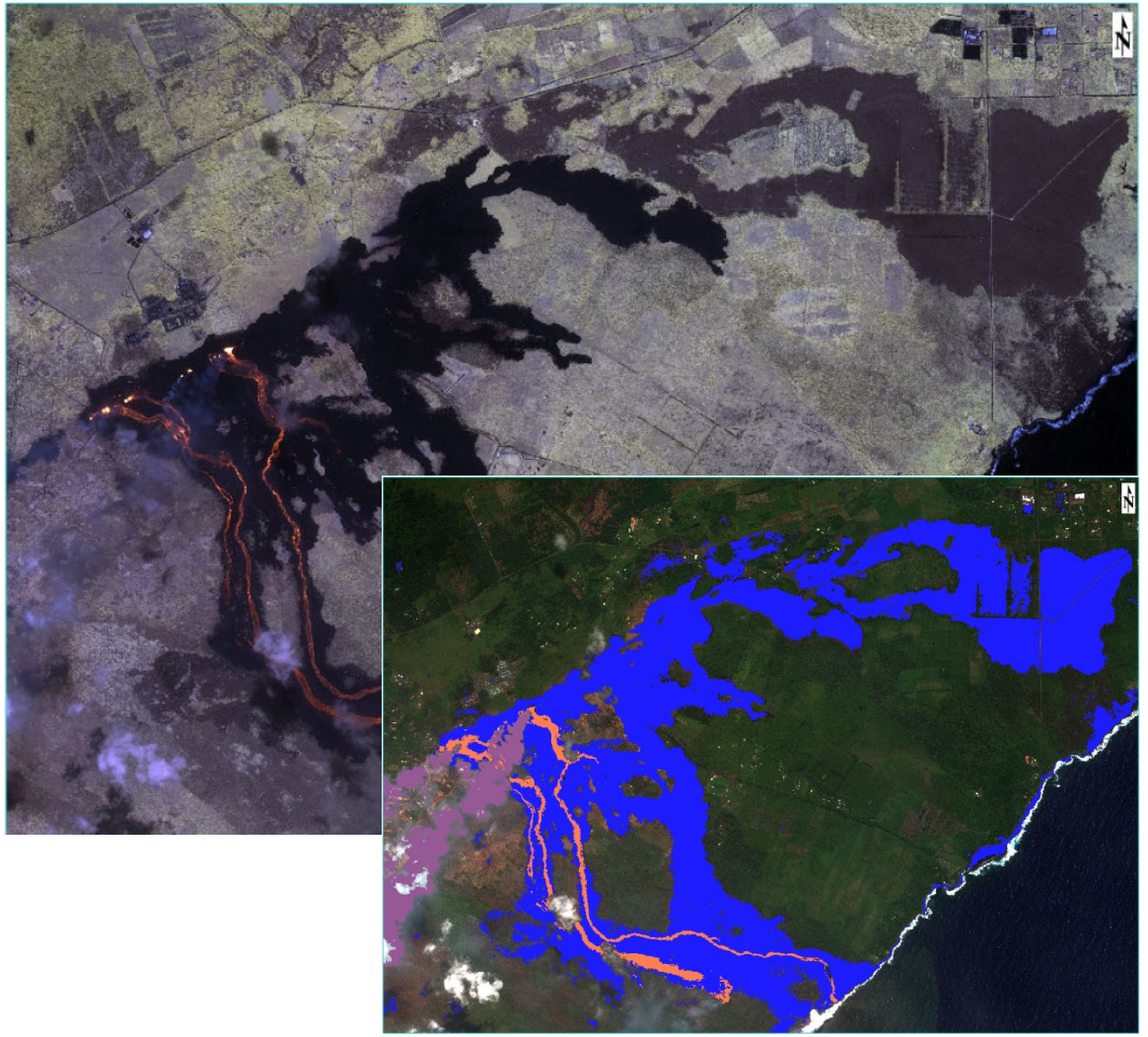
The Disaster Management Cycle: Response

L3Harris Geospatial offers solutions for effective disaster response to:

- Rapidly assess and map the severity and impact of damage
- Map and evaluate the status of critical infrastructure and facilities
- Identify risks of secondary damage to the community from imminent hazards
- Identify open routes to aid search and rescue operations
- Provide real-time situational awareness to first responders
- Estimate the number of displaced citizens by evaluating building damage

https://www.l3harrisgeospatial.com/Industry-Solutions/Disaster-Management

Volcano Eruption

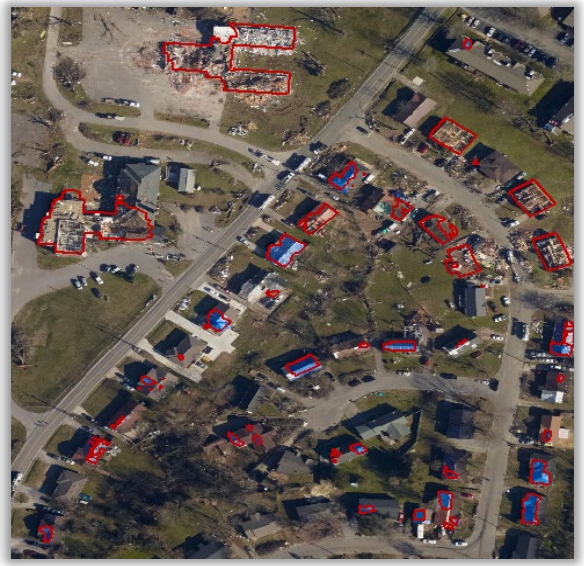


Kilauea Eruption 2018

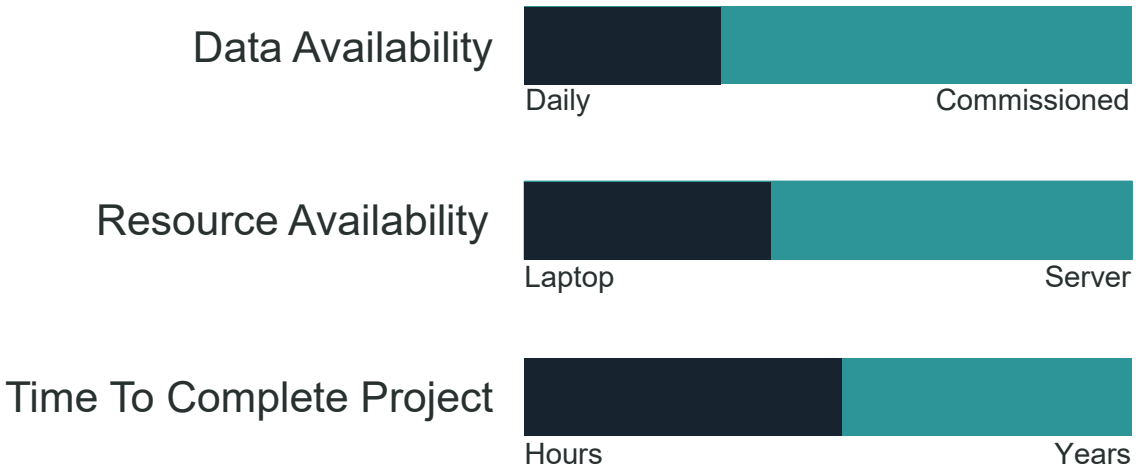
Worldview 2 – 8 bands

https://www.l3harrisgeospatial.com/Learn/Case-Studies/Case-Studies-Detail/ArtMID/10204/userid/277078/ArticleID/23557/Lava-Plumes-and-Machine-Learning-Oh-My

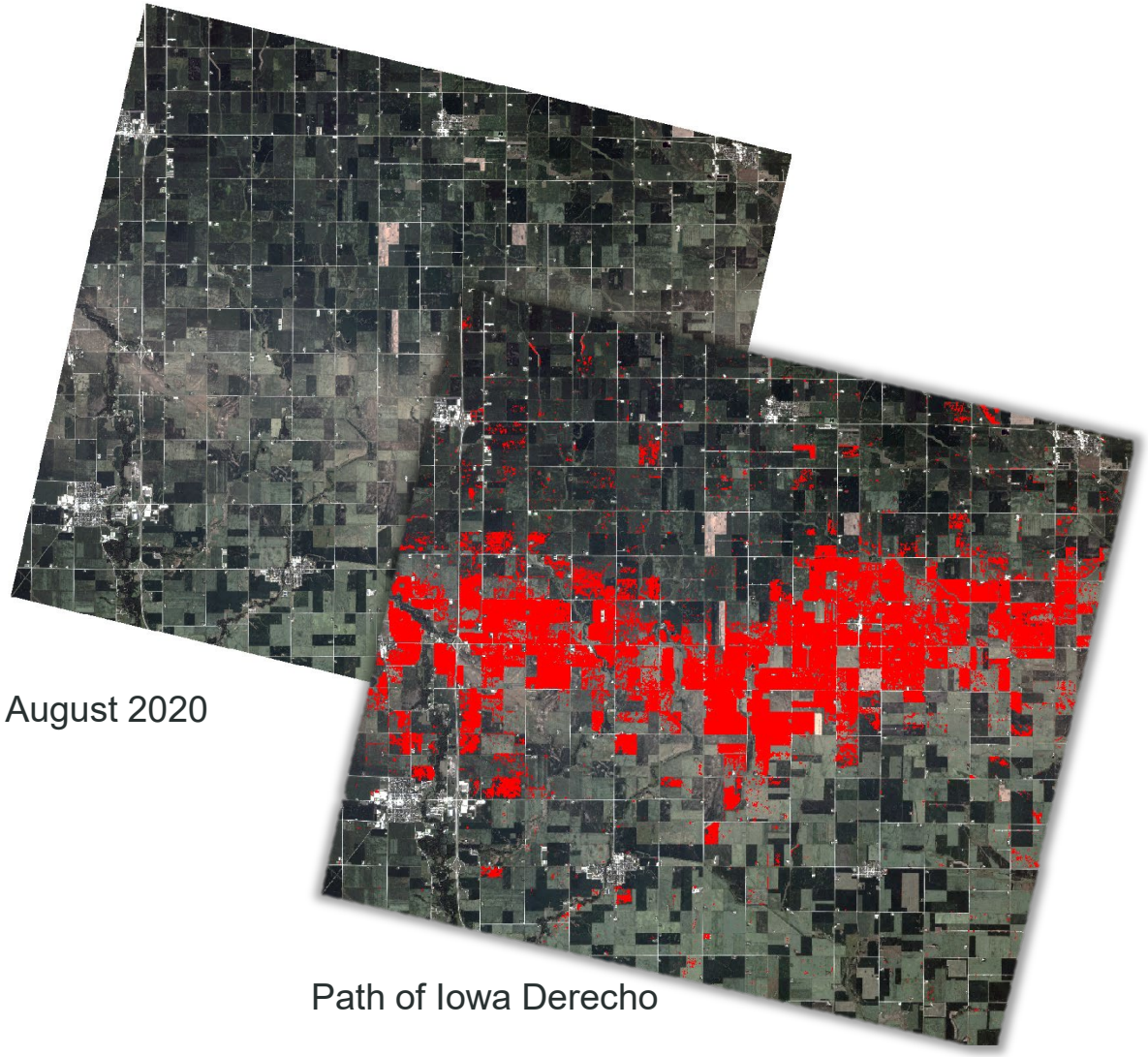
Mapping Tornado Path



Don’t lose the forest for the trees. You don’t need perfect results, just good enough.



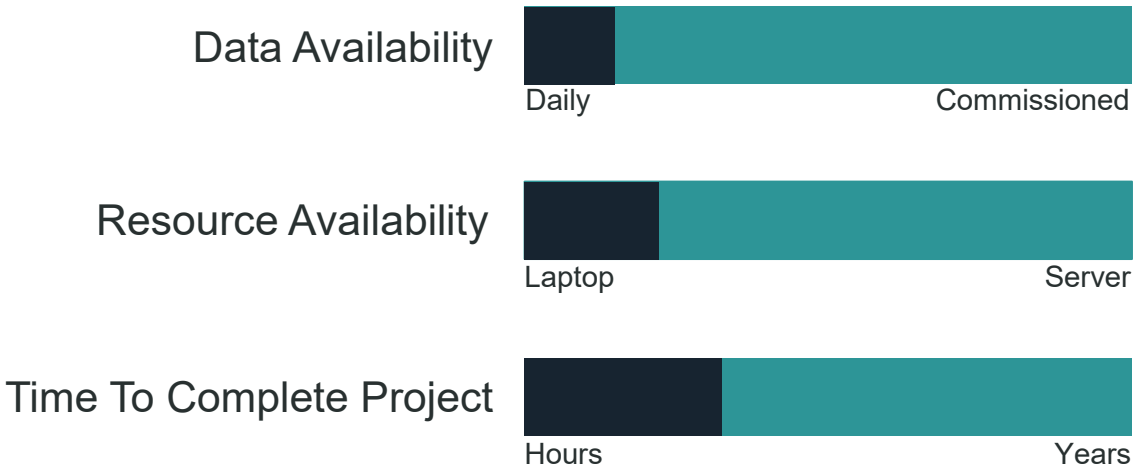
Mapping Derecho Path



August 2020

Path of Iowa Derecho

Simple solution can be just as powerful as complex



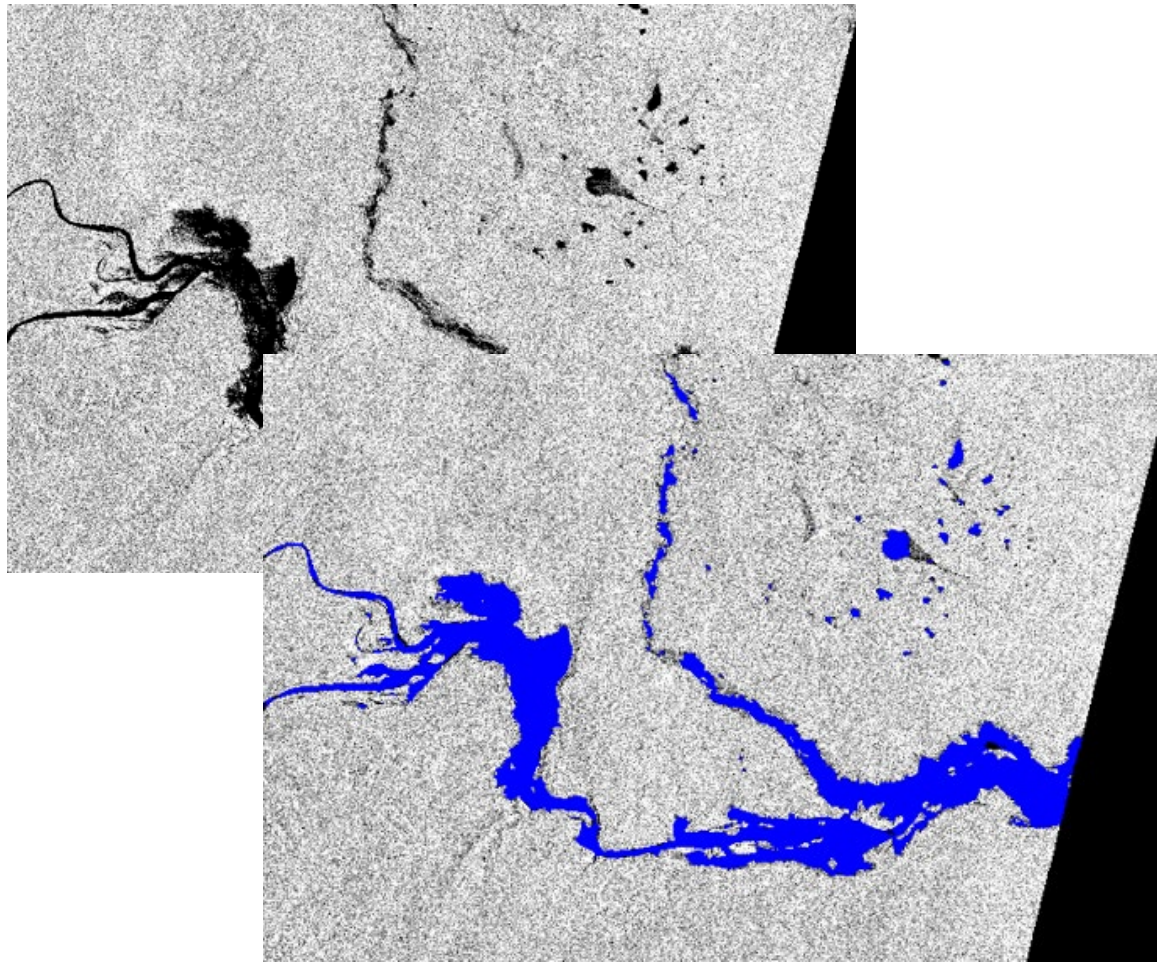
The Disaster Management Cycle: Recovery

L3Harris Geospatial offers solutions for disaster recovery to:

- Visualize, map and assess damage
- Understand and quantify landscape changes
- Update new baseline maps of affected areas
- Monitor the rate of recovery including debris removal, vegetation regrowth, reconstruction
- Analyze and evaluate the effectiveness of different recovery strategies and methods

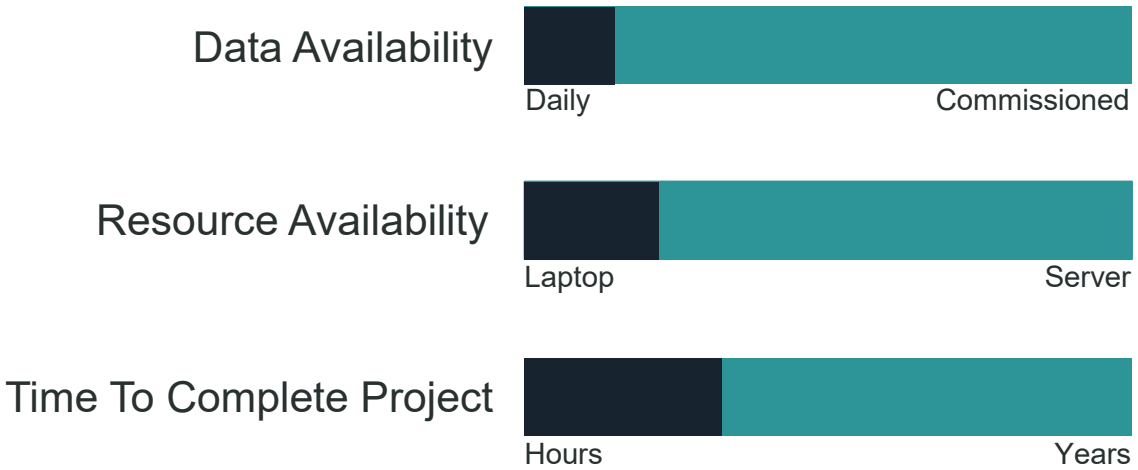
https://www.l3harrisgeospatial.com/Industry-Solutions/Disaster-Management

Cyclone Idai Flood Detection

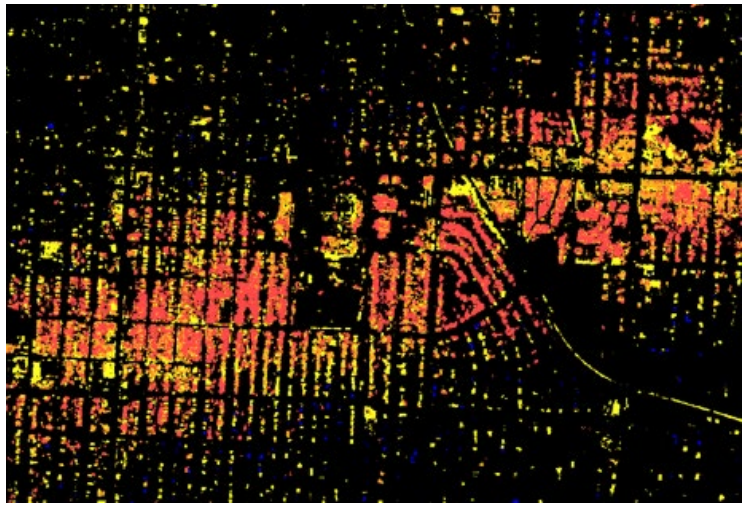


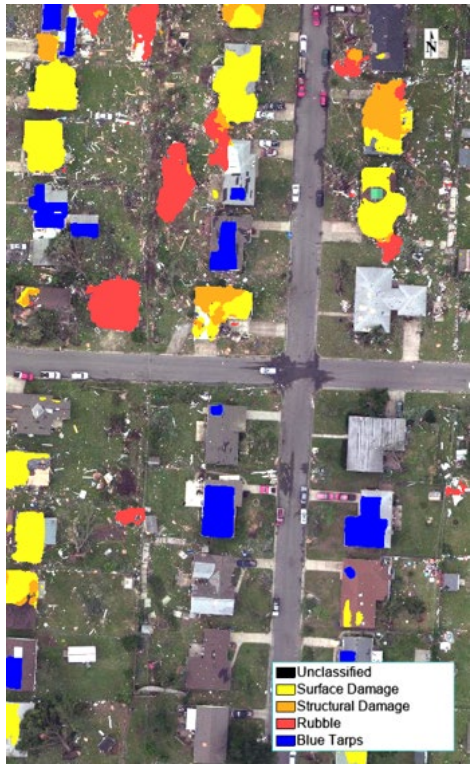
Sentinel 1 Intensity Series

SAR shows signal differences between water and the surrounding surfaces

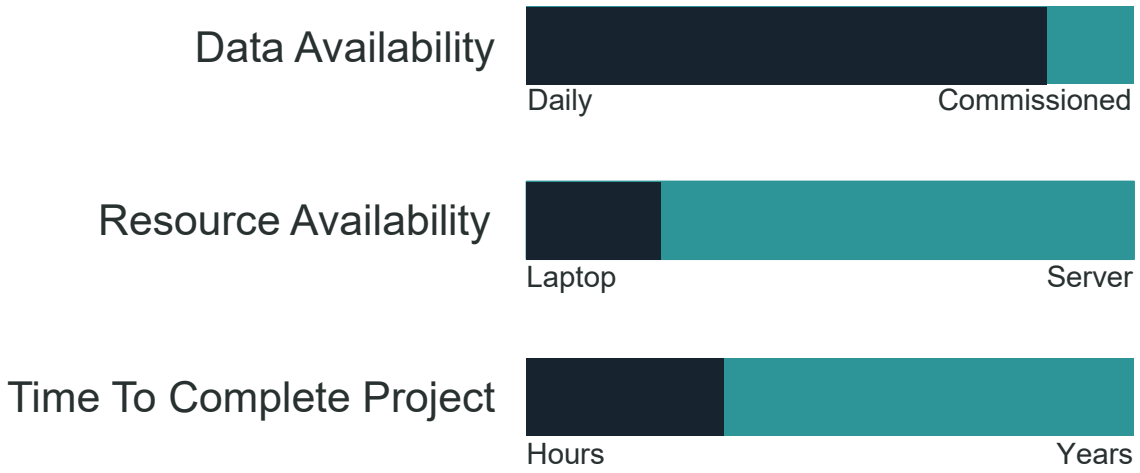


Tornado Damage Classification with Deep Learning



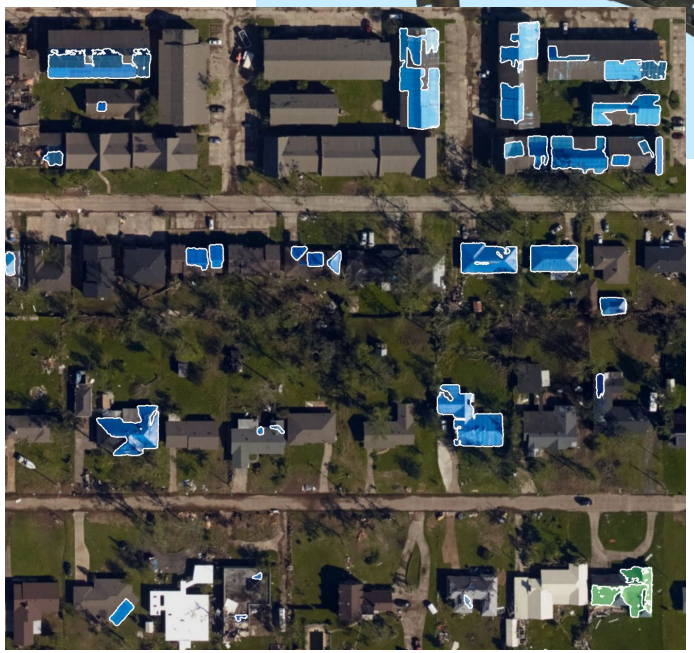


Deep learning can be trained to classify what you “see”



https://www.l3harrisgeospatial.com/docs/envideeplearningtutorialmultiplefeatures.html

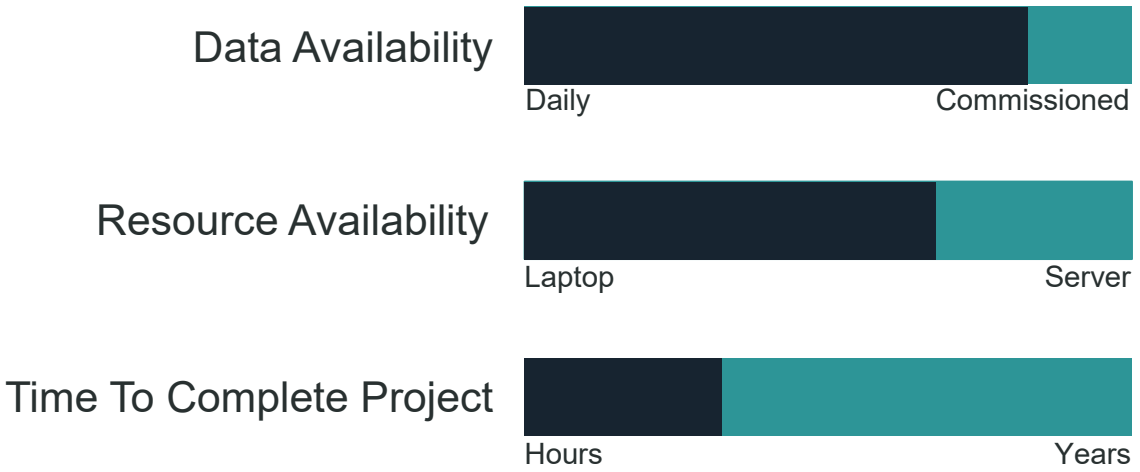
Current Work: Rooftop Tarp Delineation with Deep Learning



Hurricane Delta

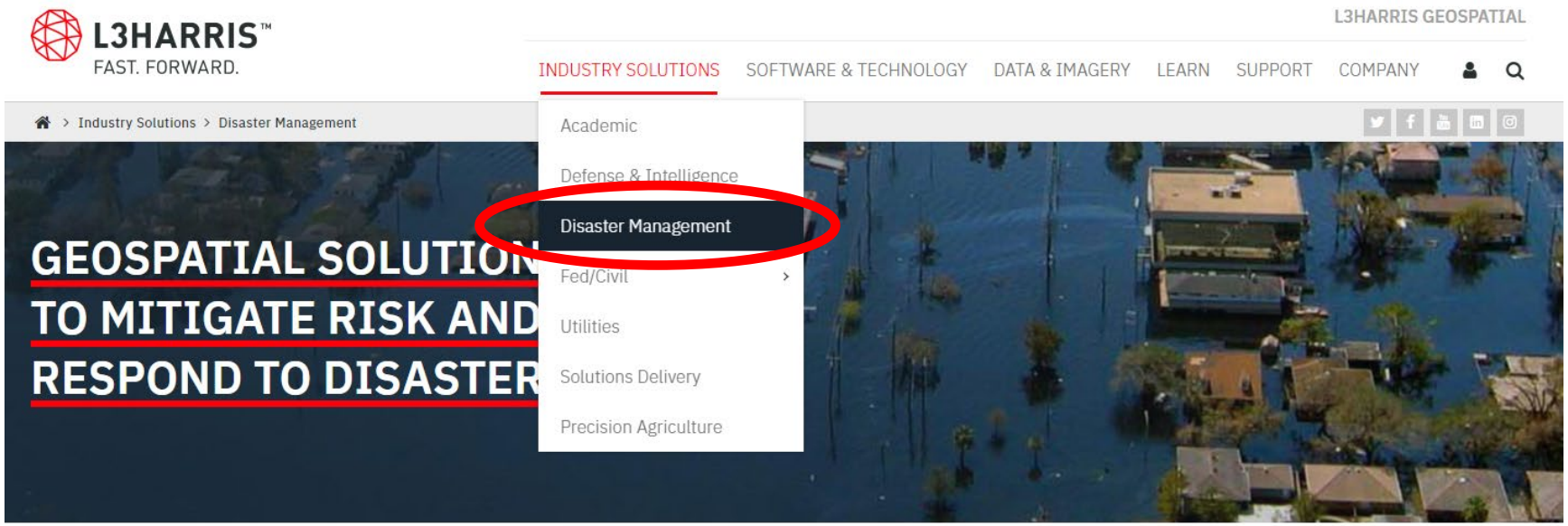
October 2020

Deep learning models are reusable, reducing training time



Emergency Response Imagery from NOAA: https://storms.ngs.noaa.gov/

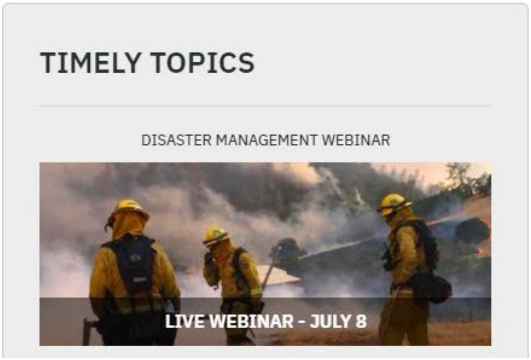
Disaster Management Focused Site (New)



Disaster Management

Man-made and natural disasters are occurring more frequently and with greater intensity, straining resources and challenging community resilience. To help combat these disasters organizations and governmental agencies can use remotely sensed data to plan for and mitigate risks and hazards and manage the response and recovery efforts when disaster strikes.

THE DISASTER MANAGEMENT CYCLE



www.l3harrisgeospatial.com/Industry-Solutions/Disaster-Management

Disaster Related Material on L3Harrisgeospatial.com

- **Case Studies**
  - Co-seismic Deformation Quantified Following Greek Earthquake Using ENVI SARscape, 4/13/2021
  - An Australian City Council Leverages Deep learning for Tree Inventory, 2/25/2021
  - U.S. DoD Partner Uses DTM Data to Mitigate Effects of Climate Change, 12/2/2020
  - Environmental Applications for ENVI Deep Learning, 9/25/2020
  - Highway Collapse: Monitoring Subsidence Using ENVI SARscape, 9/10/2020
  - ENVI Deep Learning Identifies Damaged Building Structures in Wake of Nashville Tornado, 7/22/2020
- **Webinars**
  - Surface Motion Monitoring Using SAR Interferometric Techniques, 6/9/2021
  - Remote Sensing Solutions for Emergency Response, 11/10/2020
  - Create Accurate Image Classification Products to Aid in Disaster Response Efforts, 9/22/2020
  - Utilities, Drones and Imagery: How Utilities Use Imagery to Gain Insights, 4/24/2020
- **During Pandemic – Geospatial Distancing on YouTube**
  - Hot Mess: Remote Sensing Applications for Wildfires and Other Natural Disasters, 3/1/2021
  - Episode 1: Monitoring the Impact of Covid-19

Questions?

Find out more on www.L3HarrisGeospatial.com

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