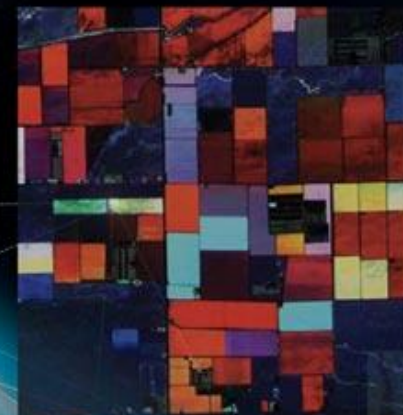


INTRODUCTION TO THE ENVI ECOSYSTEM

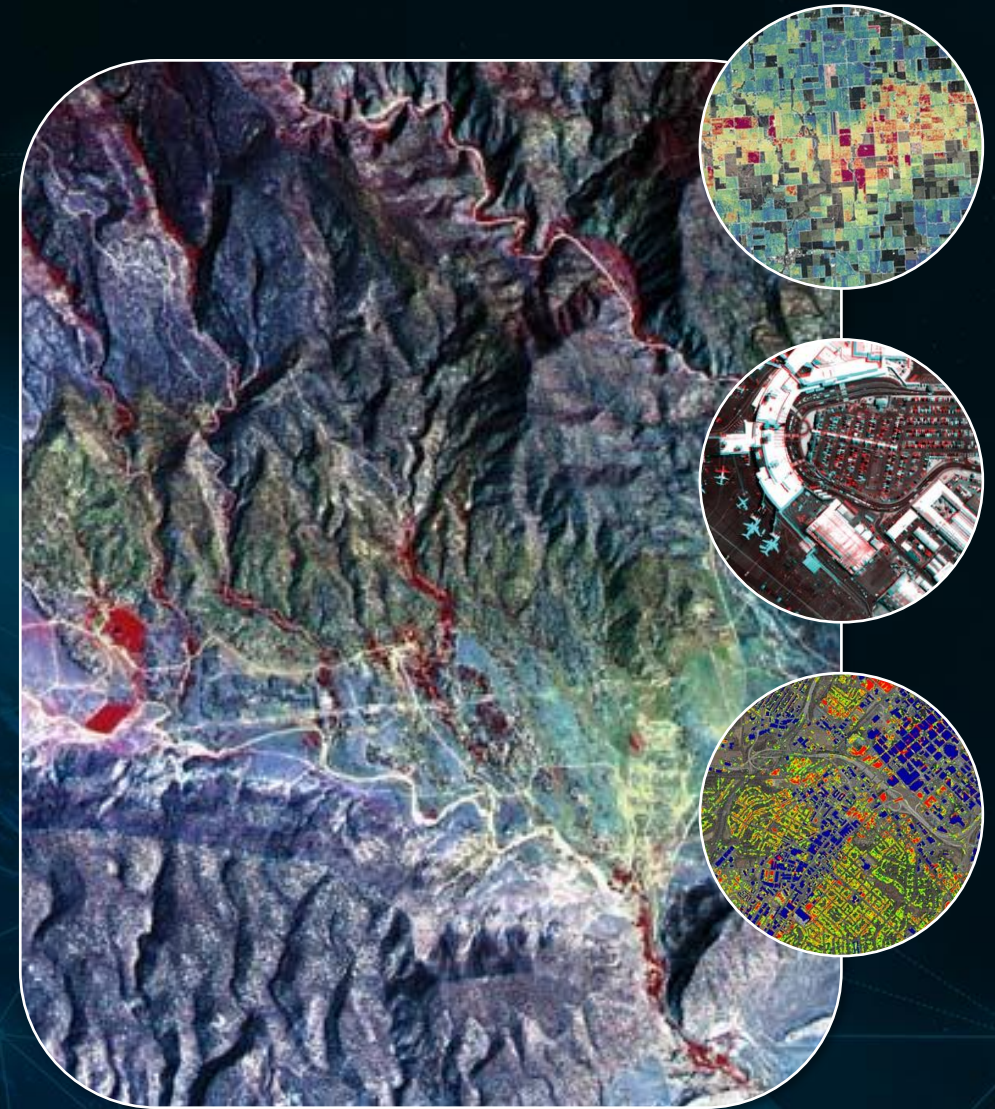
October 20th, 2023

Cherie Tyrrell
Asia Pacific Regional Manager



Introductions & Agenda

- Introduction to NV5 Geospatial
- Introduction to the ENVI Ecosystem
- Component Demonstration
- Five Pillars of our Ecosystem
- Leveraging ENVI Ecosystem for Disaster Response
- Interoperability
- Questions



Welcome to NV5 Geospatial

North American Offices

- Broomfield, CO
- Suffolk, VA

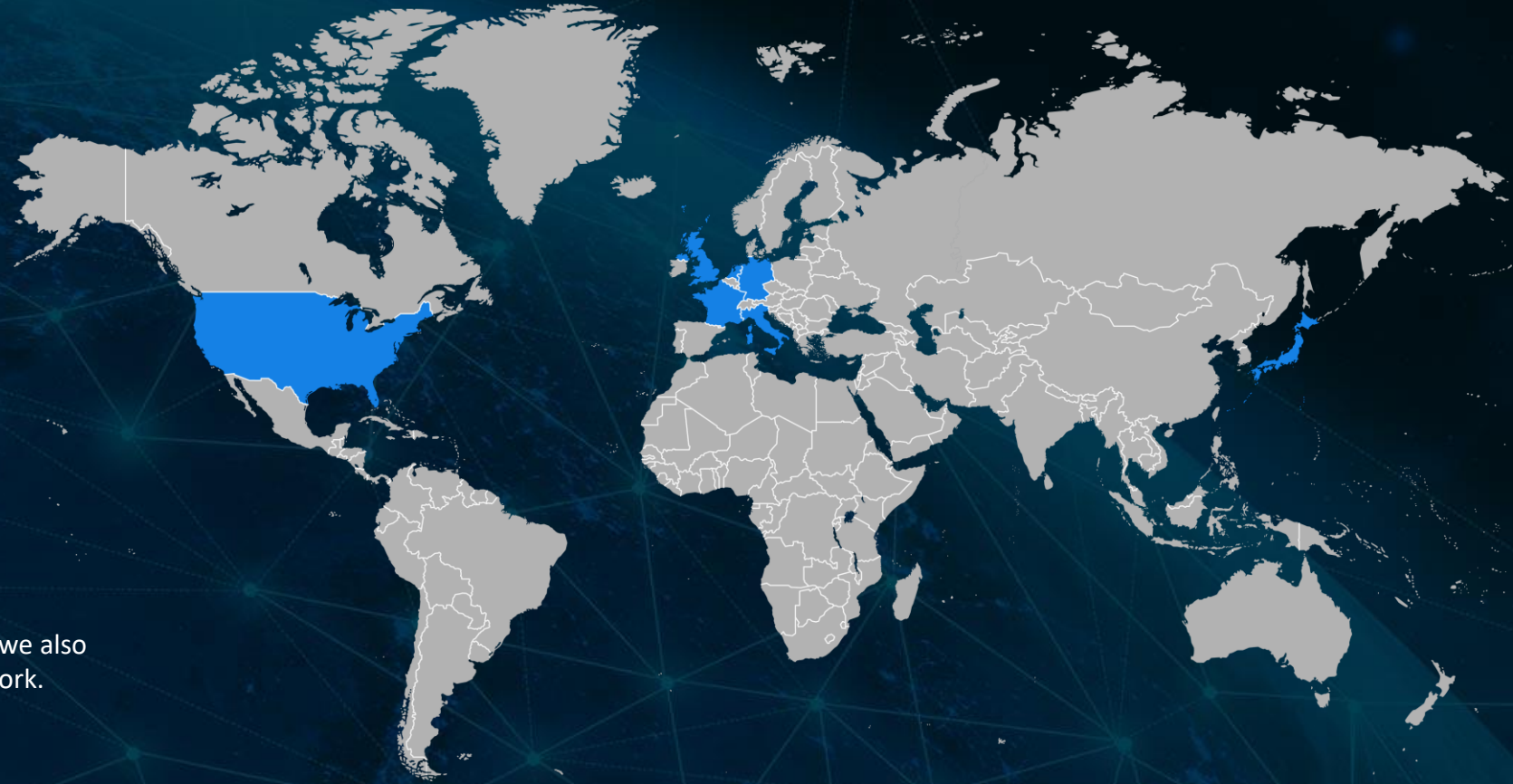
European Offices

- Paris, France
- Milan, Italy
- Munich, Germany
- Bracknell, United Kingdom

APAC Offices

- Tokyo, Japan
- Osaka, Japan

In addition to our office locations, we also have a worldwide distributor network.



Expanding Software and Services to Meet Demand





1,300+ geospatial professionals across 12+ domestic and international offices delivering end-to-end solutions and insights to organizations that need geospatial information to mitigate risk, plan for growth, better manage resources, and advance scientific understanding.



One of 1 of 17 globally, since start of Partner Network.
Hold 7 Esri Specialty Designations

PRIMARY MARKETS

Defense & Intelligence

Federal Government

State / Local

Utilities / Oil & Gas / Renewables

Natural Resources / Agriculture

Commercial

NGOs / Universities

Solutions

Capture

Remote Sensing

Lidar
Bathymetric
Hydrographic
Thermal
Hyperspectral
Multispectral
Synthetic Aperture Radar (SAR)

Satellite
Fixed Wing Aircraft
Rotary Wing Aircraft
Ocean Vessels
Mobile
Drones

ANALYZE

Software Solutions

- **ENVI®**, the industry standard image processing and analysis software.
- **ENVI® Connect** is a web-based product that enables users to easily work together and solve geospatial problems.
- **ENVI® Inform** provides automated monitoring to inform critical decision making.

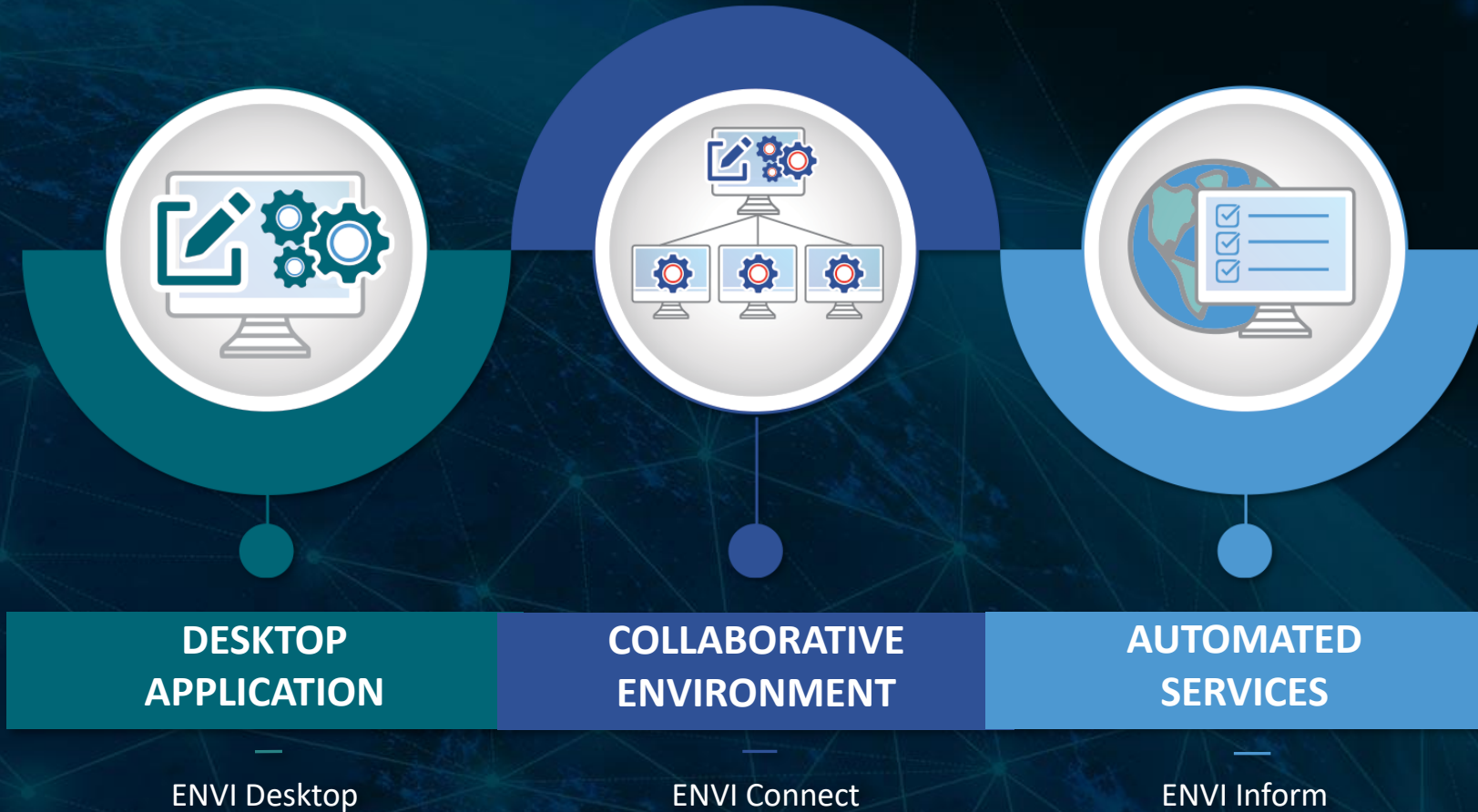
ANSWER

Services

- **Digital Twin** - Virtual representation of the real world
- **Analytics** – industry-centric analytics
- **Surveying & Mapping** – planimetric mapping, feature extraction, field survey, cartographic production
- **Enterprise GIS & Cloud** - We design, configure, implement, manage, and extend enterprise GIS.

Introduction to the ENVI Ecosystem

A suite of solutions to fit your needs

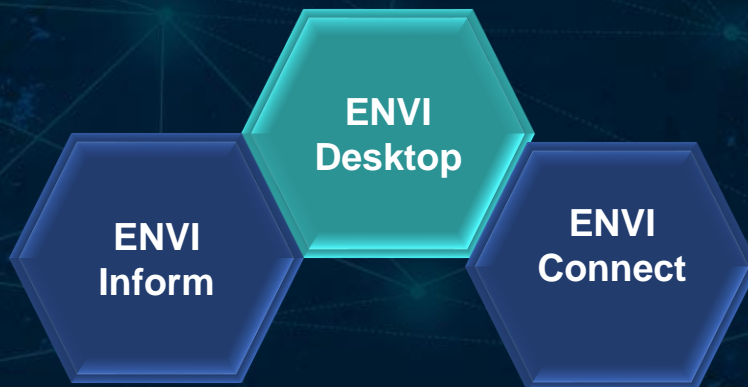
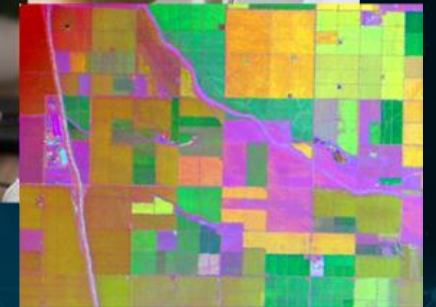
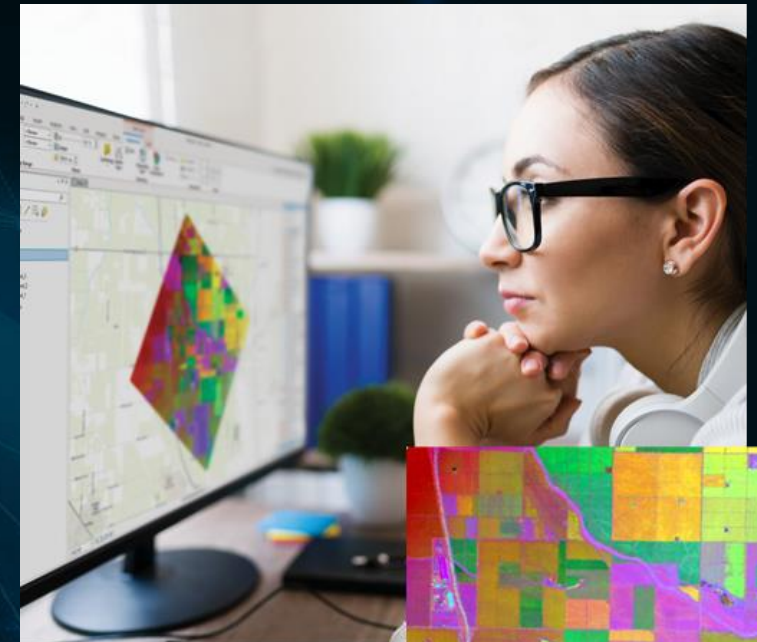


ENVI Ecosystem | ENVI Desktop

Create. Develop. Analyze.



ENVI Desktop software is the industry standard for image processing and analysis. It is used across industries and around the world to extract timely, reliable, and accurate information.



ENVI 5.7 – Now available!

Empower users by creating a better viewing and analytics experience

Examples for ENVI modeler, band math

Integration with ArcGIS Pro

Native GeoJSON support

Revamped ENVI Workflows

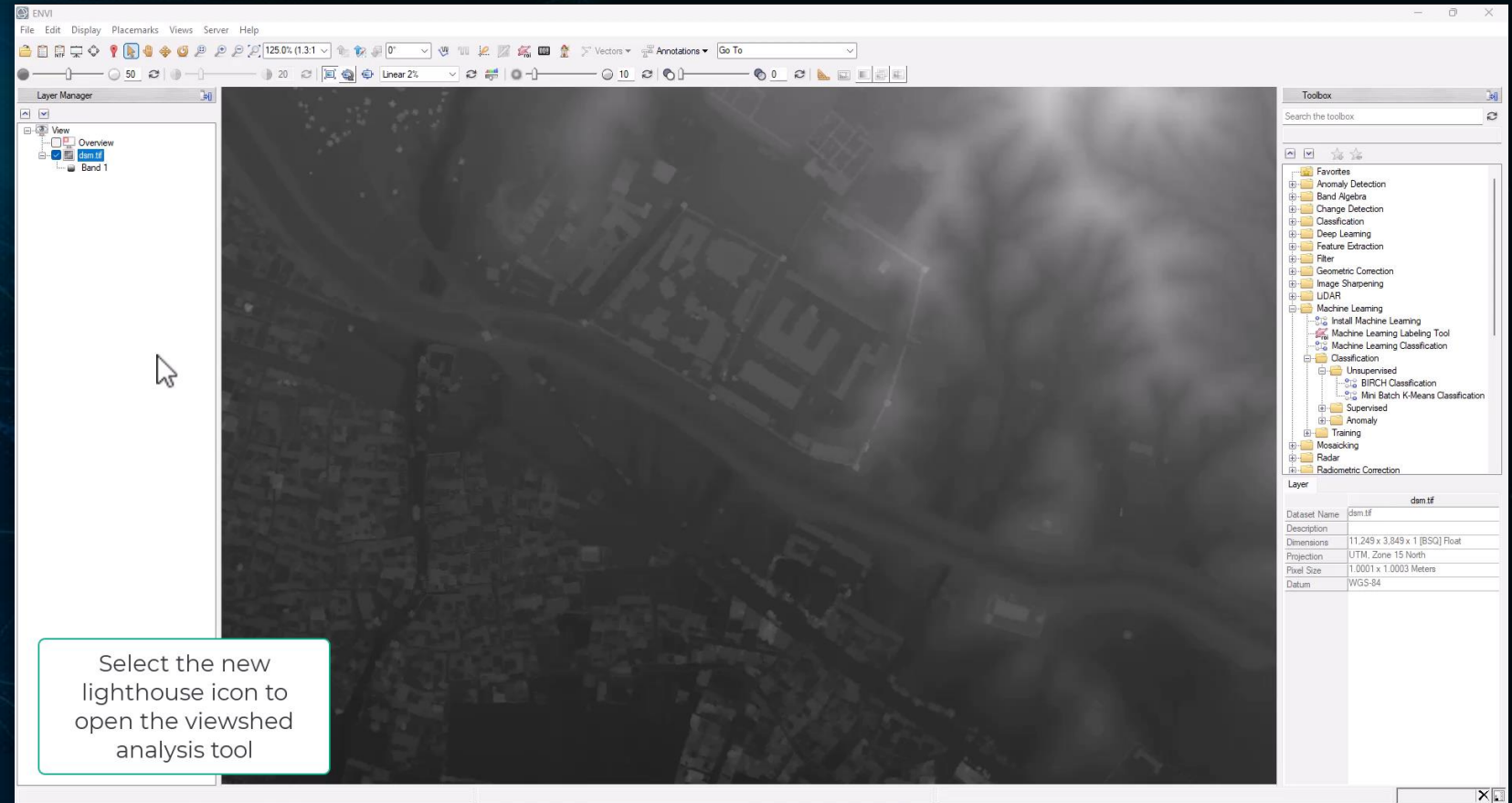
Line of Sight 2.0

Route analysis

Fast band animation

Quick link

- New licensing



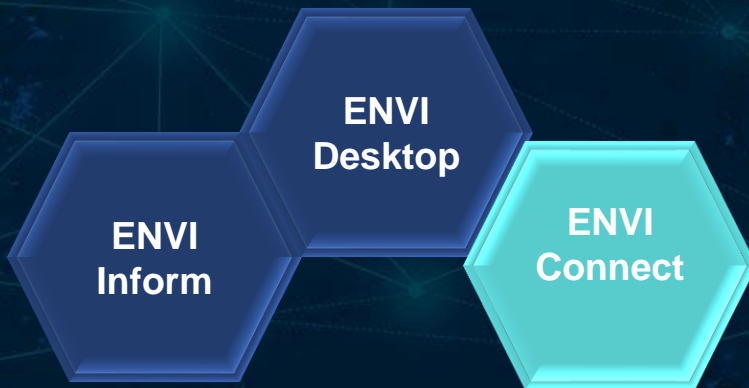
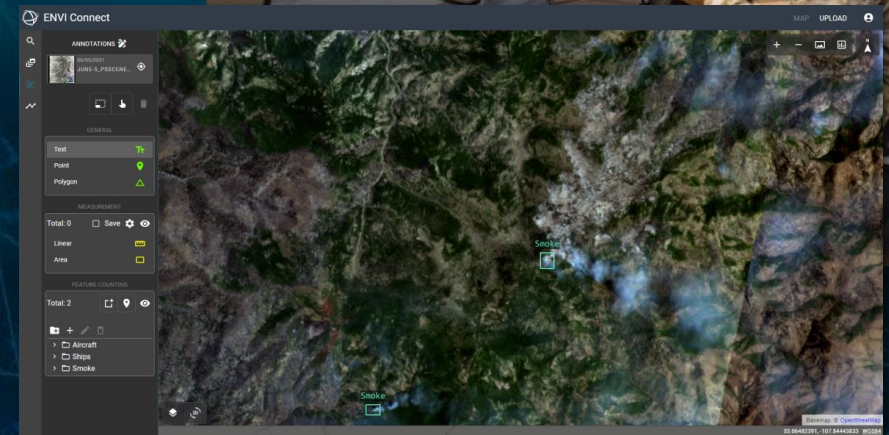
Video showing line of sight, route analysis, quick link, and performance boost for band animation

ENVI Ecosystem | ENVI Connect

View. Collaborate. Solve.

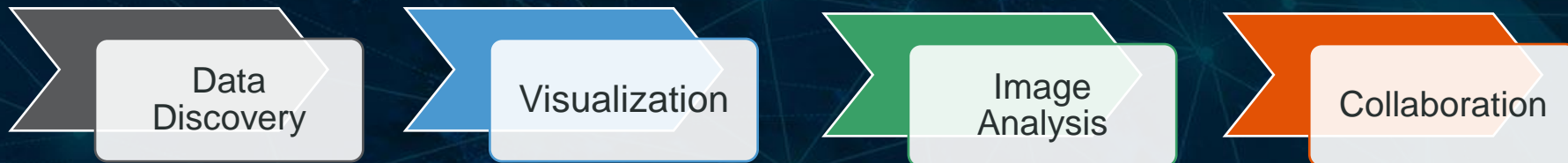
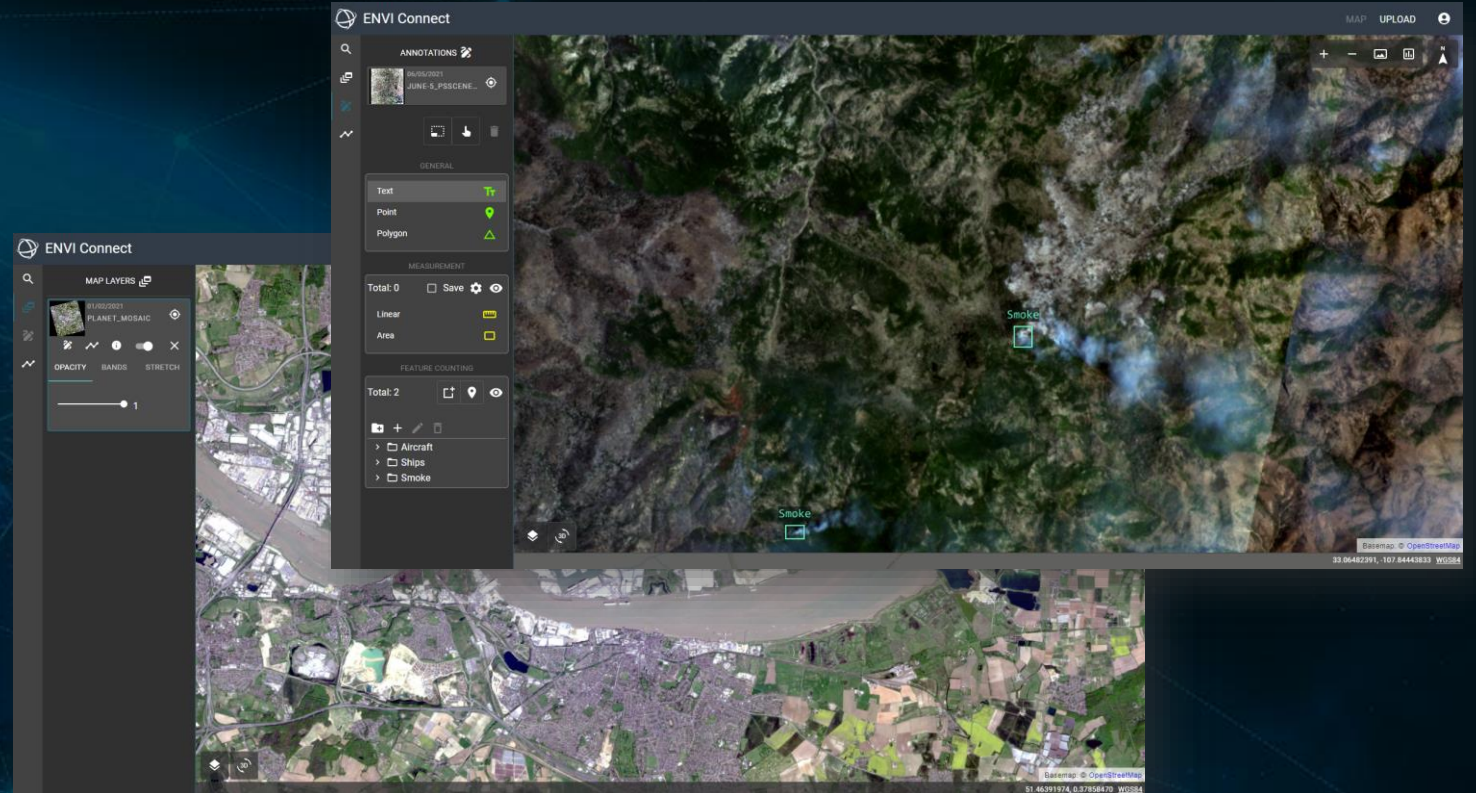


ENVI Connect is a lightweight web application to quickly discover, visualize, and analyze data, and generate products. It empowers users across an organization to collaboratively solve geospatial problems with ease.



ENVI Connect for Defense and Intelligence

- Utilize ENVI Connect for defense and intelligence:
 - Easily find and view data over your AOI
 - Use drawing tools to perform literal analysis such as feature counting and measurement
 - Easily view other's work to perform QA/QC and collaborate because insights you generate are saved automatically on the server
 - Create output products using PPT



Demonstration of Capabilities in ENVI Connect

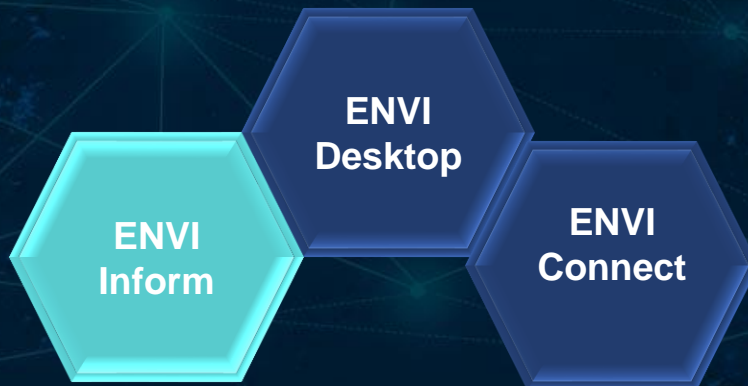
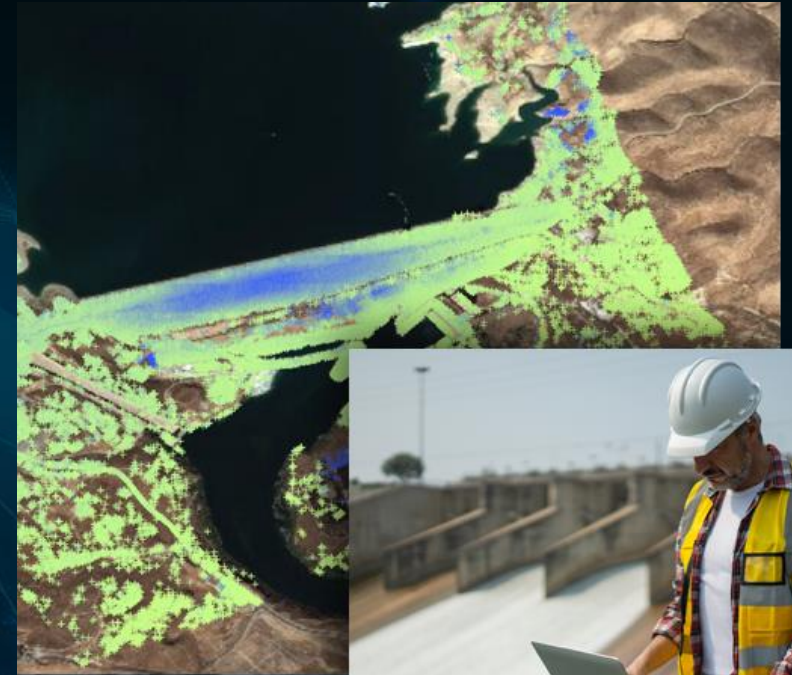
The screenshot displays the ENVI Connect software interface. At the top left, the logo for L3HARRIS | ENVI Connect is visible, along with 'MAP' and 'UPLOAD' buttons. A central banner reads 'PROPRIETARY INFORMATION'. The main area is a map with a satellite view overlay. The satellite view shows a large airport terminal and runways, with a red crosshair indicating the current location. The map background is a light-colored vector map showing roads, rivers, and place names. On the left side, there is a sidebar with a search bar and a 'TIME RANGE' section. The 'TIME RANGE' section shows two time periods: '03/18/2022 18DEC16060559-...' and '03/18/2022 19MAR11033051-...'. Below the sidebar, there are navigation controls including a zoom in (+) and zoom out (-) button, and a '1' button. At the bottom right, there are additional navigation controls including a zoom in (+) and zoom out (-) button, and a 'Dawuli' button. The coordinates '112.88584348, 26.58795902 WGS84' are displayed at the bottom right.

ENVI Ecosystem | ENVI Inform

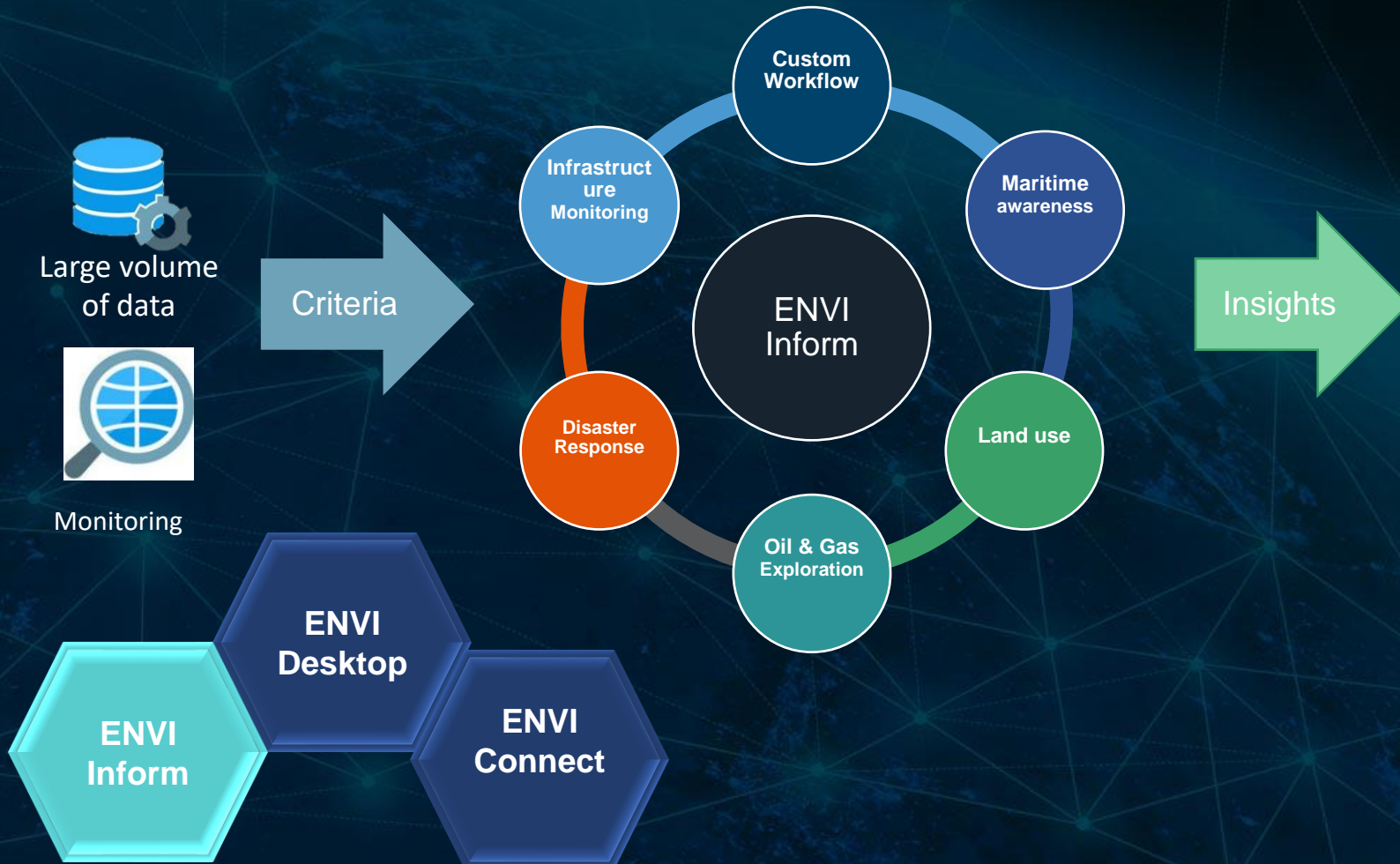
Monitor. Scale. Answer.



ENVI Inform performs automated cloud-based processing and analysis on remotely sensed data, delivering valuable insights and answers to customers.



ENVI Ecosystem | ENVI Inform



Customer Deliverables



Automated monitoring that delivers
insights to inform decision making

ENVI Inform Gallery

Please bookmark/favourite this gallery page. Do not bookmark the individual dashboard webpage.

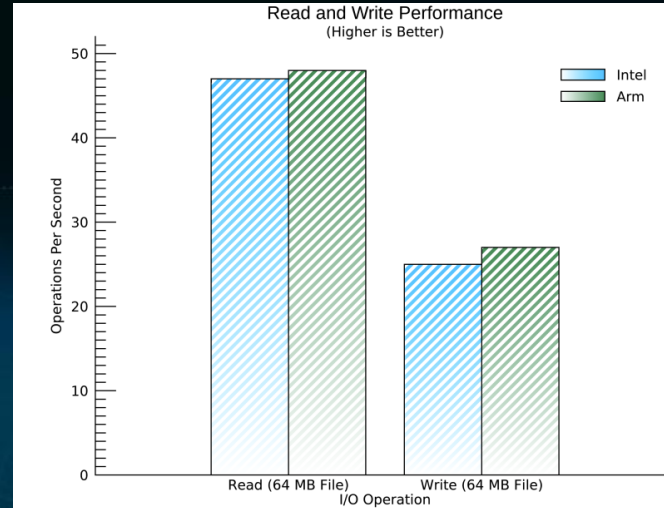
Ground Monitoring



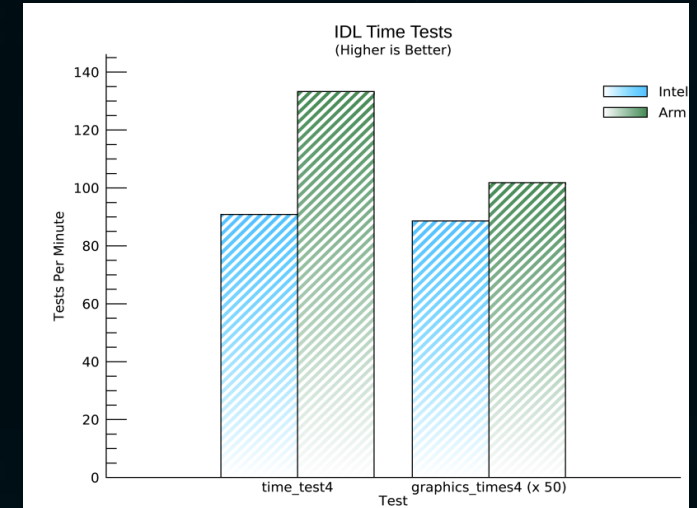
Upcoming Releases

IDL 9.0: IDL for Mac Arm!

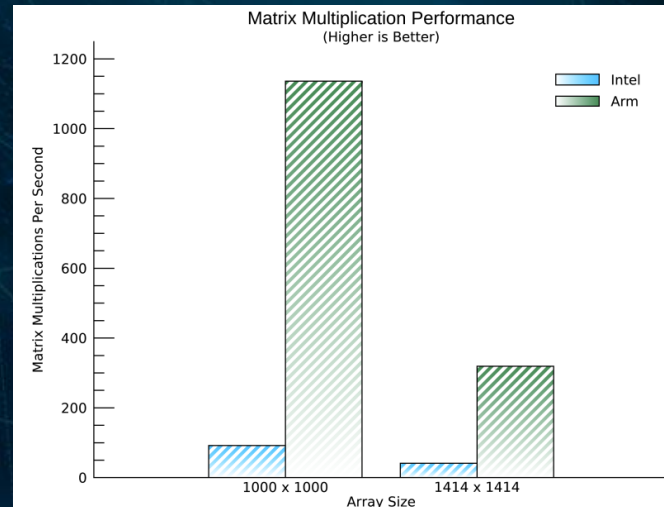
- As a part of IDL 9.0, we are including support for Arm processors on the Mac
- Limited to IDL and does not include ENVI



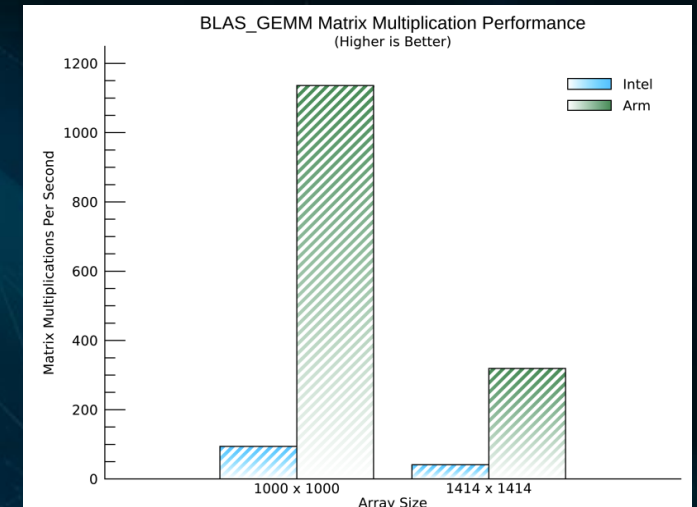
Tests were run on a Mac Studio with an M1 Max. Intel IDL was run under Rosetta 2 translation.



Tests were run on a Mac Studio with an M1 Max. Intel IDL was run under Rosetta 2 translation.

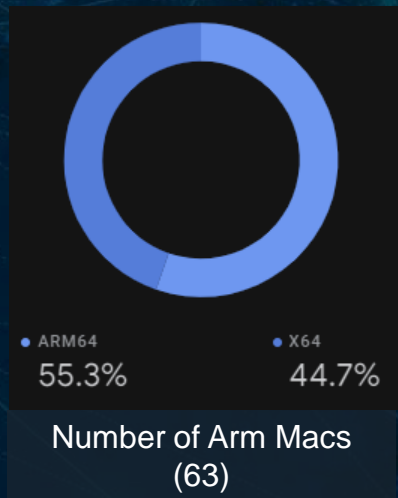
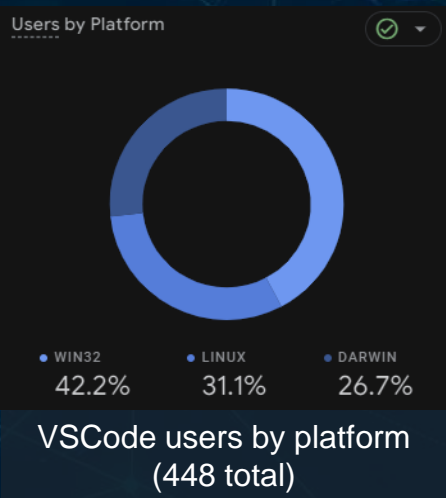


Tests were run on a Mac Studio with an M1 Max. Intel IDL was run under Rosetta 2 translation.



Tests were run on a Mac Studio with an M1 Max. Intel IDL was run under Rosetta 2 translation.

Performance metrics showing (higher is better) how native Arm support for Mac is much faster than using an emulator like Rosetta



IDL 9.0: Developer Environment

The first to simulate a double pendulum is to get the basics details of our simulation defined.

Apart from the comments in the code, we aren't going to go into all the gory detail about what these parameters are.

If you just want to see the neat outputs, run all the cells and jump ahead!

```
IDL
;+
; Parameters related to the length of our simulation
;-
;+ Max time (seconds)
maxT = 10.0
;+ delta time between frames
dT = 0.0001d
;+ number of frames
n = ceil(double(maxT) / dT)
;+ animation frame rate
fps = 60
;+ goal dt between frames
dTGoal = 1d / fps
;+ The frequency of frames that we play from our simulation for 60 FPS
frameSpacing = floor(dTGoal / dT) > 1

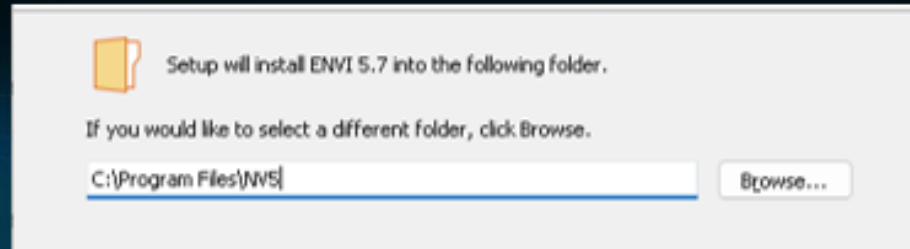
;+ Mass of pendulum 1 (kg)
m1 = 0.5
;+ Length of pendulum 1 arm (meters)
L1 = 0.5
;+ Second pendulum start angle (degrees)
th02 = 30
;+ Second pendulum angular velocity (degrees/second)
dth02 = -360
;+ Mass of pendulum 2 (kg)
m2 = 0.5
;+ Length of pendulum 2 arm (meters)
L2 = 0.5
;+ Second pendulum start angle (degrees)
th01 = 90
;+ Second pendulum angular velocity (degrees/second)
dth01 = 42
;+ Strength of gravity (m/s^2)
g = 3d
;+ The frequency of frames that we play from our simulation for 60 FPS
frameSpacing = floor(dTGoal / dT) > 1
;+ animation frame rate
fps = 60
;+ goal dt between frames
dTGoal = 1d / fps
;+ number of frames
n = ceil(double(maxT) / dT)
;+ delta time between frames
dT = 0.0001d
;+ Max time (seconds)
maxT = 10.0
;-
; Parameters related to the length of our simulation
;-
```

New developer environment: IDL for VSCode! New paradigm and user experience for writing IDL code.

Includes integrated IDL Notebooks for a modern approach to data science and programming

ENVI 6.0

- Rebranded
 - New install folder
 - New logo and NV5 branding
- New display user experience
 - Fast and clear pyramids
 - Band selection
- Spectral Updates and ENVI Classic Migration
 - Target detection
 - Material ID
 - Spectral hourglass
 - Endmember collection
- GSFPy Update
- New sensors
 - ISIS3, PDS4, GRUS
- ENVI Notebooks

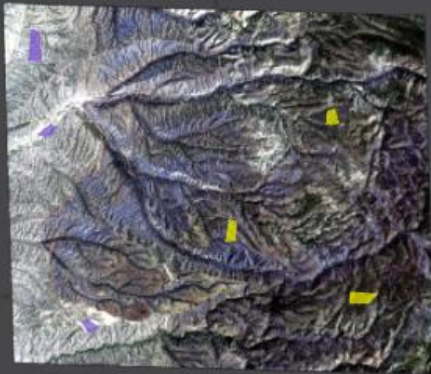


Before (left) and after (right) image display enhancements

ENVI 6.0: Visuals

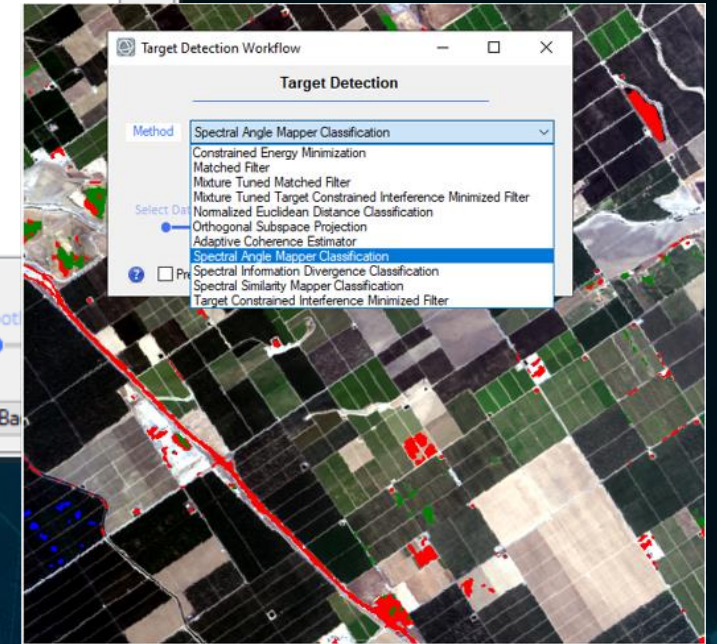
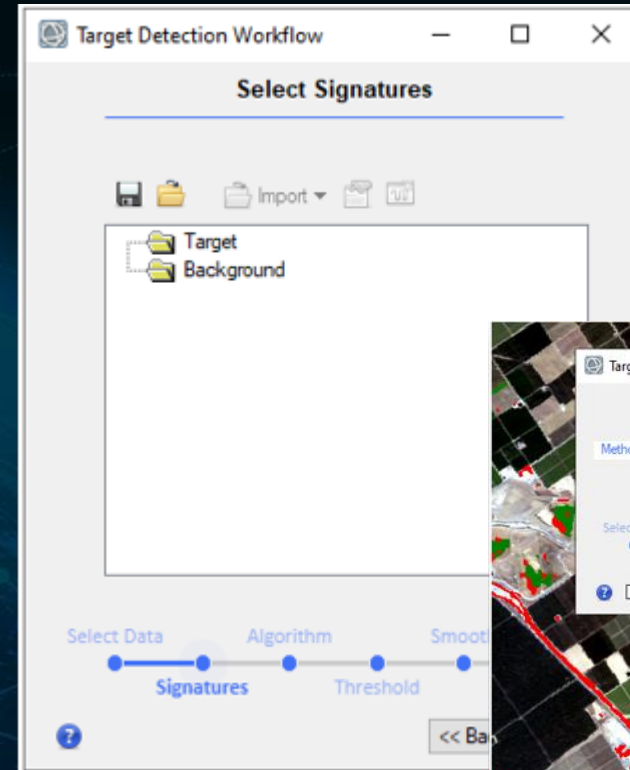
```
;-  
; The order we add to the map is the order that we can visualize the data  
;  
; Here we add the raster and then the ROIs  
;  
; For the ROIs, purple represents not-burned and yellow is burned  
;-  
ENVI.displayInNotebookMap, postReady  
ENVI.displayInNotebookMap, rois
```

IDL



Notebooks aren't just limited to IDL, they have functionality for ENVI too!

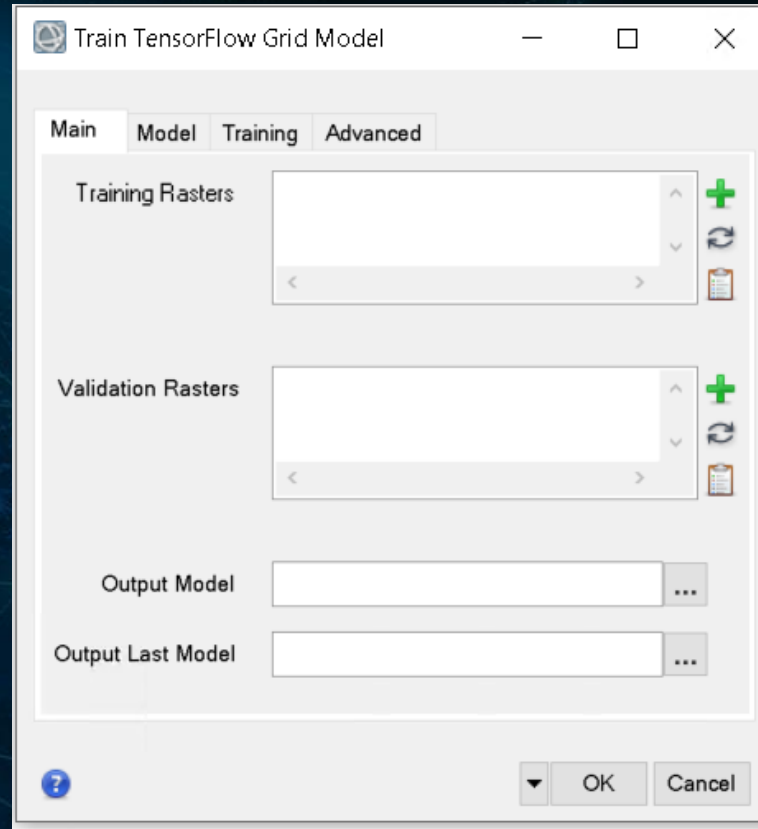
Base map: Powered by



New and improved target detection workflow with modern ENVI user interface and user experience

ENVI Deep Learning

- New deep learning: grids!
- Capabilities
 - Reduce false positives by performing tipping and cueing on parts of an image
 - Reduce overall processing time by not processing portions of an image that don't have features of interest
 - Plug and play with existing models and training data
- Other features:
 - Normalized training user experience for all models
 - Optimize startup time



Grid training dialog that accepts all forms of previously generated training data

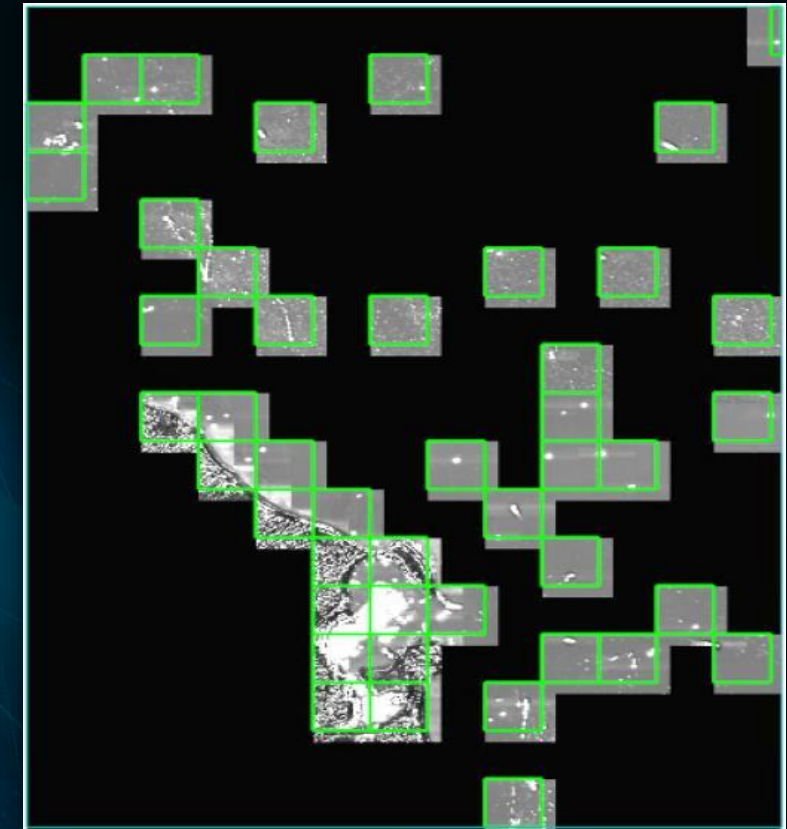


Image showing grid (green squares) being used to indicate which tiles of data should be processed with segmentation

Why Grid?



For aircraft, we only need to process 5.7% (59/1024 tiles) of the image which dramatically reduces the classification time

ENVI Ecosystem Capabilities



Questions and Discussion

Thanks for joining! Learn more about our products and our ecosystem at

<https://www.nv5geospatialsoftware.co.jp/>