

# Feature Data Collection with Stereo Imagery

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# Overview

<http://www.virginiadot.org/business/locdes/photogrammetry.asp>

# Feature Data Collection with Stereo Imagery

## Outline

- Objective
- Workflow
- Principles of data collection with stereo imagery
- Hardware configuration
- Demo

# Objective

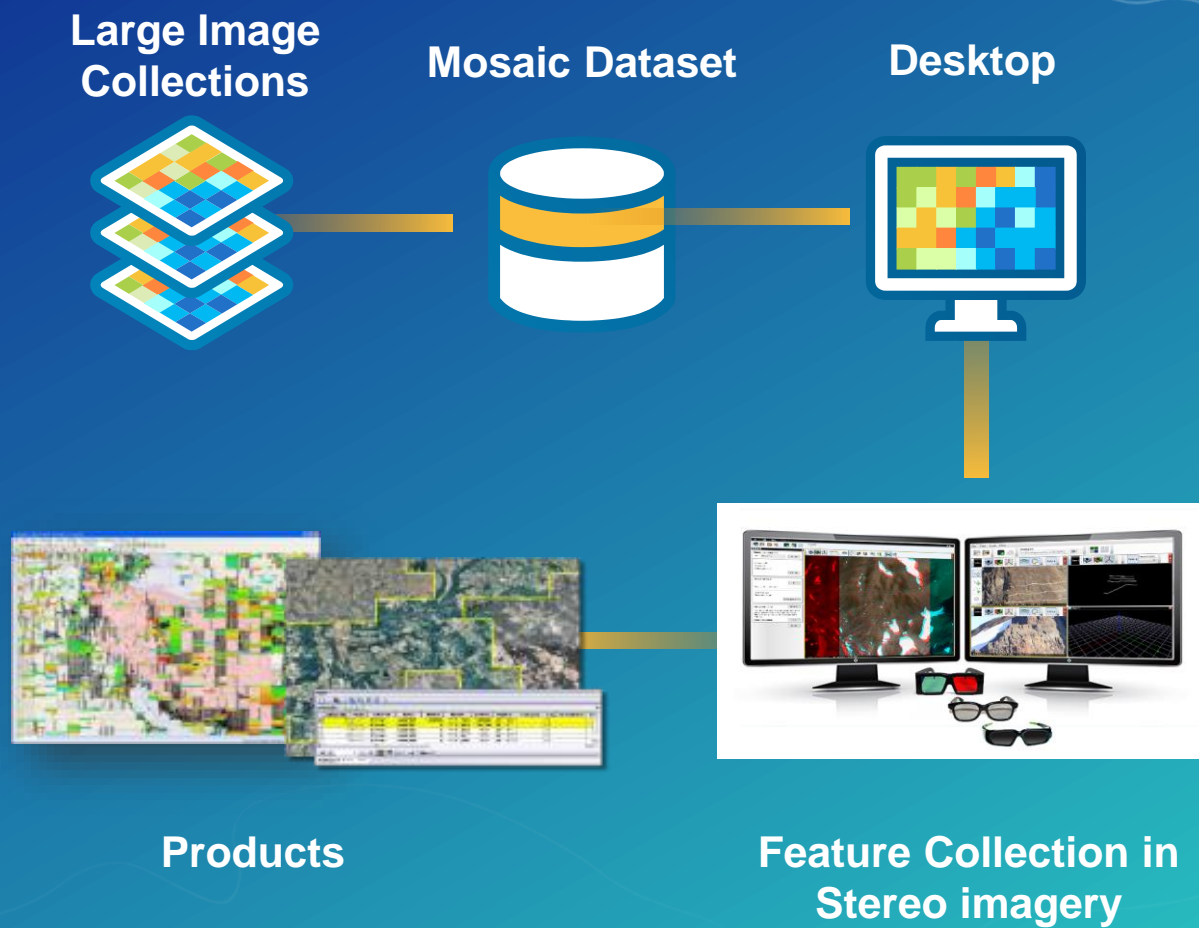
- Digital photogrammetric stereo imagery to collect 3D features
  - Collection: Feature collection from aerial frame, satellite, UAV/close-range in stereo mode
  - Editing: Superimpose collected or imported vector data directly onto stereo models for effective and efficient interactive mapping, change detection and GIS updates

# Applications

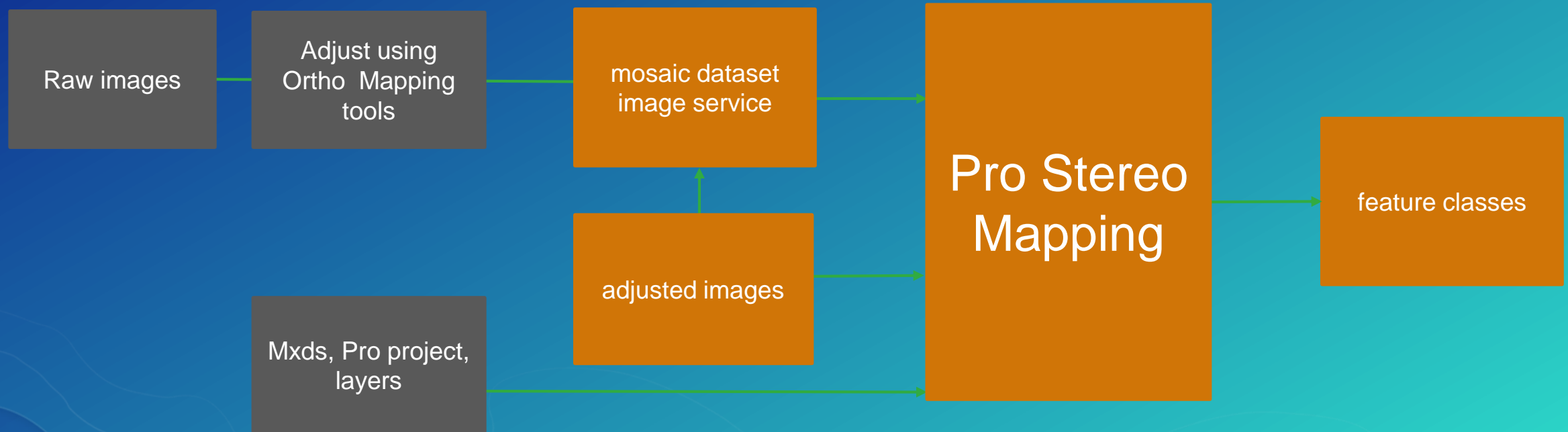
- With ArcGIS Pro Stereo Mapping, user can collect 3D features (Point, Polyline, Polygon) which support the following typical applications
  - Topographic mapping
  - Parcel editing
  - Simple 3D building
  - Height measurement
- **Surveying, mapping, farming, forestry, utilities...**



# Workflow



# Workflow



# Supporting Data

- Pre-processed Mosaic Dataset to manage digital frame camera data and satellite data
- Frame Aerial, UAV/UAS, Satellite Imagery Data
  - UAV/UAS, DMC, Vexcel
  - Ikonos
  - WorldView
  - ...
- Required information:
  - Interior orientation (camera parameters)
  - Exterior orientation (unique frame parameters)



# Pre-processing

- Create Mosaic Dataset
- Data processing
  - Adjustment
  - Metadata
    - Sensor location (x,y,z) and orientation (o,p,k)
    - RPC (Rational Polynomial Coefficient) parameters
    - Sensor parameters (camera distortion, camera calibration)
  - Image enhancement (stretching,...)
- Generate stereo images (Image rectification)

# Principles of Stereo Imagery

## Image rectification

- Image rectification
  - Image orientation parameters
  - Camera calibration parameters
  - Image resampling
- *One object has same vertical coordinates in stereo images*



Original  
Images



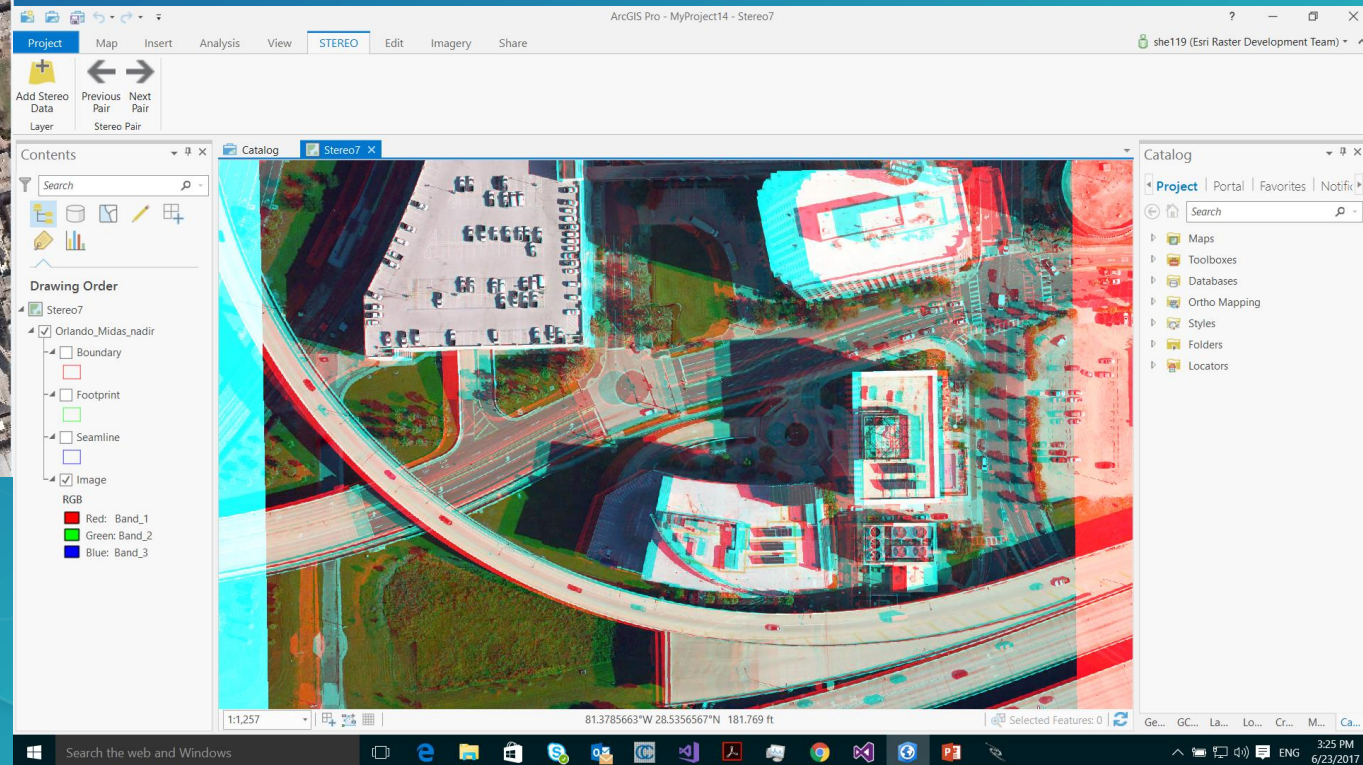
Rectified  
Images



# Rectified Images



- One object must have same Y coordinate in stereo for accurate data collection.
- If offset exists in Y coordinate, adjustment is not done well.

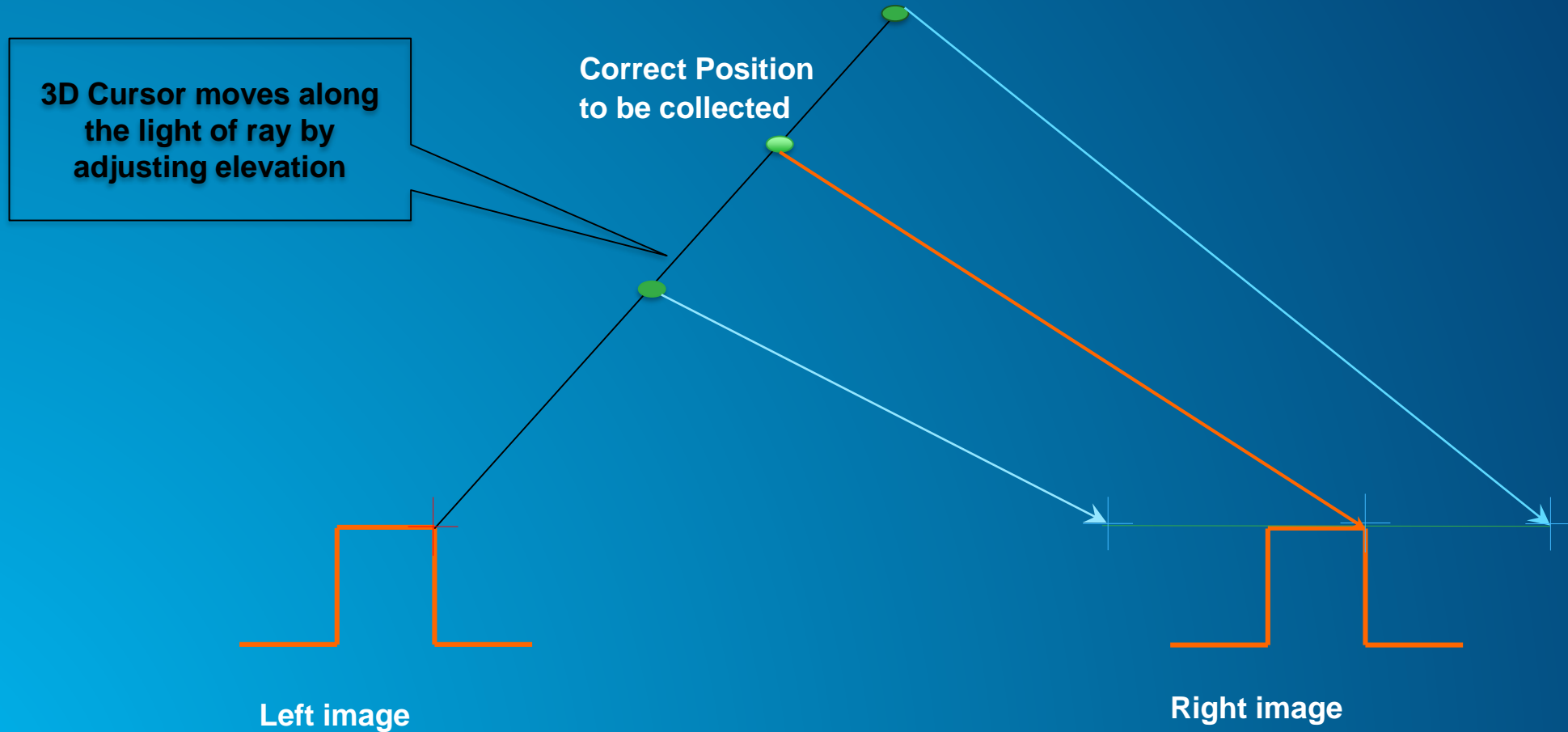




# Principle of Feature Data Collection with Stereo Imageries

- A virtual 3D point triggered by mouse moves in 3D map space
- 3D point projected on to stereo images as two cursors always of same Y coordinate
- With help of stereo glasses, operator adjust the elevation of 3D point to determine if cursor is fitting at the correct object that is going to be collected
  - In separated views, two cursors should on the same image points
  - In stereo view
    - Only one cursor visible in stereo glasses
    - Cursor is fitting on the ground surface at the object

# Principle of Feature Data Collection with Stereo Imageries





# Hardware Configuration

- Anaglyph Stereo
  - Anaglyph Stereo Glasses
- Shutter Glass Stereo
  - Graphic card supporting stereo display
  - Monitor supporting 120 Hz
  - Shutter glasses
- Optional: 3D mouse

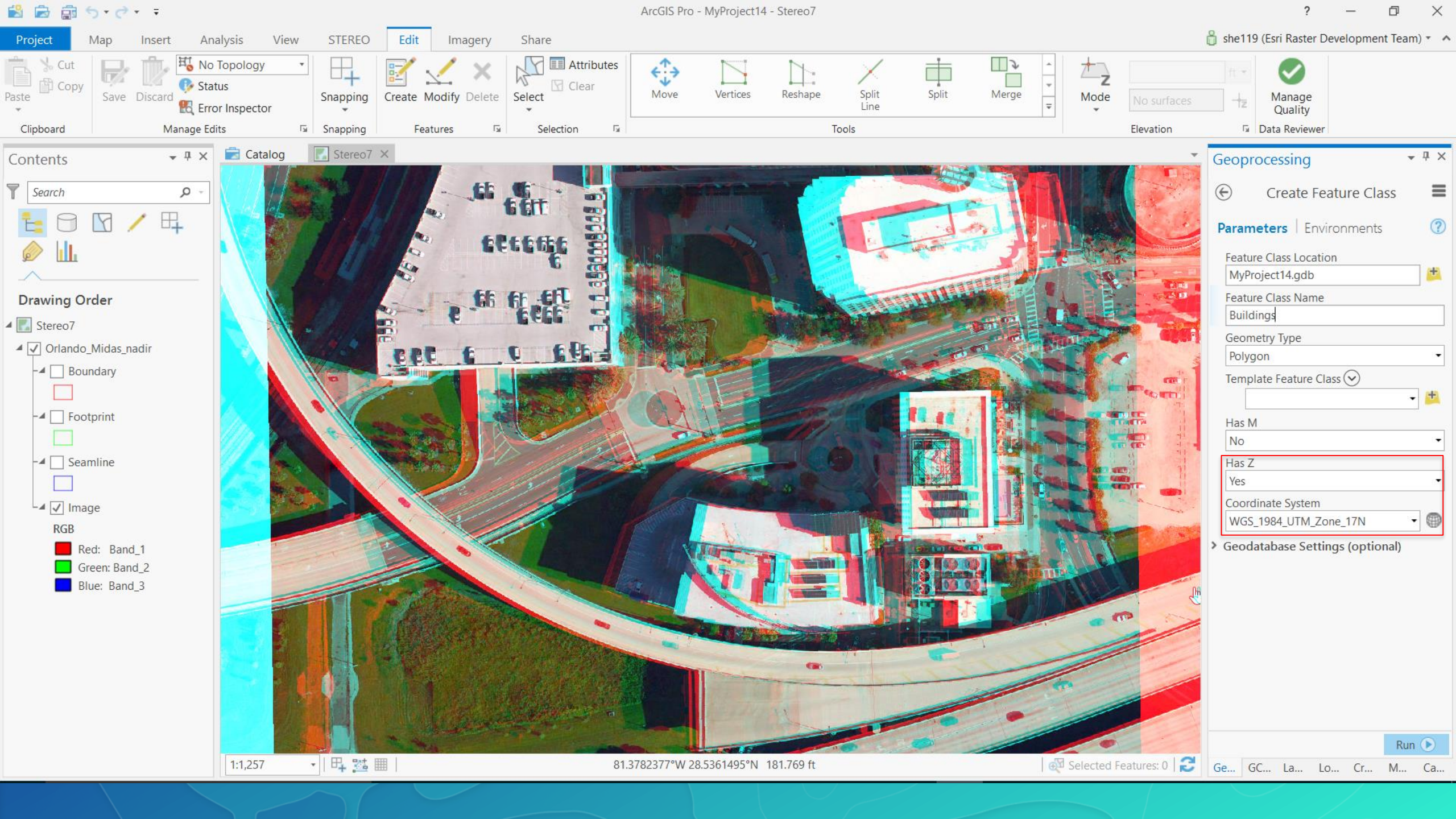


# Photogrammetric Workstation



Image Source:  
<http://www.adamtech.com.au/Blog/?p=327>





Project Map Insert Analysis View STEREO Edit Imagery Share

Clipboard Manage Edits Snapping Features Selection

No Topology Status Error Inspector

Create Modify Delete Select Clear

Move Vertices Reshape Split Line Split Merge

Tools

Mode Elevation

Manage Quality Data Reviewer

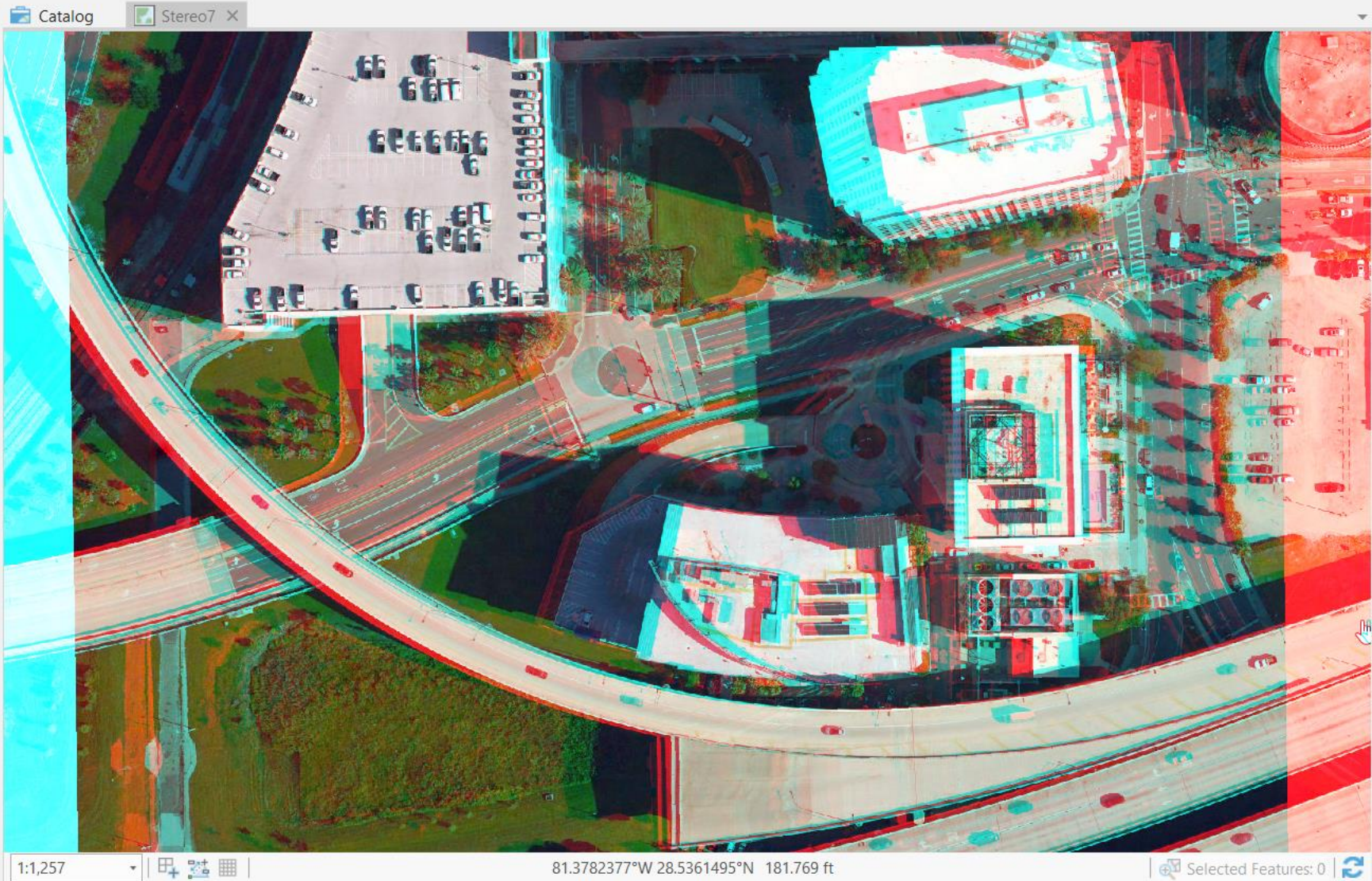
Contents

Search

Drawing Order

Stereo7

- Orlando\_Midas\_nadir
  - Boundary
  - Footprint
  - Seamline
  - Image
    - RGB
      - Red: Band\_1
      - Green: Band\_2
      - Blue: Band\_3



Geoprocessing

Create Feature Class

Parameters Environments

Feature Class Location: MyProject14.gdb

Feature Class Name: Buildings

Geometry Type: Polygon

Template Feature Class

Has M: No

Has Z: Yes

Coordinate System: WGS\_1984\_UTM\_Zone\_17N

Geodatabase Settings (optional)

Run



# Remarks

- Data collection with stereo imagery is a operation in 3D space. Stereo comes from 2 rectified images.
- Movement of cursor is in a 3D map space. This virtual cursor is projected to stereo images on flight.
- Exercise of stereo is necessary. In order to get accurate result, operator should be proficient at place cursor at correct elevation so that “stereo cursor” fits at the object surface.

# Demos

Feature Data Collection with Stereo Imagery

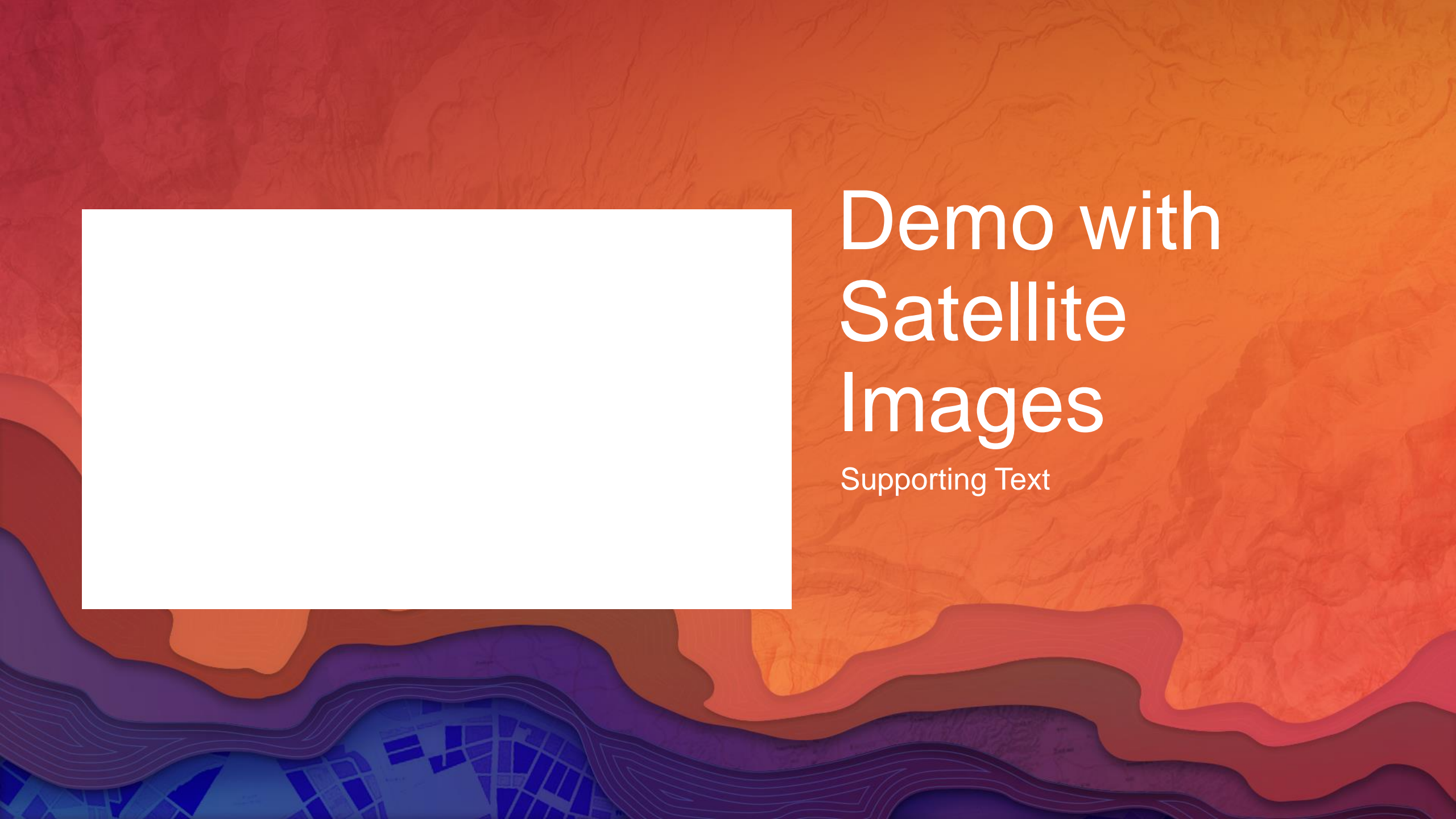






# Demo with Frame Camera

Supporting Text

The background is split horizontally. The top half is a textured orange-to-red gradient. The bottom half features a stylized map with blue and purple wavy lines representing water or terrain, and a grid pattern representing a city or land parcels.

# Demo with Satellite Images

Supporting Text

# Please Take Our Survey on the Esri Events App!

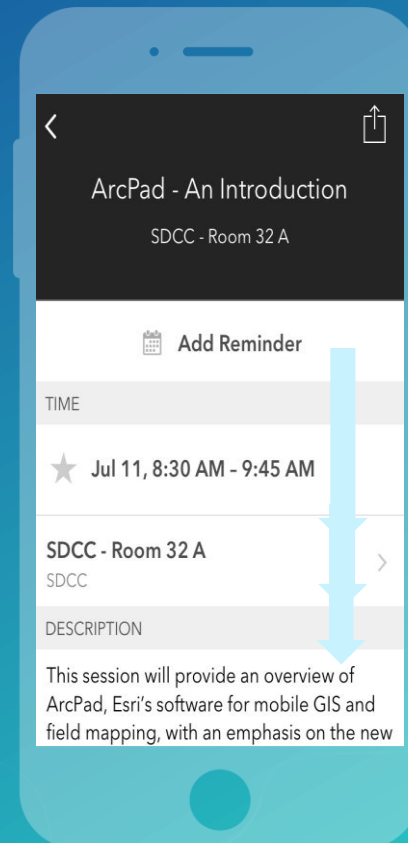
**Download the Esri Events app and find your event**



**Select the session you attended**



**Scroll down to find the survey**



**Complete Answers and Select "Submit"**







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