



ArcGIS Full Motion Video 1.3 Add-In

Esri Raster Development Team

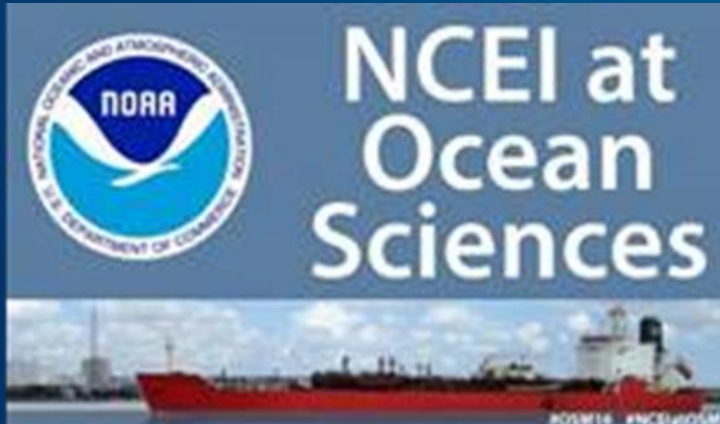
Jeff Liedtke

Alex Muleh

ArcGIS Full Motion Video Overview

Agenda

- What is Full Motion Video (FMV)?
- Who uses it?
- Esri FMV product features
- FMV Landing page
- Demos – data courtesy of NCEI

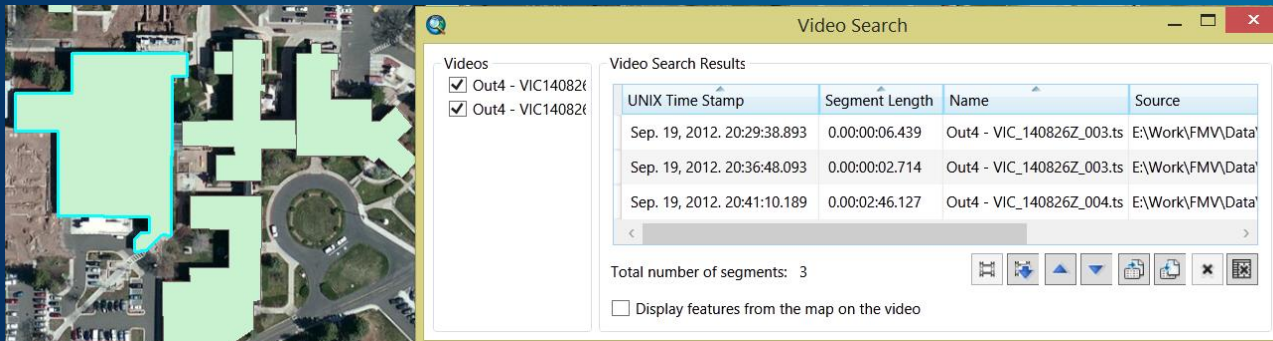
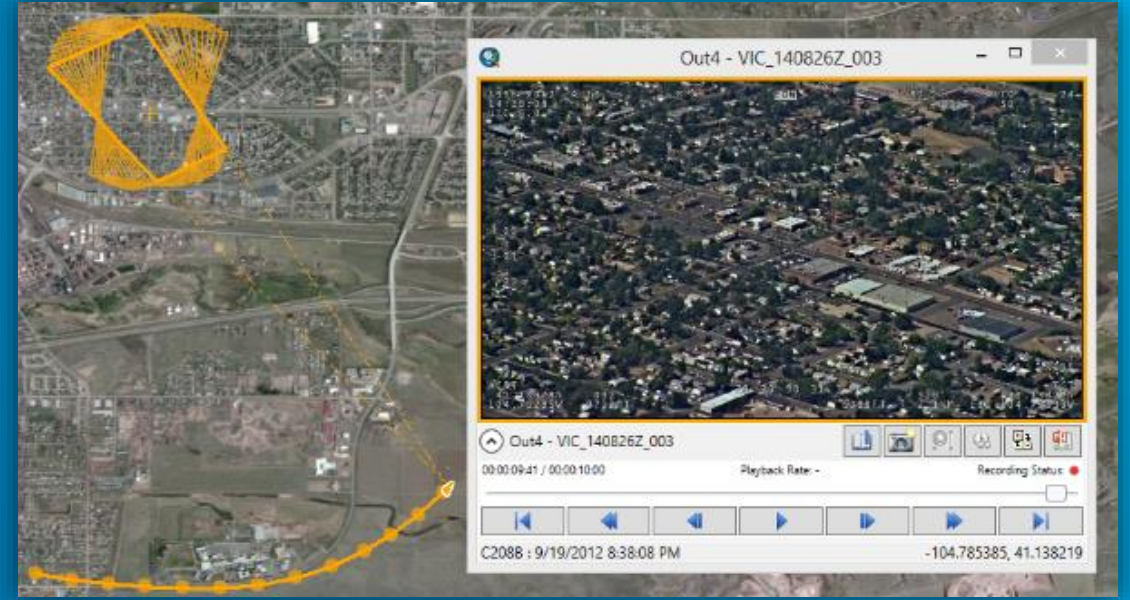


The image displays the ArcGIS software interface. The main window is titled "Untitled - ArcMap". On the left, the "Layers" panel shows a list of layers, including "EX1404L3_MB_FNL_W" and "World Ocean Reference". The "Table Of Contents" panel is also visible. The main map area shows a blue background with a yellow polygon. On the right, the "Video Metadata" panel displays a table of metadata for the video "EX1404L3_VID_20140919T140135Z_ROV...". Below the metadata table, there are buttons for "Capture", "Metadata", and "Source". The "Playback" panel at the bottom shows a video player with a red vertical line in the center of the frame. The video title is "EX1404L3_VID_20140919T140135Z_ROVHD_SQD_ZOOM_Low_GOODTRY2". The playback controls include a progress bar, a play button, and a stop button. The video is currently at 00:00:00:33 / 00:00:01:15. The playback rate is set to 1.0. The video is recorded at 14:02:08 on Sep. 19, 2014. The coordinates are -73.912357, 37.890853.

ArcGIS Full Motion Video

Advantages

- Map your videos
- Quickly find, view and analyze video data
- Easily share videos and information derived from videos
- Enable smarter decisions – faster!



Full Motion Video is often abbreviated "FMV"

Who Uses FMV

Situation Awareness

- Anyone who needs to monitor remote or dangerous locations
- Public Safety and Emergency Management
- Defense
- Oil Companies
- Local and Federal Governments
- Border Patrol
- Utilities



ArcGIS Full Motion Video

Where does FMV data come from?

- Unmanned Aerial Vehicles (UAV's; UAS's, RPV's, drones)
 - Need to add USV – Unmanned Submersible Vehicles !!!
- Fixed Wing and Helicopter
- Orbital sensors (overhead sensors)
- Vehicle mounted cameras
- Hand-held mobile devices and cameras
- Stationary (persistent surveillance)

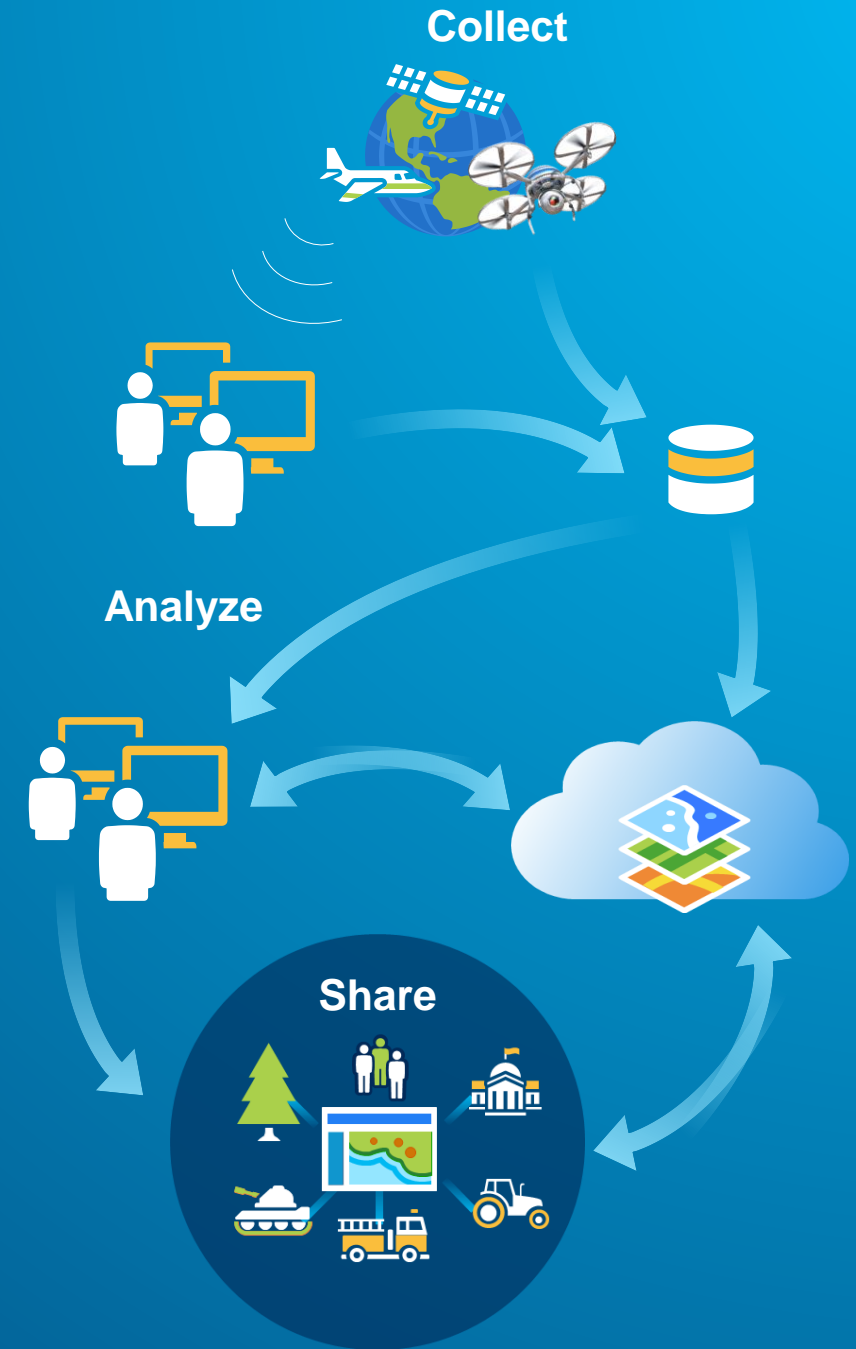


ArcGIS Full Motion Video

Support Operational Workflows

Find, Analyze and Disseminate video information

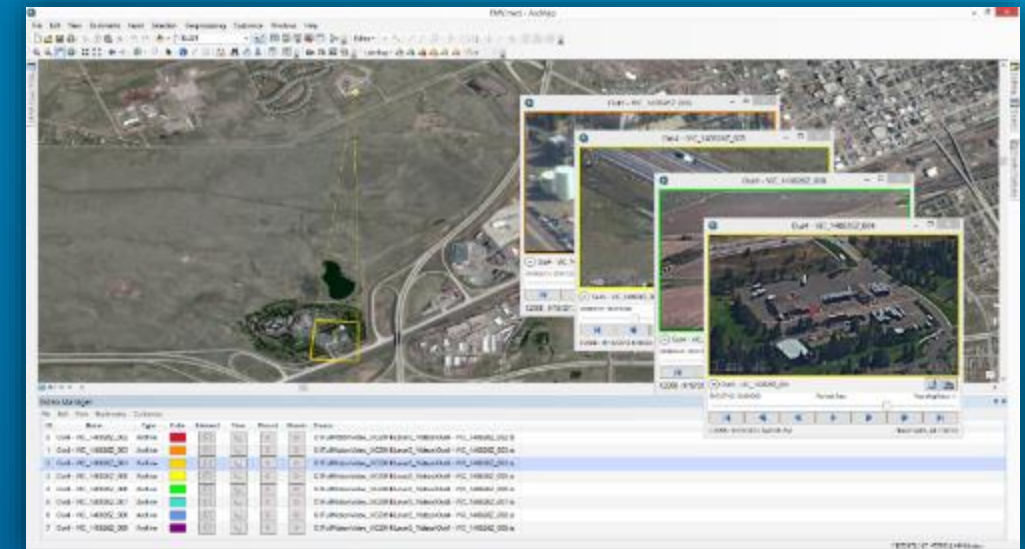
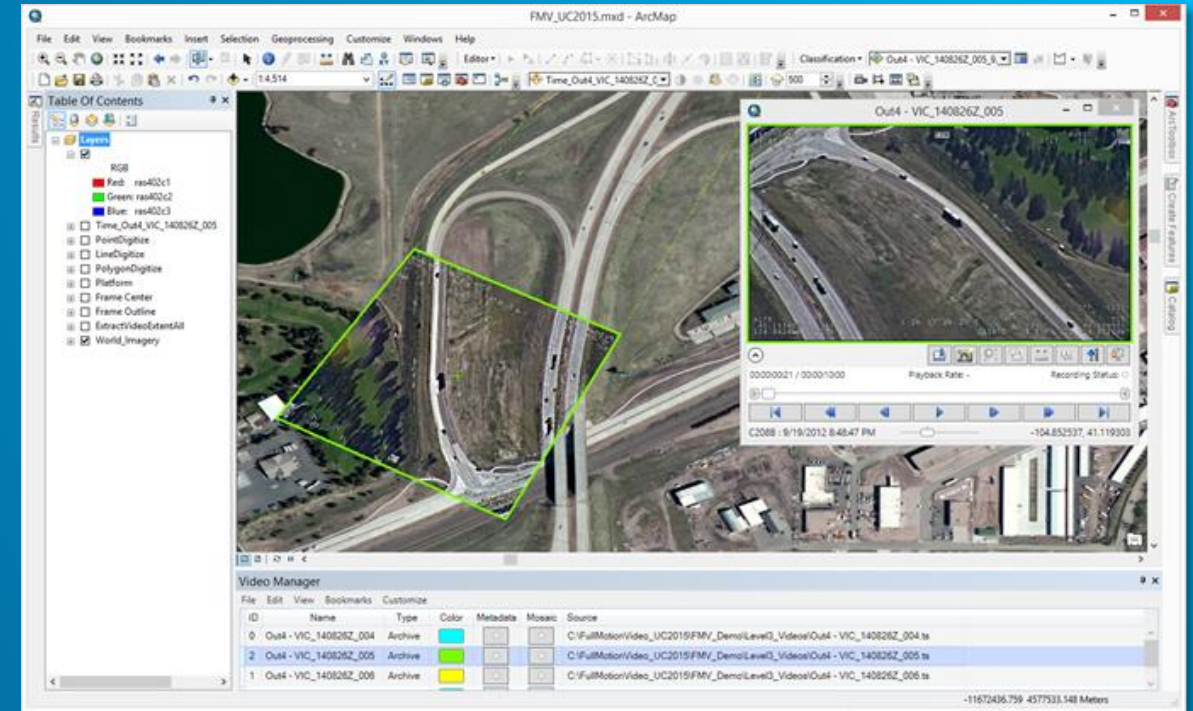
- Direct connect to live video streams
- Search archived video based on location, features of interest and timeframe
- Analyze video information, measure, mark, annotate, Bookmark critical locations and events, create and edit feature data on the video and map seamlessly, create mosaics
- Generate Powerpoint reports with one click, export video clips, create mosaics and share as a service



ArcGIS FMV Features

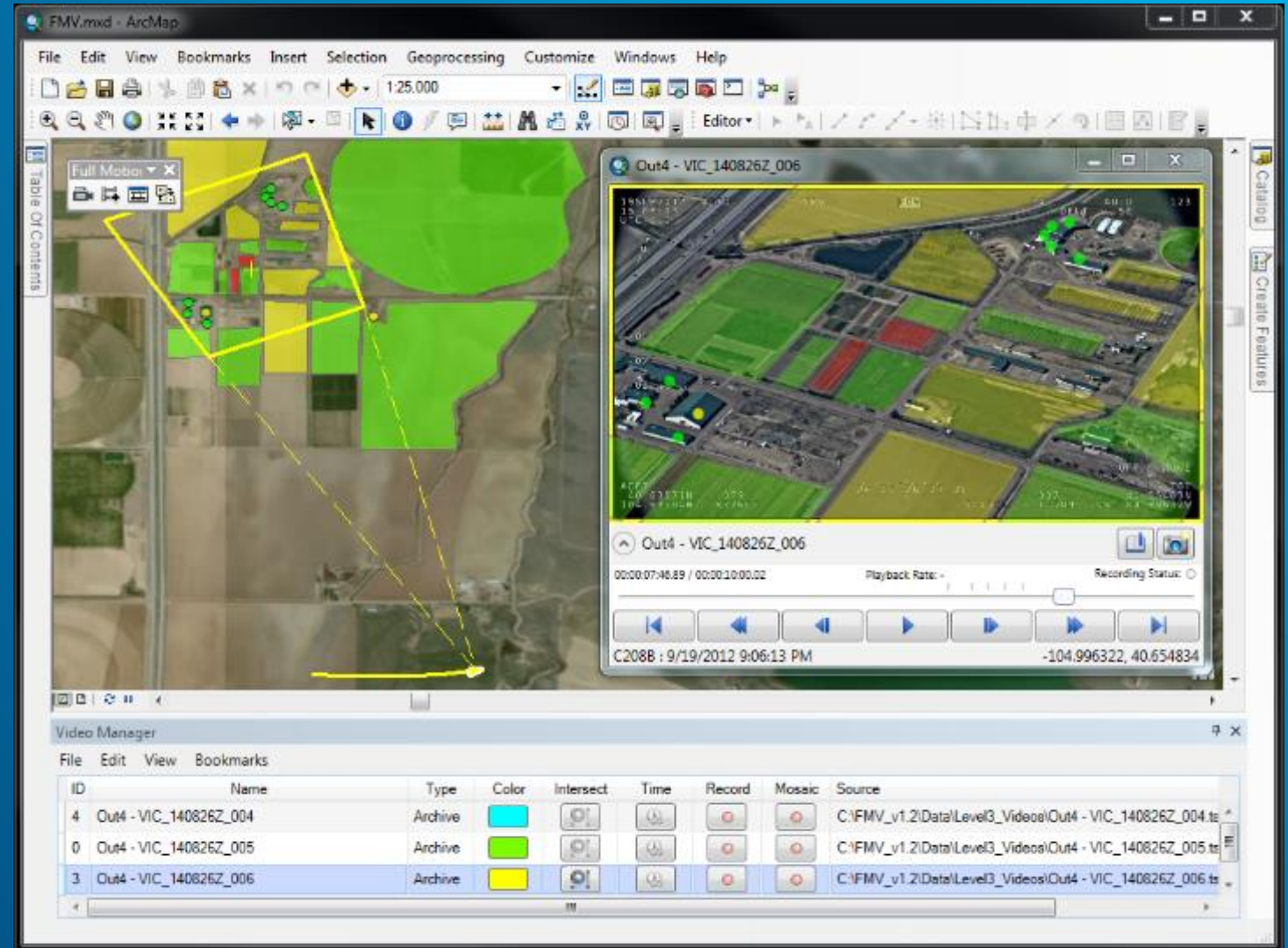
The Video Player

- Pan and Zoom for live streams and archived videos
- Easily export new video clips
- Live stream Recording
- Slow & fast motion playback
- Overlay video frames on the map display
- Use DEM/DTED data to increase video-to-map and map-to-video accuracy
- Display metadata in real time



Analyze and disseminate videos and information

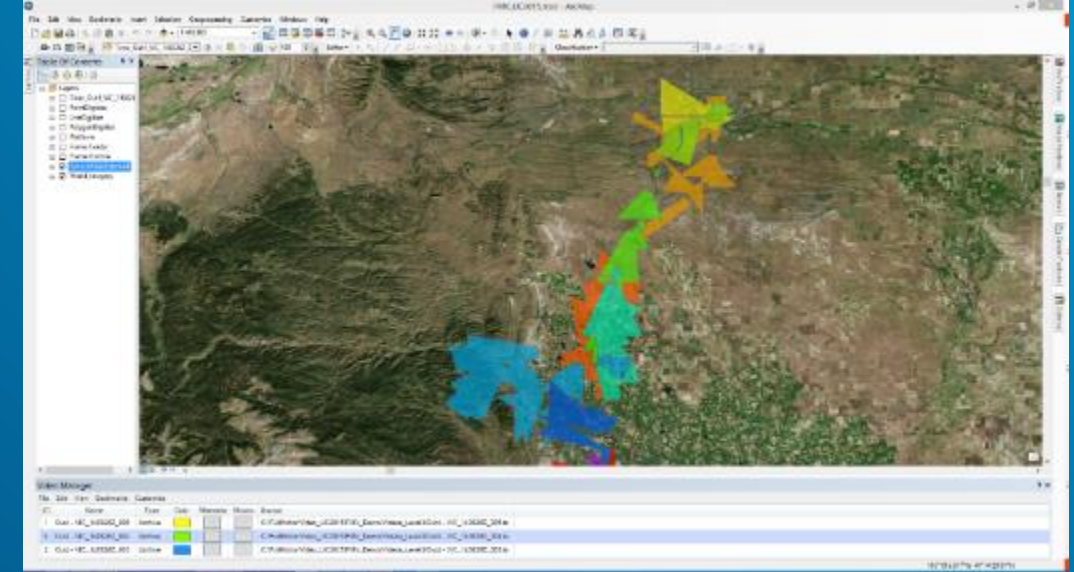
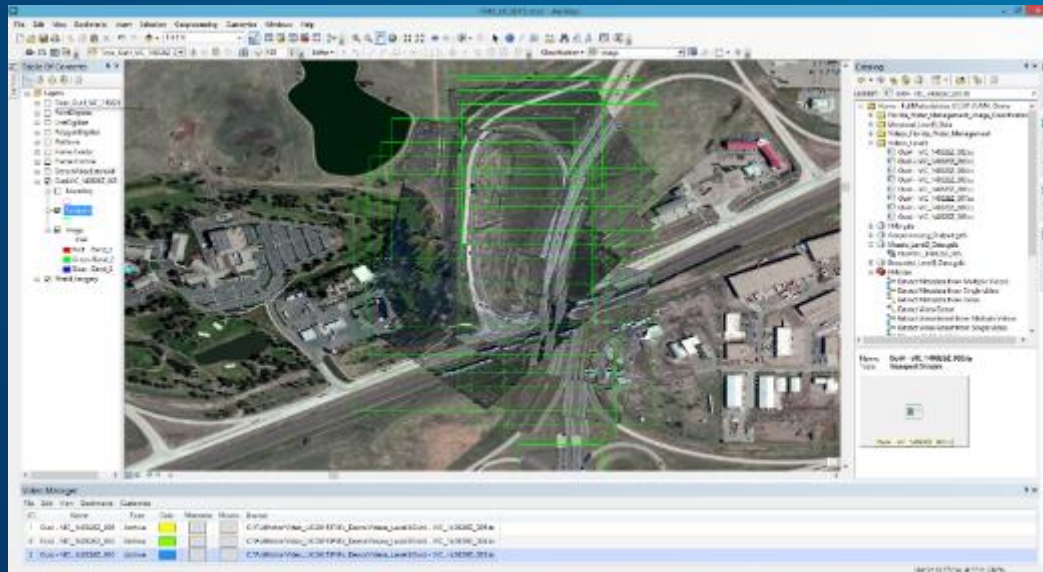
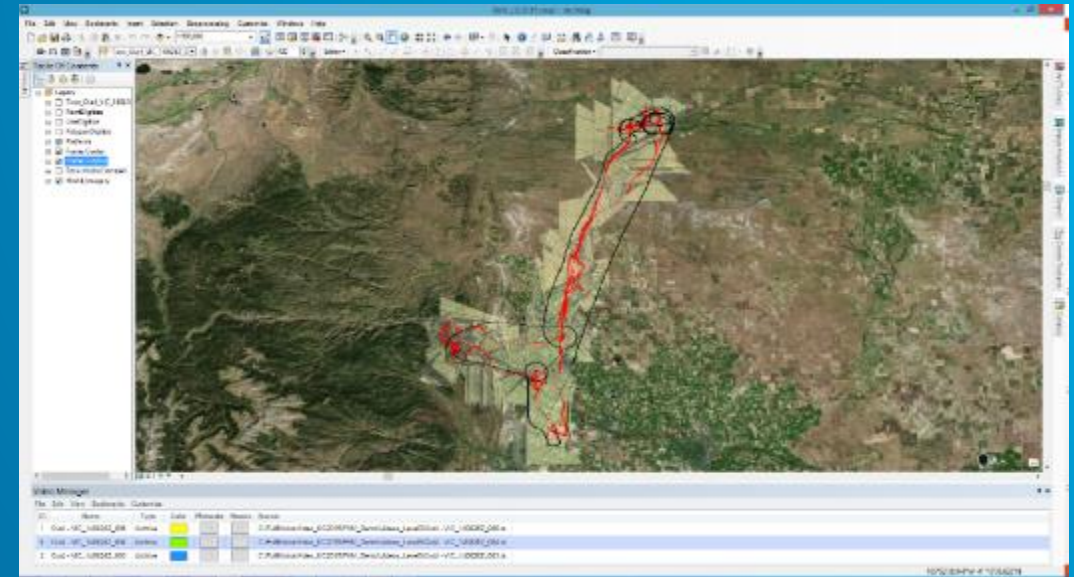
- FMV is integrated with ArcMap
- Georeference video frames to your maps
- Collect and overlay features seamlessly in both the video display and the ArcGIS Desktop display
- Bookmark critical locations and events
- Measure, mark, annotate video
- Create mosaics
- Create and export video clips
- Create Powerpoint reports with one click



ArcGIS Full Motion Video

FMV Geoprocessing Tools

- Extract Metadata from Video
- Extract Video Extent
- Mosaic Video
- Video Multiplexer
 - Combine Video and metadata into one video stream to create MISB-compliant data



Steps to get NCEI data into FMV

1. Combined 2 .raw file containing metadata into csv files
 - .raw file 1 contained platform latitude, longitude, and Unix time stamp
 - .raw file 2 contained Platform heading, pitch, roll and depth
2. Did a join in ArcMap using the Unix Time Stamp to create 1 CSV containing all metadata
 - A few records did not join, these were not significant and were omitted
3. Used the FMV Video Multiplexer tool to combine the video stream and metadata

Need

1. Horizontal Field of View
2. Sensor Relative Azimuth
3. Sensor Relative Elevation
4. Sensor Relative Roll

UnixTimeStamp	Platform Heading	Platform Pitch	Platform Roll	Sensor Longitude	Sensor Latitude	Sensor Altitude	Horizontal FOV	Sensor Relative Azimuth	Sensor Relative Elevation	Sensor Relative Roll
1411141140000000	153	1.4	0.9	-73.9129819	37.89008	-1093.8	100	0	0	0
1411141140000000	153.1	1.4	0.9	-73.9129819	37.89008	-1093.8	100	0	0	0
1411141140000000	153.1	1.4	0.9	-73.9129819	37.89008	-1093.8	100	0	0	0
1411141140000000	153.1	1.5	0.9	-73.9129819	37.89008	-1093.8	100	0	0	0
1411141140000000	153.1	1.5	0.9	-73.9129819	37.89008	-1093.8	100	0	0	0
1411141141000000	153.1	1.5	0.9	-73.9129818	37.89008	-1093.8	100	0	0	0

Video Multiplexer

☒ Input Video File (e.g. in_video.ts)

☒ Input Metadata File (e.g. in_video_metadata.csv)

☒ Output Video File (e.g. out_video.ts)

Metadata Field Mapping File (e.g. MISB_field_mapping.csv) (optional)

☐ Calculate corner coordinates using sensor information (optional)

Average elevation (meters AMSL) (optional)

Output Bit Rate (as percentage of input bit rate) (1 to 100) (optional)

Time Shift Observations File (e.g. time_shifts.csv) (optional)

OK

Cancel

Environments...

Show Help >>

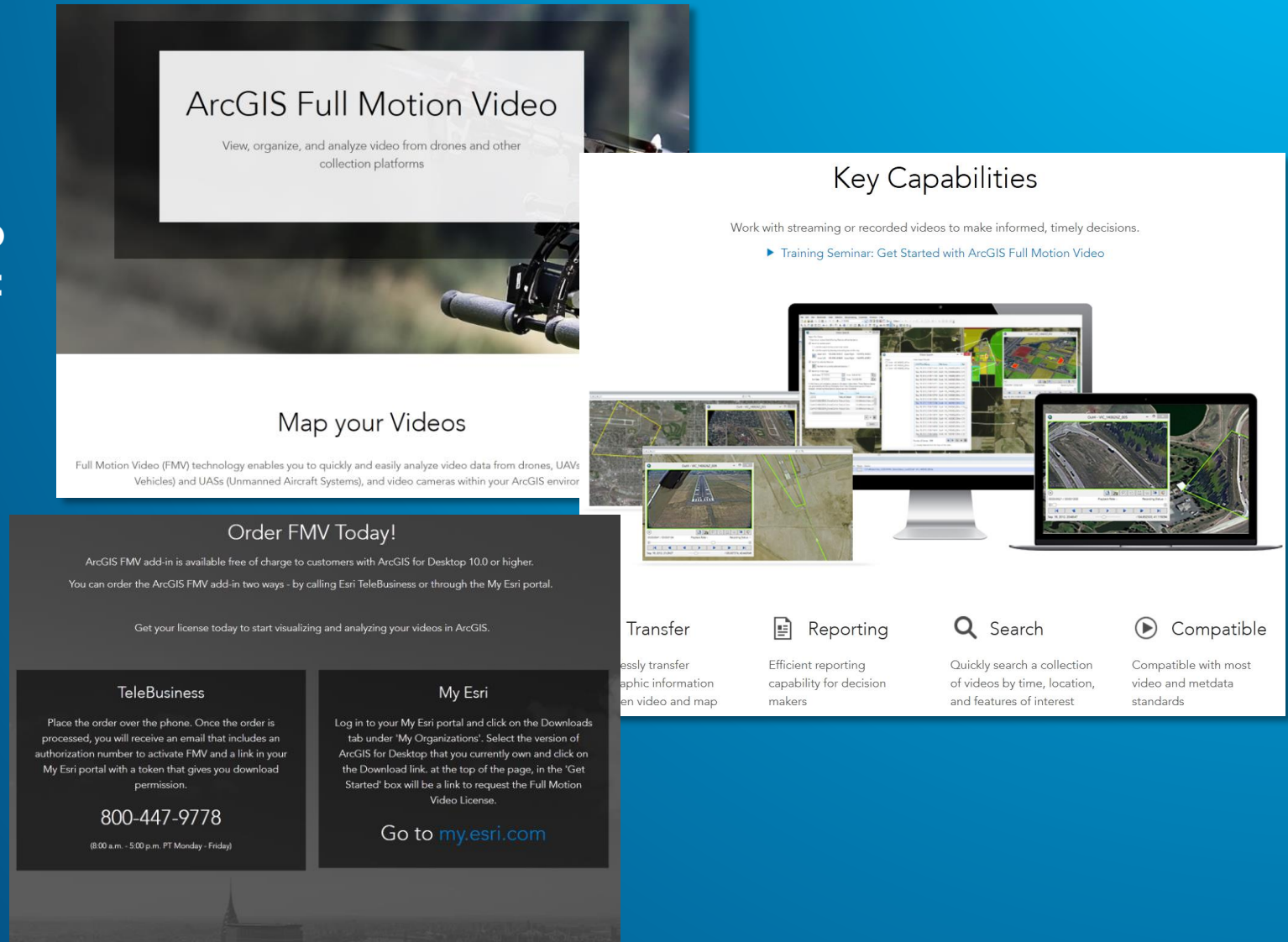
UnixTimeStamp	Platform Heading	Platform Pitch	Platform Roll	Sensor Longitude	Sensor Latitude	Sensor Altitude	Horizontal FOV	Sensor Relative Azimuth	Sensor Relative Elevation	Sensor Relative Roll
1411141140000000	153	1.4	0.9	-73.9129819	37.89008	-1093.8	100	0	0	0
1411141140000000	153.1	1.4	0.9	-73.9129819	37.89008	-1093.8	100	0	0	0
1411141140000000	153.1	1.4	0.9	-73.9129819	37.89008	-1093.8	100	0	0	0
1411141140000000	153.1	1.5	0.9	-73.9129819	37.89008	-1093.8	100	0	0	0
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1411141141000000	153.1	1.5	0.9	-73.9129818	37.89008	-1093.8	100	0	0	0
1411141141000000	153.1	1.5	0.9	-73.9129818	37.89008	-1093.8	100	0	0	0
1411141141000000	153.1	1.6	1	-73.9129818	37.89008	-1093.8	100	0	0	0
1411141141000000	153.1	1.6	1	-73.9129818	37.89008	-1093.8	100	0	0	0
1411141141000000	153	1.6	1	-73.9129818	37.89008	-1093.8	100	0	0	0
1411141142000000	153	1.6	1	-73.9129818	37.89008	-1093.8	100	0	0	0
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1411141142000000	152.9	1.7	1.1	-73.9129818	37.89008	-1093.8	100	0	0	0
1411141142000000	152.8	1.7	1.1	-73.9129818	37.89008	-1093.8	100	0	0	0
1411141142000000	152.7	1.6	1.1	-73.9129818	37.89008	-1093.8	100	0	0	0
1411141143000000	152.7	1.6	1.1	-73.9129817	37.89008	-1093.8	100	0	0	0
1411141143000000	152.6	1.6	1.1	-73.9129817	37.89008	-1093.8	100	0	0	0

Enabling Capabilities for NOAA/NCEI video viewing, processing and management

- **Video Multiplexer**
 - Enables metadata and videos to be converted to MISB-compliant video data
 - Display video frame on the map and bathymetry data
- **Video Search**
 - Allows NOAA-NCEI video archives to be searched according to location and time
- **Mosaicking of video frames into a Mosaic Dataset**

Full Motion Video Landing Page

- <http://www.esri.com/fmv>
- Esri webpage containing links to customer-facing FMV resources:
 - Order FREE FMV 1.3 Add-In
 - GeoNet correspondence and info
 - User's Manual
 - Blogs
 - Tutorials and data
 - FAQ and other customer service information
 - Presentations



ArcGIS Full Motion Video

View, organize, and analyze video from drones and other collection platforms

Map your Videos

Full Motion Video (FMV) technology enables you to quickly and easily analyze video data from drones, UAVs, Vehicles, and UASs (Unmanned Aircraft Systems), and video cameras within your ArcGIS environment.

Order FMV Today!

ArcGIS FMV add-in is available free of charge to customers with ArcGIS for Desktop 10.0 or higher. You can order the ArcGIS FMV add-in two ways - by calling Esri TeleBusiness or through the My Esri portal.

Get your license today to start visualizing and analyzing your videos in ArcGIS.

TeleBusiness

Place the order over the phone. Once the order is processed, you will receive an email that includes an authorization number to activate FMV and a link in your My Esri portal with a token that gives you download permission.

800-447-9778
(8:00 a.m. - 5:00 p.m. PT Monday - Friday)

My Esri

Log in to your My Esri portal and click on the Downloads tab under 'My Organizations'. Select the version of ArcGIS for Desktop that you currently own and click on the Download link. At the top of the page, in the 'Get Started' box will be a link to request the Full Motion Video License.

Go to my.esri.com

Key Capabilities

Work with streaming or recorded videos to make informed, timely decisions.

- ▶ Training Seminar: Get Started with ArcGIS Full Motion Video

Transfer

Efficiently transfer geographic information between video and map

Reporting

Efficient reporting capability for decision makers

Search

Quickly search a collection of videos by time, location, and features of interest

Compatible

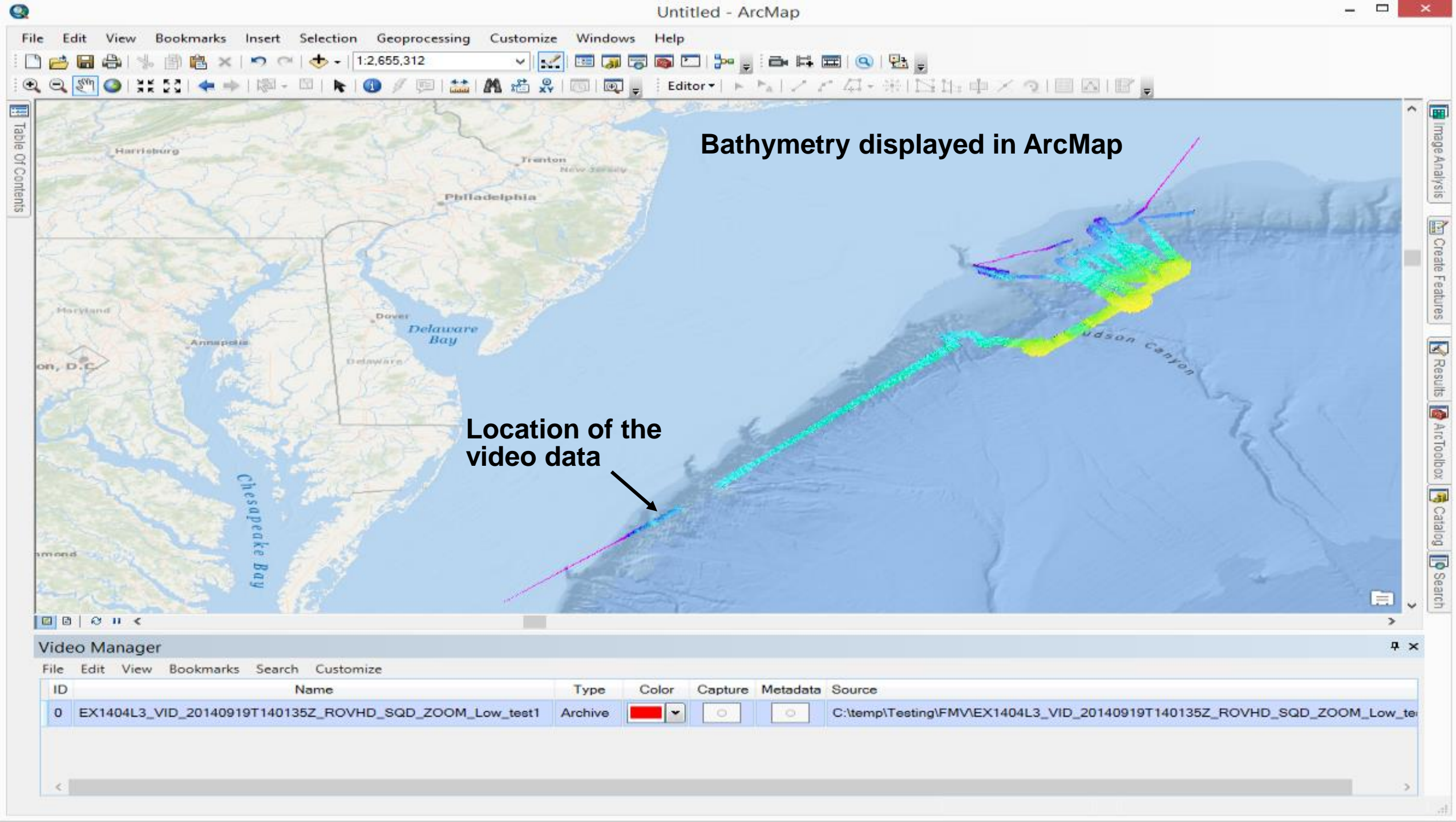
Compatible with most video and metadata standards

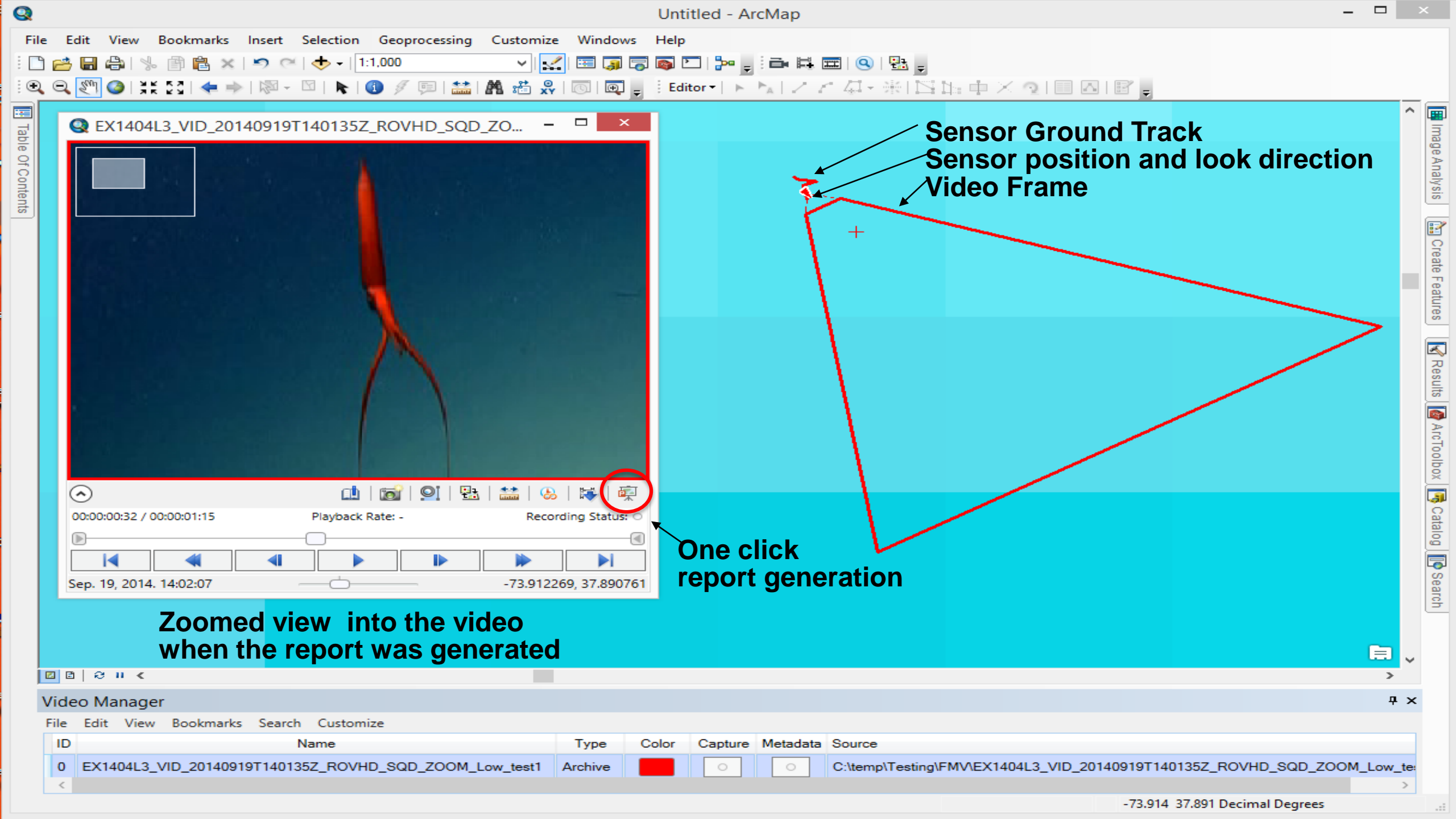
Contact Information: jliedtke@esri.com

For information about the MISB Standard:

Go to http://www.gwg.nga.mil/misb/zip_pubs.html and download the zip file titled 'MISP-2016.1'. Unzip the file and look for a folder called

'MISP-2016.1CompositeDocuments'. Open the folder and look for a pdf called 'ST0601.9.pdf'. This pdf contains a reference to all of the MISB fields supported by the FMV tool set. It also includes descriptions of the parameters and useful diagrams.





Sensor Ground Track
Sensor position and look direction
Video Frame

One click
report generation

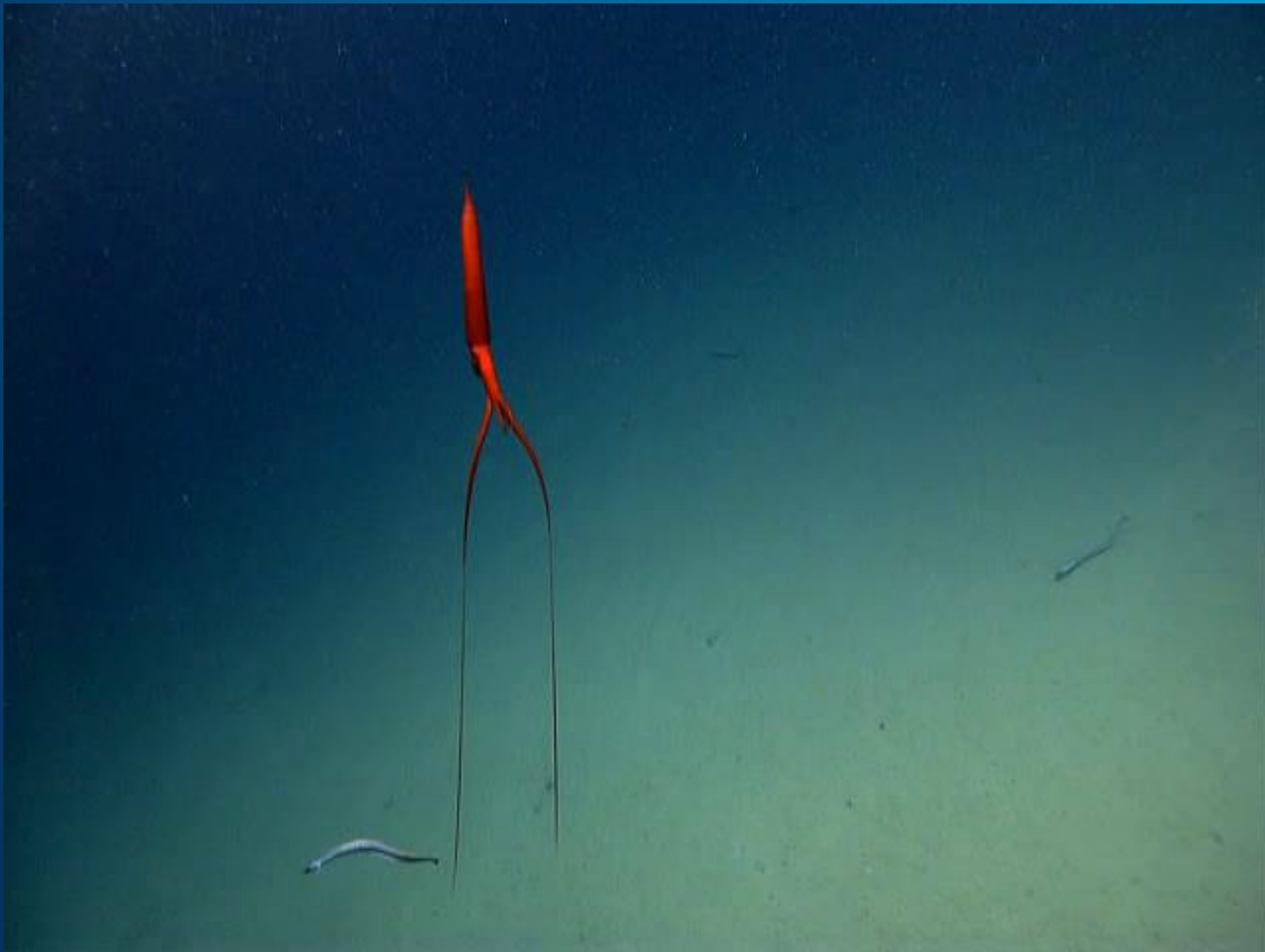
Zoomed view into the video
when the report was generated

Video Manager

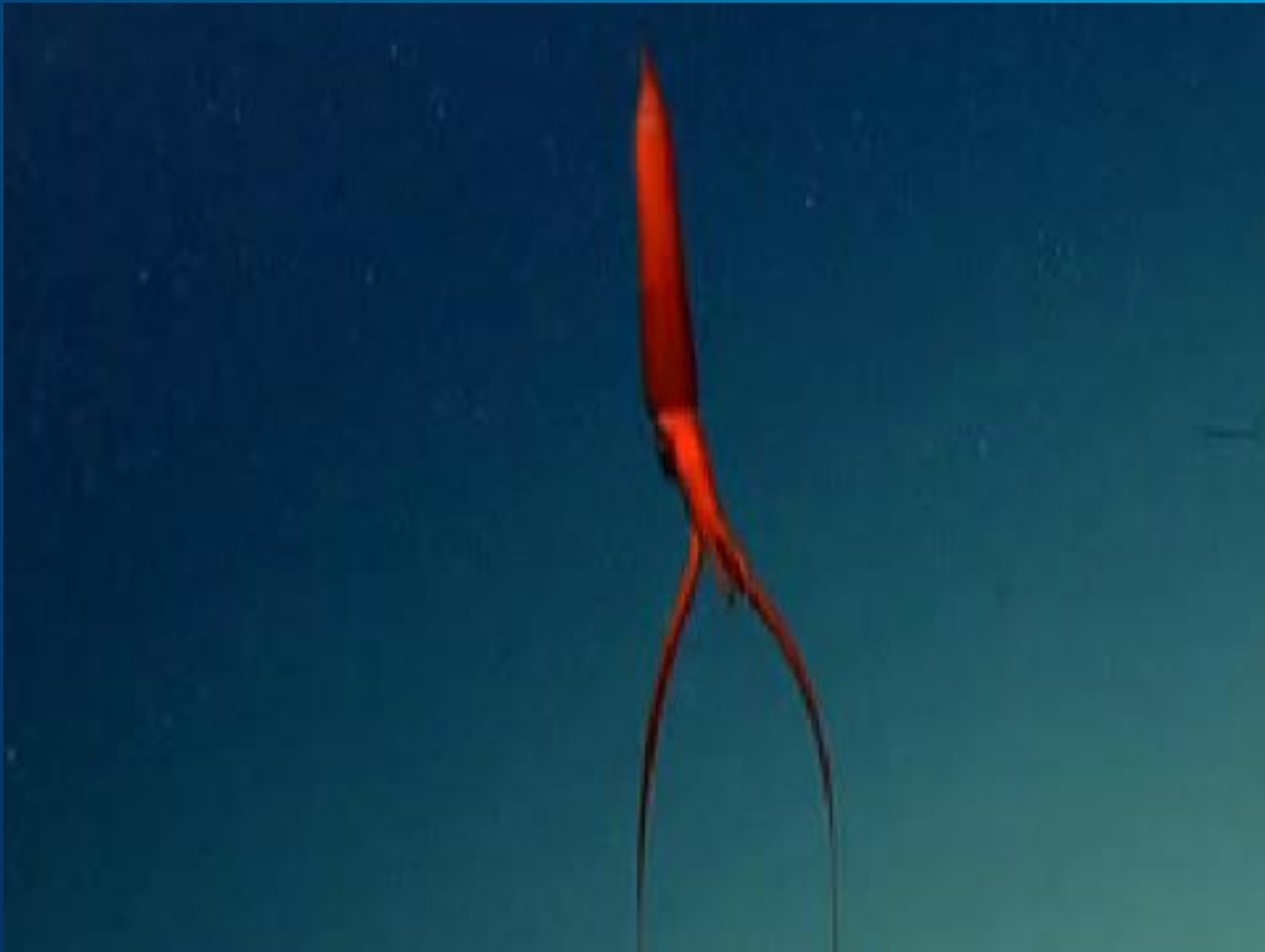
ID	Name	Type	Color	Capture	Metadata	Source
0	EX1404L3_VID_20140919T140135Z_ROVHD_SQD_ZOOM_Low_test1	Archive	Red	<input type="radio"/>	<input type="radio"/>	C:\temp\Testing\FMV\EX1404L3_VID_20140919T140135Z_ROVHD_SQD_ZOOM_Low_te



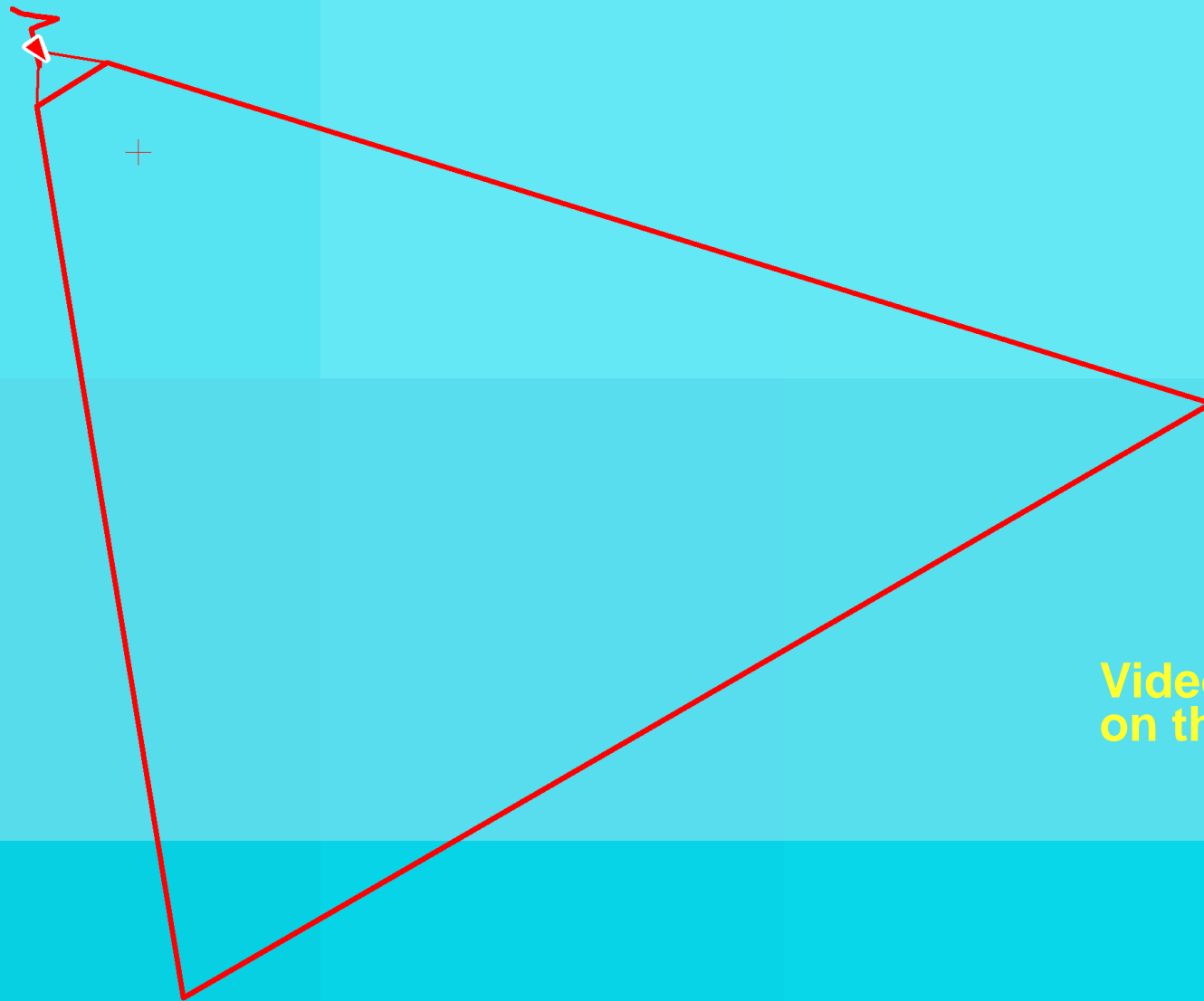
ArcGIS Full Motion Video Automatic Powerpoint Report



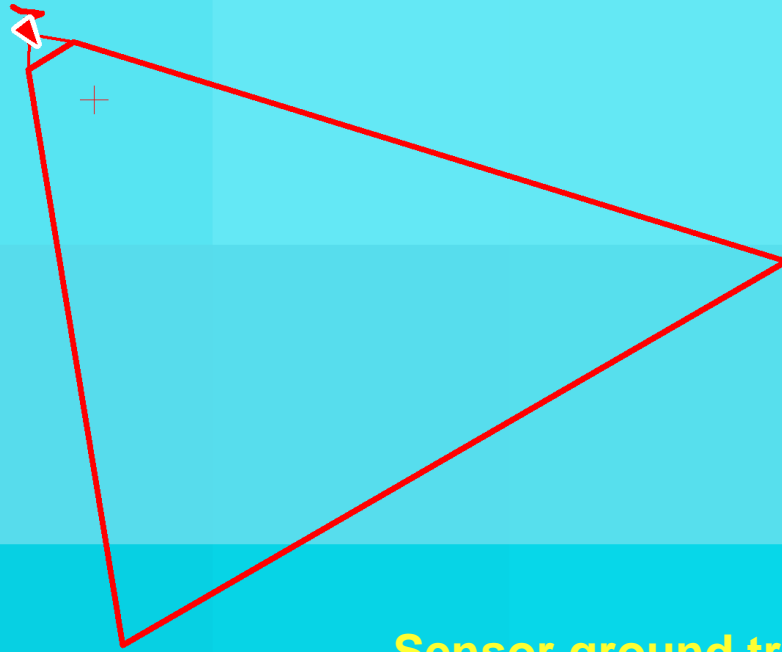
Video Frame



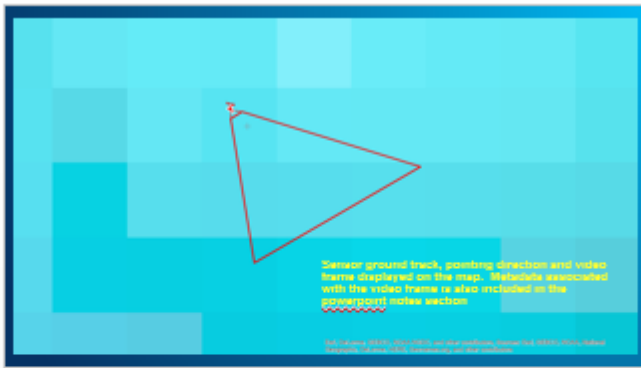
**Zoomed view into
the video when the
report was generated**



**Video Frame displayed
on the map**



Sensor ground track, pointing direction and video frame displayed on the map. Metadata associated with the video frame is also included in the powerpoint notes section



Metadata associated with the video frame is also included in the report in the Powerpoint Notes section

Source:

C:\temp\Testing\FMV\EX1404L3_VID_20140919T140135Z_ROVHD_SQD_ZOOM_Low_test1.ts

Elapsed Time: 00:00:00:32 / 00:00:01:15

UNIX Time Stamp: Sep. 19, 2014. 14:02:07.000

Platform: Longitude, Latitude: -73.91237, 37.89086

Military Grid Reference System (MGRS): 18SWG9563494263

Frame Center:

Longitude, Latitude: -73.91237, 37.89086

Military Grid Reference System (MGRS): 18SWG9563494263

Frame Corners:

Upper Left - Longitude, Latitude: -73.91123, 37.89052

Military Grid Reference System (MGRS): 18SWG9573594226

Upper Right - Longitude, Latitude: -73.91223, 37.88994

Military Grid Reference System (MGRS): 18SWG9564894161

Lower Right - Longitude, Latitude: -73.91237, 37.89081

Military Grid Reference System (MGRS): 18SWG9563494257

Lower Left - Longitude, Latitude: -73.9123, 37.89085

Military Grid Reference System (MGRS): 18SWG9564094262

19SEP2012
14:43:13
UTC-6.0

AUTO

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200

DFLT

AUTO
50

123

N →

-01-

-02-

-03-

04

ACFT
41.15091N
104.76420W

330°
9756FT

27 28 29 30 3

6102FT

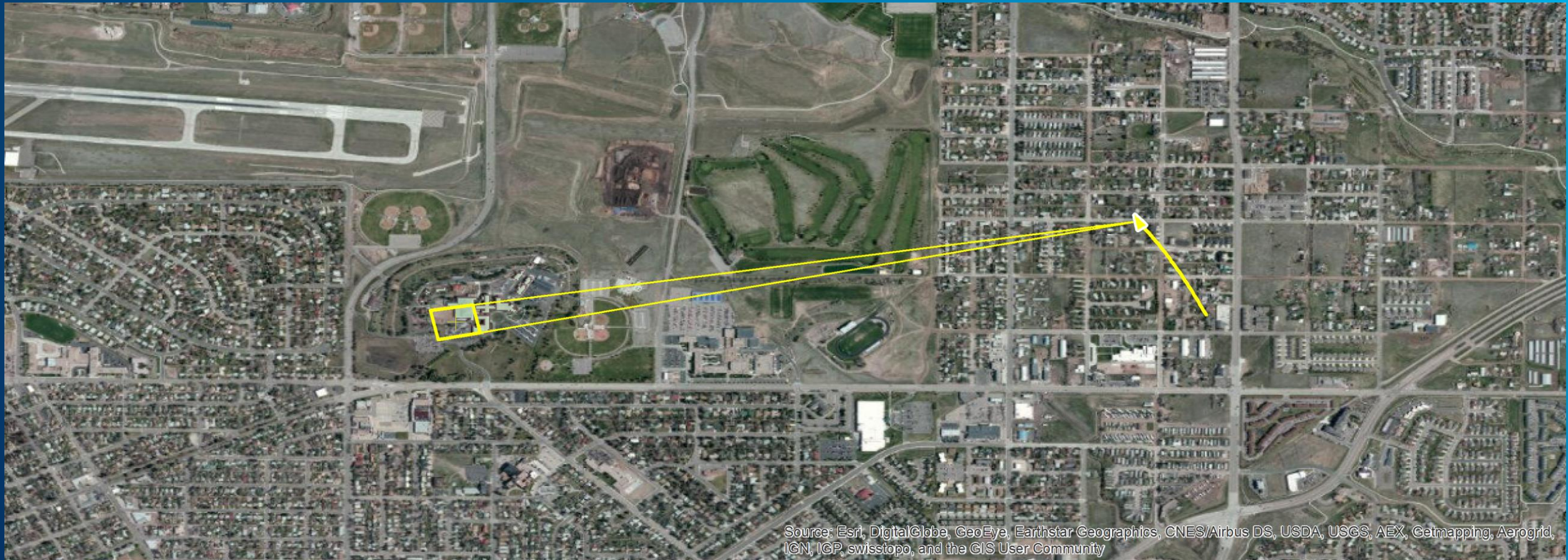
259°
1.2NM

OFF NONE
TGT
41.14777N
104.78654W





Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community