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U.S. Delegation to the OSCC

Please see the attached presentation for the Second Open Skies Review Conference, 7-9 June 2010

**Working Session 2, Agenda Item (v):
“Open Skies Digital Output: Easy Access with Earth Viewer Software”**

Presented by Mr. Dennis Grieshop, United States Open Skies Media Processing Facility

OPEN SKIES REVCON 2010

**OPEN SKIES DIGITAL
OUTPUT:
EASY ACCESS WITH
EARTH VIEWER SOFTWARE**



MR DENNIS GRIESHOP
USAF – OPEN SKIES
MEDIA PROCESSING
FACILITY



Overview



- Why go digital?
- What is Earth Viewer software?
- Reasons Earth Viewers are NOT a substitute for Open Skies products, but a tool for Open Skies!



Why go Digital?



- Digital products, Video, Infrared, SAR, and digitized film are:
 - Easy to store, share, and use
 - In use everywhere
- Film cameras and film usage are rapidly decreasing
 - Open Skies alone cannot sustain manufacturing
- Earth Viewers make using Open Skies DIGITAL output easy!

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What Is Earth Viewer Software?



- Software programs, often free, that allow the user to view stored imagery, either locally or over the internet from any database
- Satellite
- Aerial
- Bird's eye and
- Street view

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Earth Viewer Programs



- Include:
 - Google Earth* (actual imagery)
 - Earth and Moon viewer (you can see the moon!)
 - Microsoft's Bing Maps*
 - Falcon View
 - Plus hundreds of other programs
- *These are the two most popular in the U.S.

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Earth Viewer Imagery Sources



- Majority of images are from commercial satellites, such as DigitalGlobe, some images are from aerial mapping companies (Bird's eye view)
- Images limited to panchromatic and color
- Resolution ranges from 0.2 meters to 15 meters
 - Depends on date of coverage
- Some images up to 3 years old
- Open Skies resolution = 0.3 meters

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Capabilities of Earth Viewers



- Move around visually, using the on-screen map or image, to find the specific location of interest
- Zoom and tilt
- Some Earth Viewers also provide:
 - Ability to create user supplied image overlays
 - Time lapse coverage of historical imagery

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MS BING – Bird's Eye View



Image source: 5 sources cited

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MS Bing – Aerial View



Image source: 5 sources cited

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Google – Aerial View



Image source: European Space Agency

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Google Earth Image Sources



- Google obtains its images from any and all sources available including:
 - Satellites
 - DigitalGlobe (high resolution imagery)
 - EarthSat
 - GeoEye-1
 - IKONOS
 - Aerial imagery
 - ViewGL – updated aerial imagery for Google Earth
- Other sources include individual “States” sources

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Why use Google Earth (as opposed to other Earth Viewers)



- Unlike other Earth Viewers, Google Earth allows the user to create multiple layers for display.
 - Layers can include polygons, lines, thumb-tacks, 3-D buildings, image overlays, street view, sky-view, Ocean View, flight simulator, movie maker, etc.
 - These layers can be saved as a file, called KML and small enough in size to email other recipients.
- Google Earth is a freeware
- Google Earth will execute regardless of connection status
- Movie of [OS0940](#)

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Google Earth Provides Situational Awareness



- Given a media directory file, data annotation file, and hundreds if not thousands of OSDDEF image files on a hard disk drive, the tasks for media processing personnel are time consuming if not difficult
- A mission KML with appropriate links to images can reduce operator errors by providing visual awareness

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Format 14 KML

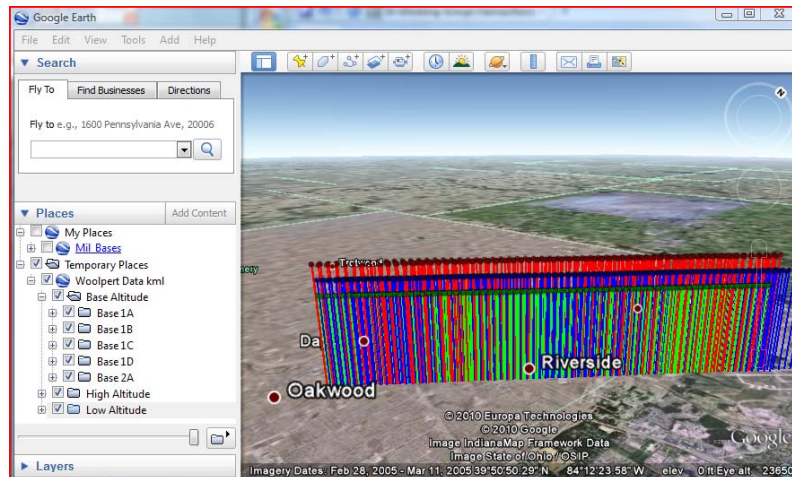


- The Finnish delegation, at the first Review Conference, briefed their capability to plot the Format 14 Mission Reports, using a special mapping program
- With Google Earth, State Parties can create a Format 14 KML file which can be sent as an attachment to an email
- [2009 passive missions over U.S. movie](#)

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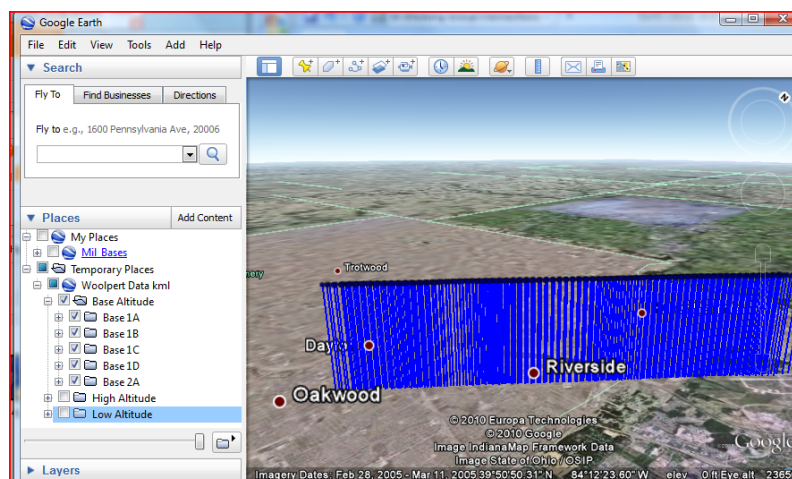
Data Gathering, Certification and Demonstration Flight KML



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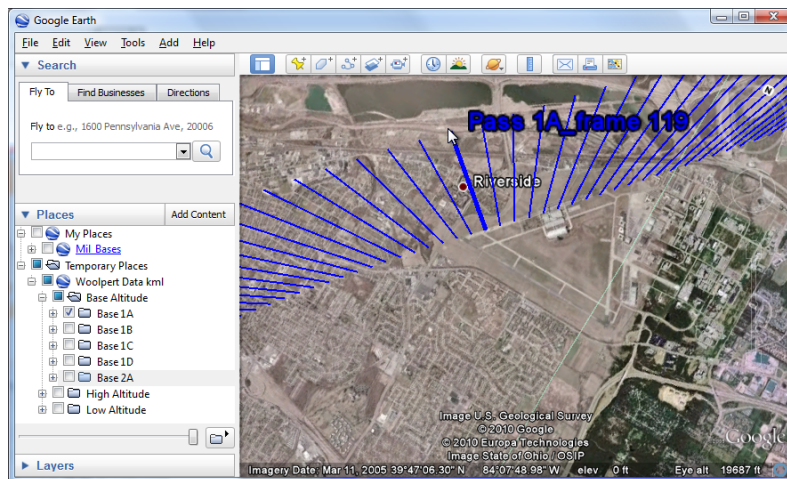
5 Passes – 1 Altitude



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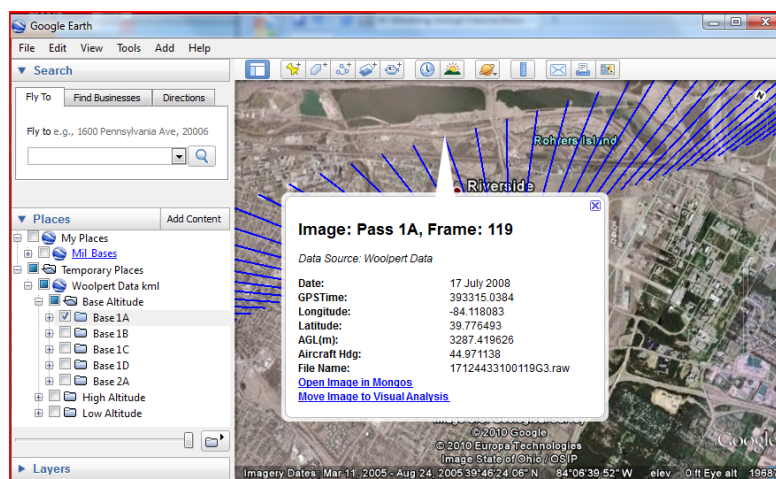
First Pass – Frame Near Target



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Balloon Information



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Open Skies Plus Google Earth

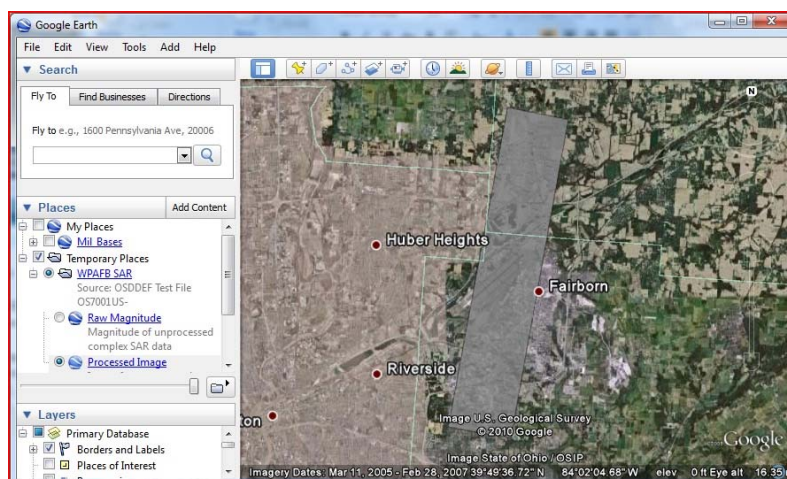


- Can overlay Open Skies digital Imagery onto Google Earth
 - Synthetic Aperture Radar
 - Infrared
 - Near Infrared
 - False Color Infrared
 - Color
 - digitized film

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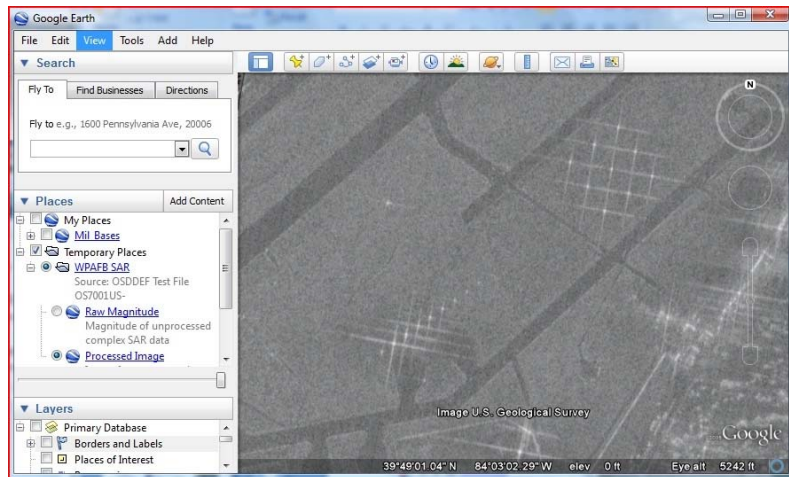
SAR Data – 4 Frames Overlaid by a KML layer



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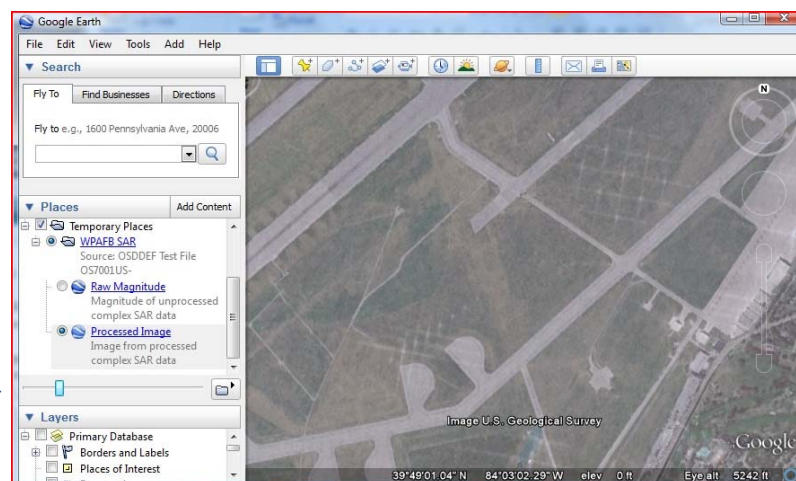
SAR Imagery



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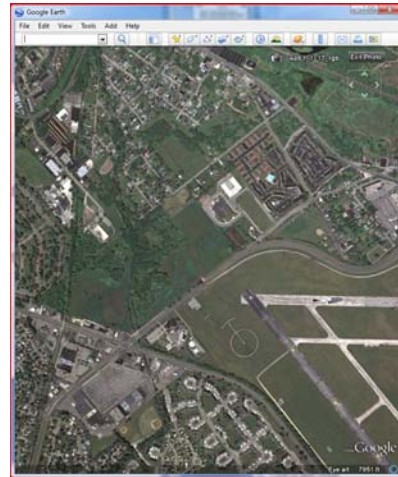
Using Layer Transparency



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False Color IR and Color



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Conclusion



- Digital output is coming!
- Earth viewers can make using digital output easier
- Google Earth is a versatile tool to assist media processing personnel perform their duties
- Great potential for future digital data development

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