Topics Presented

- Quick summary of system characteristics
- Formosat-2 Satellite
- Archive operations
- DTED2 Digital Elevation Model Product—Reference3D
- Web-based operations
SPOT Space Segment Today

- 3 Satellite constellation currently operational

- **SPOT 2 & SPOT 4** 10m Pan, 20m XI

- **SPOT 5** – Launched in mid 2002
  - Improved resolution 10m XI, 5m Pan, 2.5m Pan
  - Dedicated instrument for stereo imagery collection

- Over 100M km² of 2.5m and 5m Data in the archive

Tel Aviv, Israel - SPOT 2.5m Color

Hong Kong, China - SPOT 2.5m Color

Madrid, Spain - SPOT 2.5m Color
# SPOT System – Spectral Mode

<table>
<thead>
<tr>
<th>Mode</th>
<th>Spatial Resolution (Meters)</th>
<th>SPOT 1-3 Spectral Resolution (Microns)</th>
<th>SPOT 4 Spectral Resolution (Microns)</th>
<th>Spatial Resolution (Meters)</th>
<th>SPOT 5 Spectral Resolution (Microns)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panchromatic</td>
<td>10m</td>
<td>0.51 - 0.73</td>
<td>0.61 - 0.68</td>
<td>2.5 &amp; 5m</td>
<td>0.51 - 0.73</td>
</tr>
<tr>
<td>Multispectral</td>
<td>20m</td>
<td>0.50 - 0.59 (Green)</td>
<td>0.61 - 0.68 (Red)</td>
<td>10m</td>
<td>0.50 - 0.59 (Green)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.61 - 0.68 (Red)</td>
<td>0.79 - 0.89 (Near IR)</td>
<td>10m</td>
<td>0.61 - 0.68 (Red)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10m</td>
<td>0.79 - 0.89 (Near IR)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20m</td>
<td>1.58 - 1.73 (Mid IR)</td>
</tr>
</tbody>
</table>

![Graph showing reflectance vs. wavelength for different materials]

- **Reflectance** and **Wavelength (nm)**
- **Materials** include Snow, Vegetation, Sand, and Water.
SPOT 5 Major Improvements

**Improvements**

- **Increased Spatial Resolution (HRV)**
  - 2.5 m Panchromatic
  - 5 m Panchromatic
  - 10 m Multispectral

- **Dedicated Stereo Instrument (HRS)**
  - High Resolution Stereoscopic
  - Fore & aft fixed stereo, 120 X 600 KM strips

- **Improved Location Accuracy**
  - < 50 m (RMS) without ground control
Resolution Comparison: SPOT 5 to Ikonos
Madrid, Spain, Train Station

SPOT 2.5 M
Natural Color

Ikonos 1 M
Natural Color
Low-density Populated Areas

- Do you really need sub-1m data outside the city?
- Appropriate resolution -- based upon population density, traffic, feature density and feature significance
- SPOT 2.5m and 5m provides effective and efficient coverage between cities
- Ensure continuity in coverage and appropriate update cycles
SPOT Satellite – Viewing Capabilities

Scene Accessibility (26 days cycle) | # of scenes
--- | ---
HRV/HRG - +/- 31 deg incidence angle | 9 scenes (equator)  
13 scenes (45 deg latitude)
HRV/HRG – Nadir Viewing | 1 scene (equator)  
2 scenes (60 deg latitude)
SPOT Scene - Coverage

- 60x60km scene
- 2 cameras per satellite
- Total of 6 imaging cameras using all 3 satellites

Scene Requirements

<table>
<thead>
<tr>
<th>Coverage</th>
<th>SPOT5</th>
<th>Quickbird</th>
</tr>
</thead>
<tbody>
<tr>
<td>60x60km Scene</td>
<td>1</td>
<td>~15</td>
</tr>
<tr>
<td>30min frame</td>
<td>1-3</td>
<td>10-25</td>
</tr>
<tr>
<td>1x1deg geocell</td>
<td>7-9</td>
<td>~60</td>
</tr>
</tbody>
</table>
SPOT Ground Station Network

Main Stations
- EV SPOT 2/4/5
- EV I
- EV II
- EV III
- EV IV
- EV V

Current Deployment
- Mid 2006

<table>
<thead>
<tr>
<th></th>
<th>Mid 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPOT2/4</td>
<td>10</td>
</tr>
<tr>
<td>SPOT2/4/5</td>
<td>17</td>
</tr>
<tr>
<td>TOTAL</td>
<td>26</td>
</tr>
</tbody>
</table>
FORMOSAT-2

- Owned by NSPO (National Space Program Office), Taiwan
- Satellite, instrument & bus designed and manufactured by Astrium
- Designed to answer monitoring with high revisit frequency needs
  - 24km Swath
  - 2m Pan, 8m Multispectral
  - Daily revisit frequency

<table>
<thead>
<tr>
<th>Band</th>
<th>Res. (m)</th>
<th>Spectral (μm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pan</td>
<td>2m</td>
<td>0.45~0.90</td>
</tr>
<tr>
<td>MS</td>
<td>8m</td>
<td>0.45~0.52 (Blue)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.52~0.60 (Green)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.63~0.69 (Red)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.76~0.90 (NIR)</td>
</tr>
</tbody>
</table>

- Successful Launch on May 20, 2004
- Began commercial operation in 2005
- SPOT is Exclusive Worldwide Distributor
Formosat-2 Revisit Capabilities

- 14 fixed orbits / day
- Consistent daily revisit over the same corridors of visibility
- Design to perform Daily Monitoring
- Recorder, 8 minutes/orbit capability

Coverage with +/- 30 ° tilt (GSD < 2.88 m)

Coverage with +/- 45 ° tilt (GSD < 5.17 m)
Harris Evaluation of F2 vs SPOT 5 Data
Washington DC

F2 pan + xs merge, resampled to 2 M
How do I search for archive data?

- **www.spot.com, select “Online Catalogue”**
  - Register & get a user ID and password
  - You now have NIPRNET access to the SIRIUS catalogue. Do archive searches in the privacy & comfort of your own office.

- **Call us direct, 703-715-3100. Give us the search parameters and we will return results as you like (.kml files, .jpg views, shape files, stick drawings, Excel, quick-looks).**

- **We do (almost) 24/7 service for emergencies**

- **Call NGA Source**

- **Go to the CSIL via SkyMedia and search for Title 50 holdings of SPOT data**

- **We are not in the UNIL, because our data is not in NITF format—March 2007, some limited data now?**
How do I obtain data?

- Buy from NGA/SPOT Master Contract—Managed via NGA/Source
- Search & download from CSIL
- Download from our .ftp site, if it’s licensed for Title 50 and we have it in house
- April 2007—Web based archive for access by defense/intel customers to peruse for Title 50 and single user licensed data.
- If you need sample data to evaluate for any project under consideration-just ask!
Our Mission: Maintain a Robust Archive
A day of SPOT Collection
SPOT 5 Operational Goal—Continuous Operations
Collect & Maintain the Most Robust Archive Possible

SPOT 2.5m Panchromatic - Less than 10% Cloud Cover
January-December 2006
Reference3D
Commercial DTED2 Offering
Reference3D – Program Overview

- Unique commercial DTED program
- No equivalent in the commercial marketplace
- HRS instrument co-funded by SPOT Image and French government

- Dedicated Stereo Sensor (HRS)
- Wide area “Along-Track” stereo-pair collect, 120 by 600 KM strips
- All processing done without the use of ground control points (GCPs)

- Absolute horizontal accuracy 15 M CE90
- Absolute vertical accuracy 10-30 M LE90
- Meets NGA DTED level 2 specifications
- Dedicated SPOT Image/IGN production line
- 5 year collection plan, will renewed in 2008 for 5+
- Focused on large area collection

- Expected 30M+ km² (2002-07), additional 70M km² during next 5 years (2008-13)
Reference3D and Data Archive
Status as of March 2007

Reference3D Produced Off-the-shelf GeoCells 1,899
Validated HRS Stereo Pair Area Coverage 105,972,268 km²
Web Operations
Services

- SPOT Online Access, operational April 2007
Services (Continued)

- Incorporating new Google technology for a richer user experience
Services (Continued)

- Google .kml/kmz encapsulated files for display and decision support
Services (Continued)

- Google .kml files for archive data search and portrayal of results in a valid context
What Are the Bottom Lines?

- Medium resolution, yet very broad area coverage
- Active satellite operations, 365 days/year. Archive brimming with current data.
- Ongoing 1 arc-second DEM production program
- Access to non-US remote sensing satellite data (SPOT plus others)
- Comparable in some respects to Landsat data
  - Yes—Multispectral, near IR band, panchromatic, large footprint, continuous operation, large archive
  - No—Smaller footprint than TM, fewer MS bands, more expensive, higher resolution, pointable, higher repeat rate over a given target