Space Support Element, A Commander’s Situational Awareness Resource

MAJ Donald L. Thomsen III
Senior Space Operations Officer

5 April 2011
Agenda

Commercial Imagery
- Premobilization Support for Contingency Operations
- Exercise Support
- CONUS Defense Support to Civil Authorities, Disaster Response
- OCONUS Disaster Response and Google Earth

Space Weather Impacts on Operations
- OCONUS, 29ID Iraq AT Exercise Example
- CONUS, Recent Spaceweather

GPS Precision and Jammer Effects on Operations

Summary

Thomsen, DL III
Commercial Imagery

- Current NGA contracts with Ikonos-2, Quickbird-1, and Worldview-1 and -2.
- Daily Overflights
- Shareable with multinational partners
Calculated Overflight Schedule for Arlington, VA over a two day period, 3-4 OCT 10.

Available Satellites:

<table>
<thead>
<tr>
<th>3 OCT 10</th>
<th>4 OCT 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worldview 1</td>
<td>Worldview 2</td>
</tr>
<tr>
<td>Quickbird 2</td>
<td>Worldview 1</td>
</tr>
<tr>
<td>Ikonos 2</td>
<td>Ikonos 2</td>
</tr>
<tr>
<td></td>
<td>GeoEye 1</td>
</tr>
</tbody>
</table>

All Overflights in the late morning
Weather dependent.

Calculations made with Satellite Toolkit, www.stk.com

Thomsen, DL III
Premobilization Situational Awareness

Sharing Timely Information to Deploying Staff

source: Army Geospatial Center Imagery Office

Thomsen, DL III
3D Timely Terrain Orientation

Arcscene 3D: CIB5 draped over DTED2

Thomsen, DL III
Kabul, AF from SSW looking NNE

ArcScene 3D: CIB5 draped over DTED2

To Bagram
To Jalabad, Kyber Pass
To Kandahar
To Gardez

Thomsen, DL III
Archival Commercial Imagery For Exercise Support

Panamax, 29ID CFLCC Space Support Element with 1st Space BDE Army Space Support Team, production capability

Examples:
Great Swan Island G5’s planning for amphib. assault

IDP Camp #4, G4 logistical planning

30 commercial imagery maps shared amongst staffs from G1-G9

MDMP Resource, shareable with multinational partners

Thomsen, DL III
USGS obtains commercial imagery: supporting recent disasters:

- Dissemination by NIPR site (http://hdds.usgs.gov)
- WIDS Brite/IBS dissemination

Point of Contact, Ms. Brenda Jones, 24/7
OCONUS Disaster Response
Google Earth showing USGS Products

Thomsen, DL III
Radarsat-2 on Google Earth

Hachinone Port, NE Japan
After Tsunami, MAR 11

GeoEye-1

Radarsat-2

Thomsen, DL III
Commercial Radarsat: Up and Coming

- RADARSAT-1 and 2
  TERRASAR-X
  COSMO-SKYMED-1, 2, and 3

- Day/night

- Twice Daily
  Overflights (dawn/dusk)

- Used for Japan
  Earthquake Response,
  picked up edge of
  Tsunami damage

Thomsen, DL III
Commercial Imagery Archive: NGA uWarp

Supporting map data: NGA Geospatial Data Navigator, GIS information layers

Army Geospatial Center: archival commercial imagery, maps, geopdfs, and shapefiles, including DAGR maps.

USGS archive of domestic commercial imagery and maps.

OCONUS: Commercial Imagery Team, CENTCOM J2-Collection Manager

Thomsen, DL III
Increasing Solar Activity: Operational Impacts

- UHF SATCOM Forecast 22-24AUG10 for SW Asia
- 29ID TACSAT will have temporarily degraded or total loss of UHF radio communications forecasted from 23AUG10-26AUG10 during night time hours due to moderate scintillation.
- **Other bands that will be affected are L-Band** which are used for GPS, SATPhone (Iridium, Thuraya, and INMARSAT), and FFT. **S-Band (satellite uplinks)** will also be affected.

Prediction capabilities increasing from 3 days towards 4-5 days. Example: Proactive vs. reactive for planning primary and alternate communications important for C2 Exercise

Thomsen, DL III
Spaceweather and UHF Communication

Temporarily Degraded or Total Loss of UHF in CENTCOM region: UFO-7, UFO-2, and UFO-10

16:00Z

18:00Z

20:00Z

Exercise

Thomsen, DL III
GPS Performance and Jammer Predictions

GPS performance prediction

4 Best PDOP for 29ID AO from 24 AUG 10 0000Z – 25 AUG10 0000Z is 2.0-2.5, using GIANT, GPS Interference and Navigation Tool, source: 29ID Space Support Element. Forecasted PDOP shows minimal dilution of precision for the AO, figure 1.

GIANT can also predict GPS performance with terrain masking and interference/jammer effects. It can predict GPS performance over an area, along a route, or at a point. It is an excellent planning tool for missions that depend on GPS.
Summary

- Space support adds to situational awareness
- Commercial imagery: increasing availability and shareable.
- Spacewx weather forecasts supports predictability of SATCOM performance
- GPS analysis tools forecasts precision and jammer effects