



Communications
Research Centre
Canada

An Agency of
Industry Canada

Centre de recherches
sur les communications
Canada

Un organisme
d'Industrie Canada

Overview of MEOSAR System Status

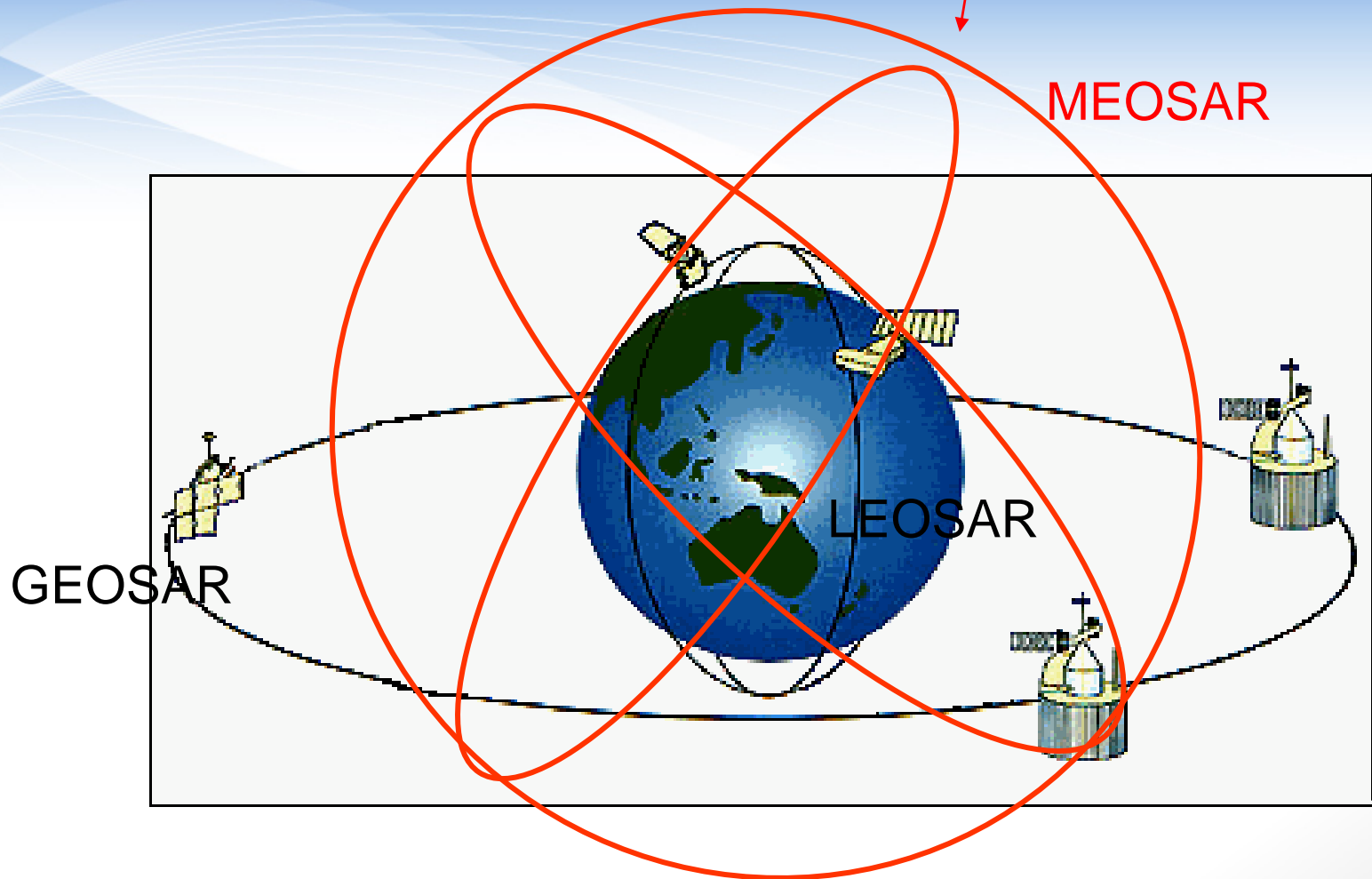
Presentation to BMW-2009

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Communications Research Centre Canada – CRC

8 May 09

SAR payloads on satellites in Medium Earth Orbit (~20,000km)



Overview of International MEOSAR System

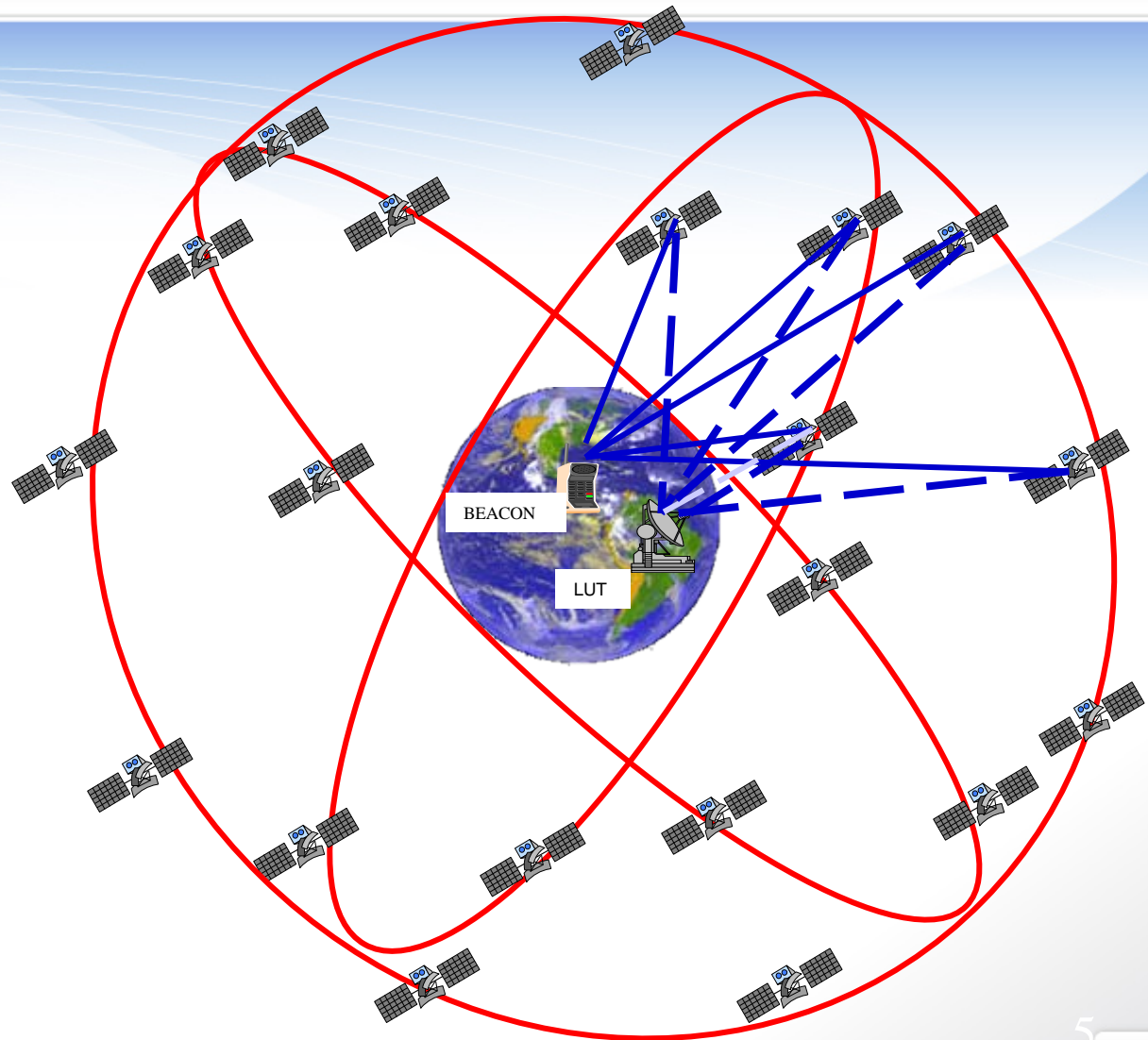
- MEOSAR system will be next generation Cospas-Sarsat system
- Medium Earth Orbit (MEO) is good for satellite Search and Rescue (SAR) coverage
- Navigation satellite constellations are in MEO orbit (~20,000 km), compared to LEOSAR (1,000 km) or GEOSAR (36,000 km)
- Elements of MEOSAR system being developed by various players:
 - Space Segment (GPS, Glonass & Galileo)
 - Ground Segment (USA, Canada, Europe, Russia, China, India...)
 - Beacons: existing 406 MHz beacons will work with MEOSAR, but studies underway to improve future beacons

Comparing LEO & MEO Footprints



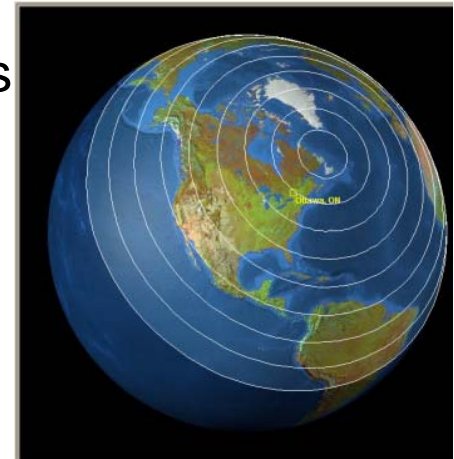
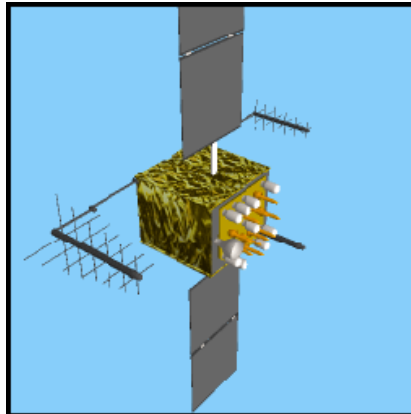
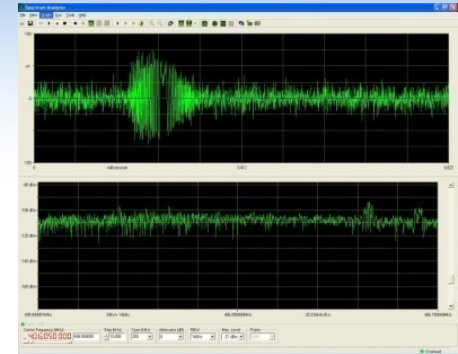
Multiple MEOSAR Satellites

- Many satellites in constellation
- Beacon sees multiple satellites simultaneously
- Less impact by local blockages
- *Reception by MEOSAR more likely* (but weaker signal than LEO)

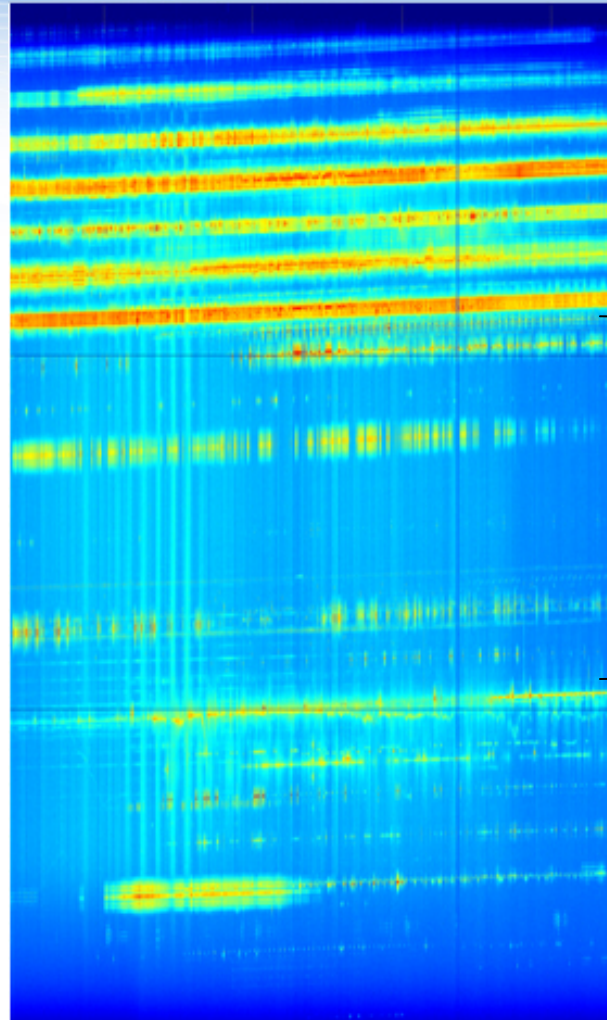


Overview of Canadian MEOSAR Activities

- Develop a MEOSAR payload (Eng Model)
- Monitor Spectrum of 406 MHz band via satellite
- Server for Networking MEOLUTs
- System Studies (coverage & geometry of satellites)
- Operate MEOLUT to conduct MEOSAR tests using experimental payloads on some GPS-BIIL satellites



Spectrum Monitoring – Part of Satellite Pass



Adjacent channels

100 kHz SAR band

Adjacent channels

Time (~1 hr)



CRC Antenna farm and MEOLUT site – and connected to UK MEOLUT



3 MEOSAR antennas

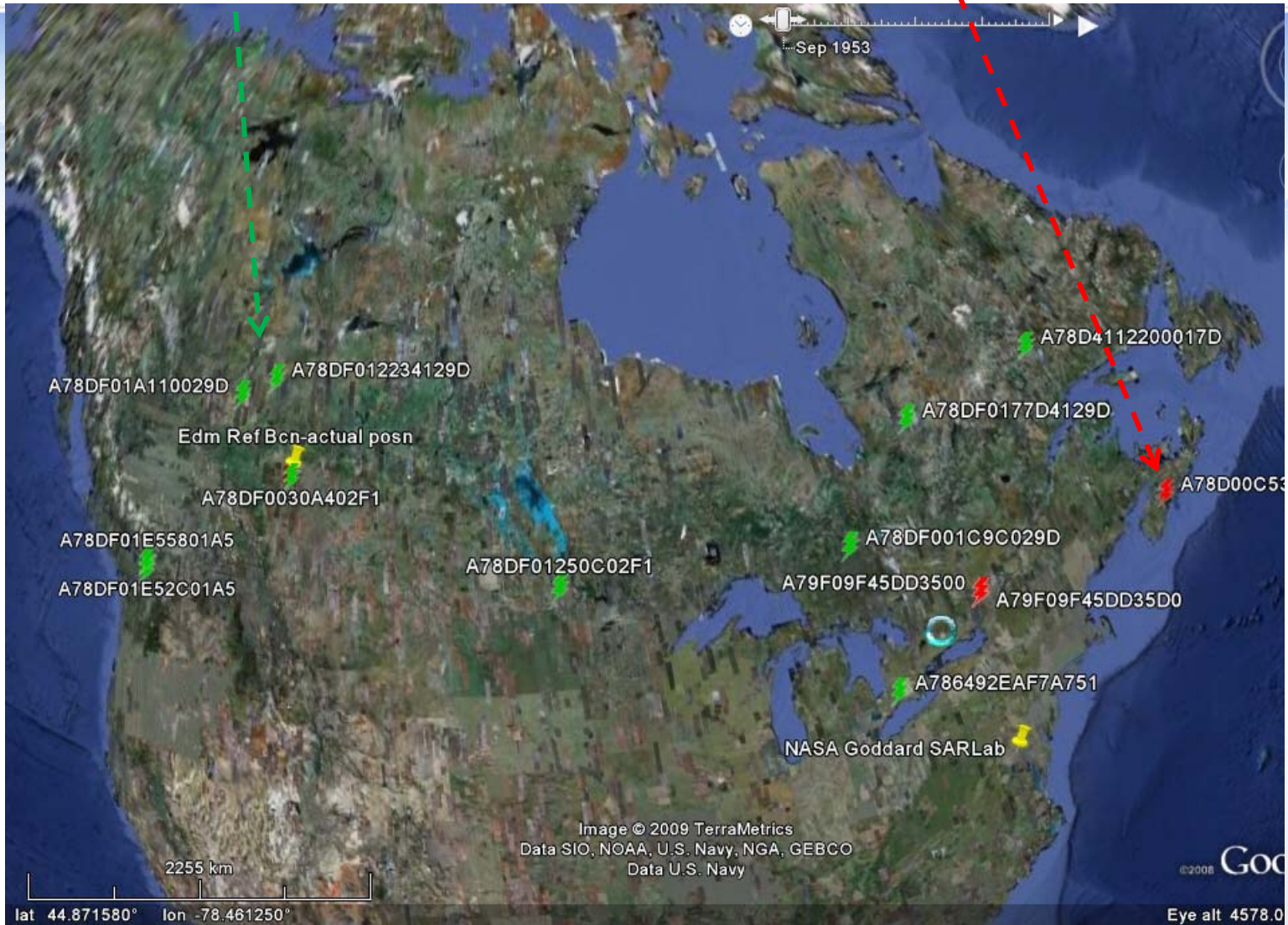
3 GEOSAR antennas



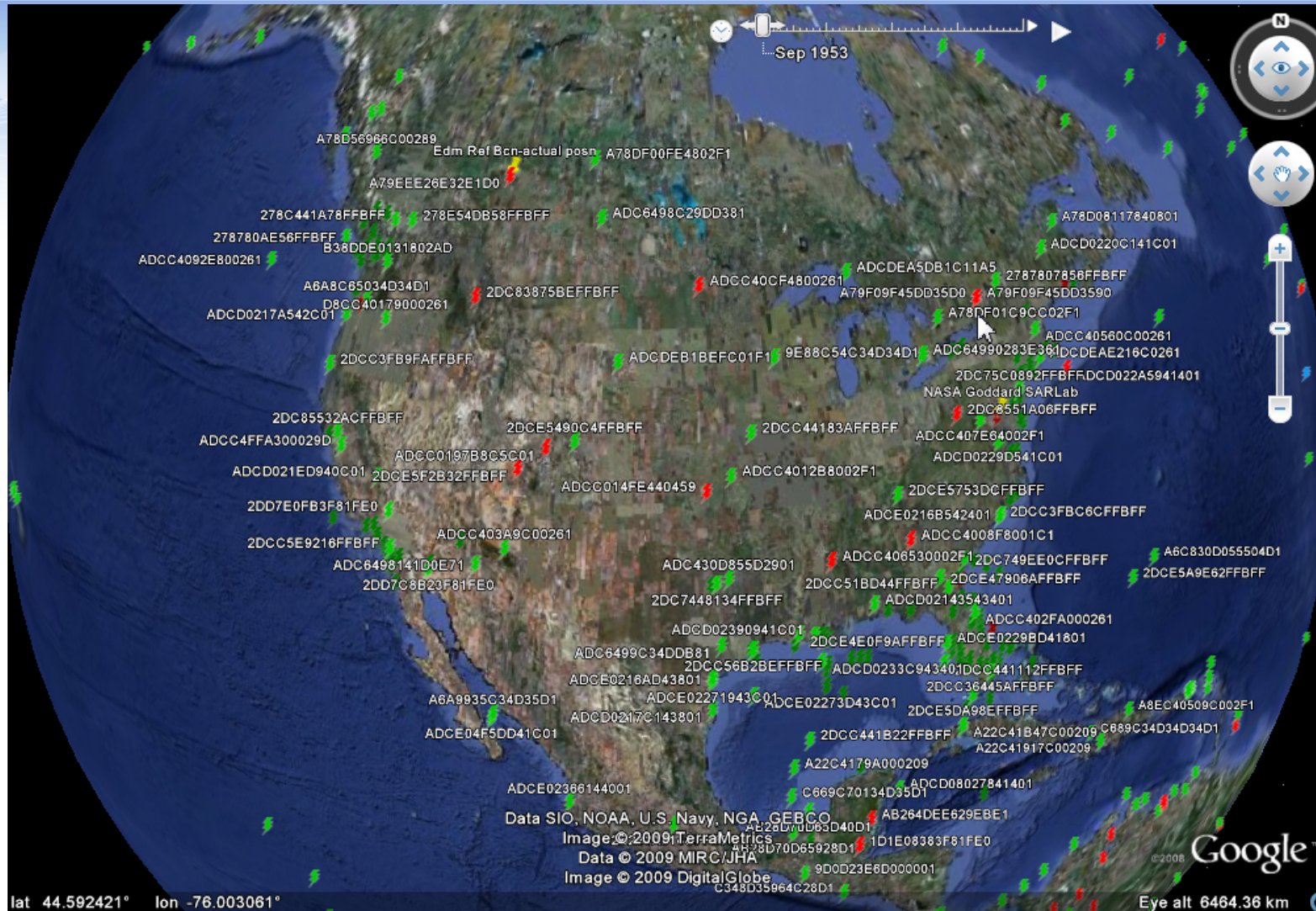
Canadian MEOLUT “Detect Only” coverage area at any instant is huge (illustrated for only 5 MEO satellites)



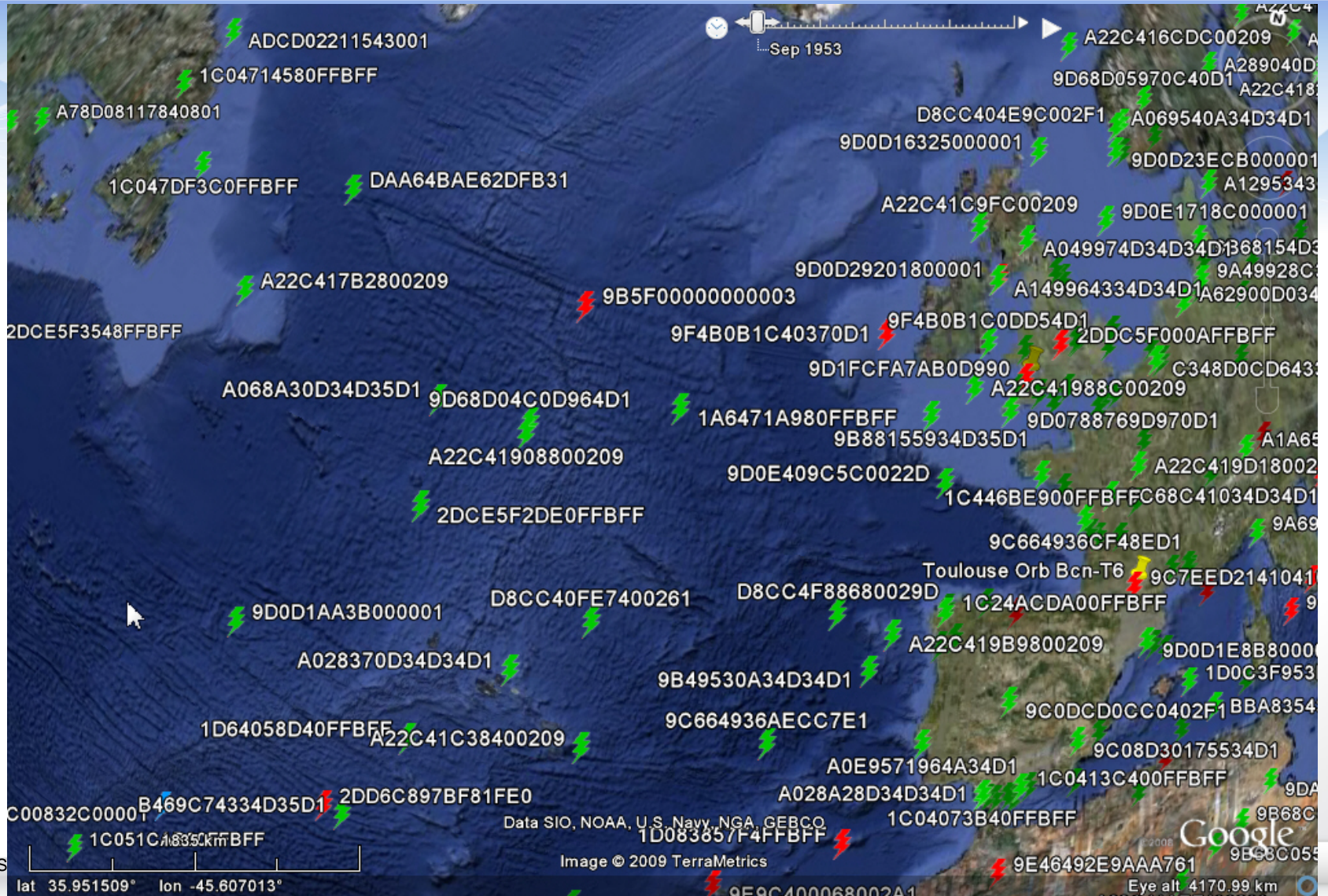
MEOLUT routinely locating & decoding beacons (green= self-test bursts red = normal beacons)



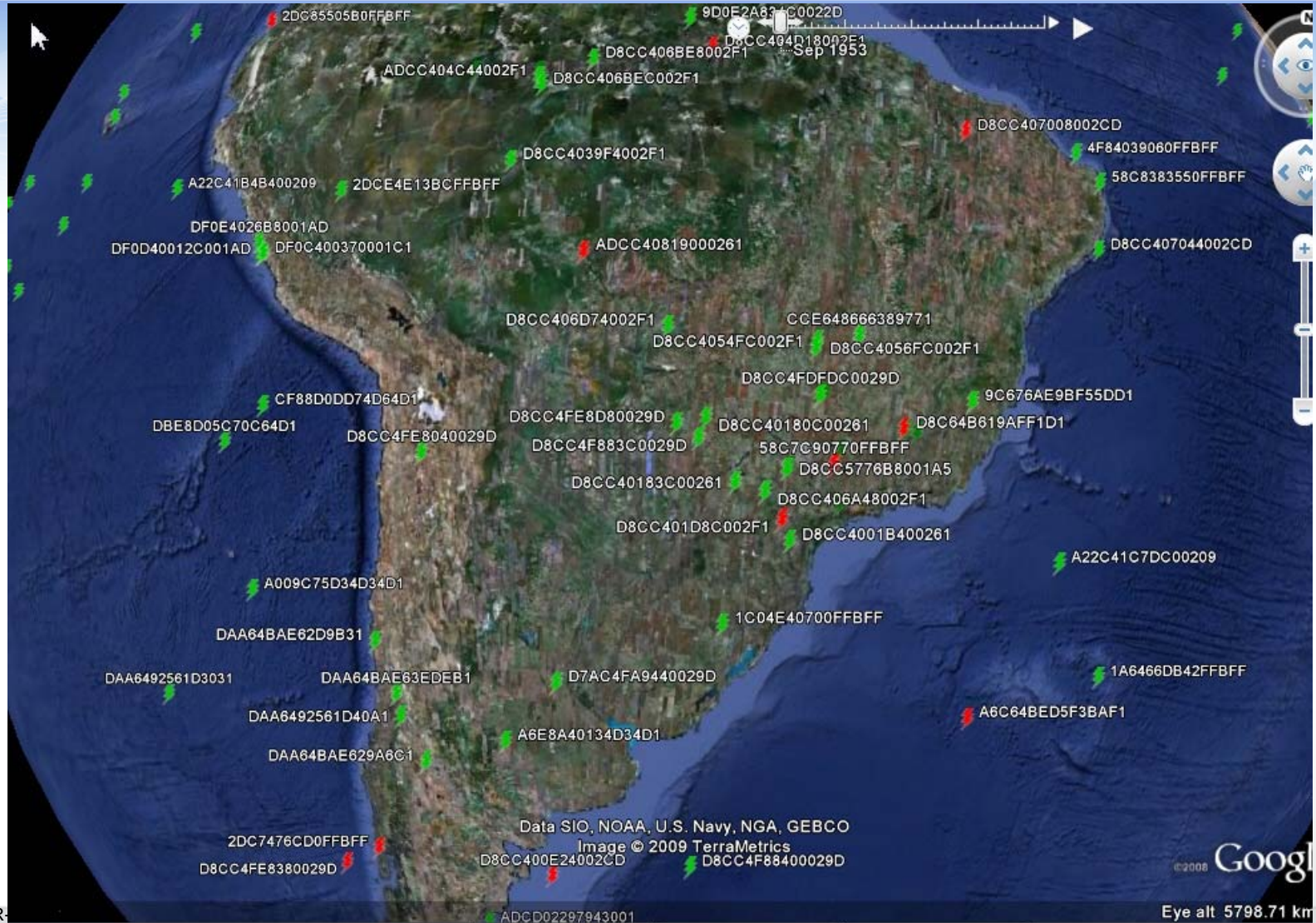
Canadian MEOLUT coverage (with MEO + GEO satellites) North & Central America (actual beacons, most are self-tests)



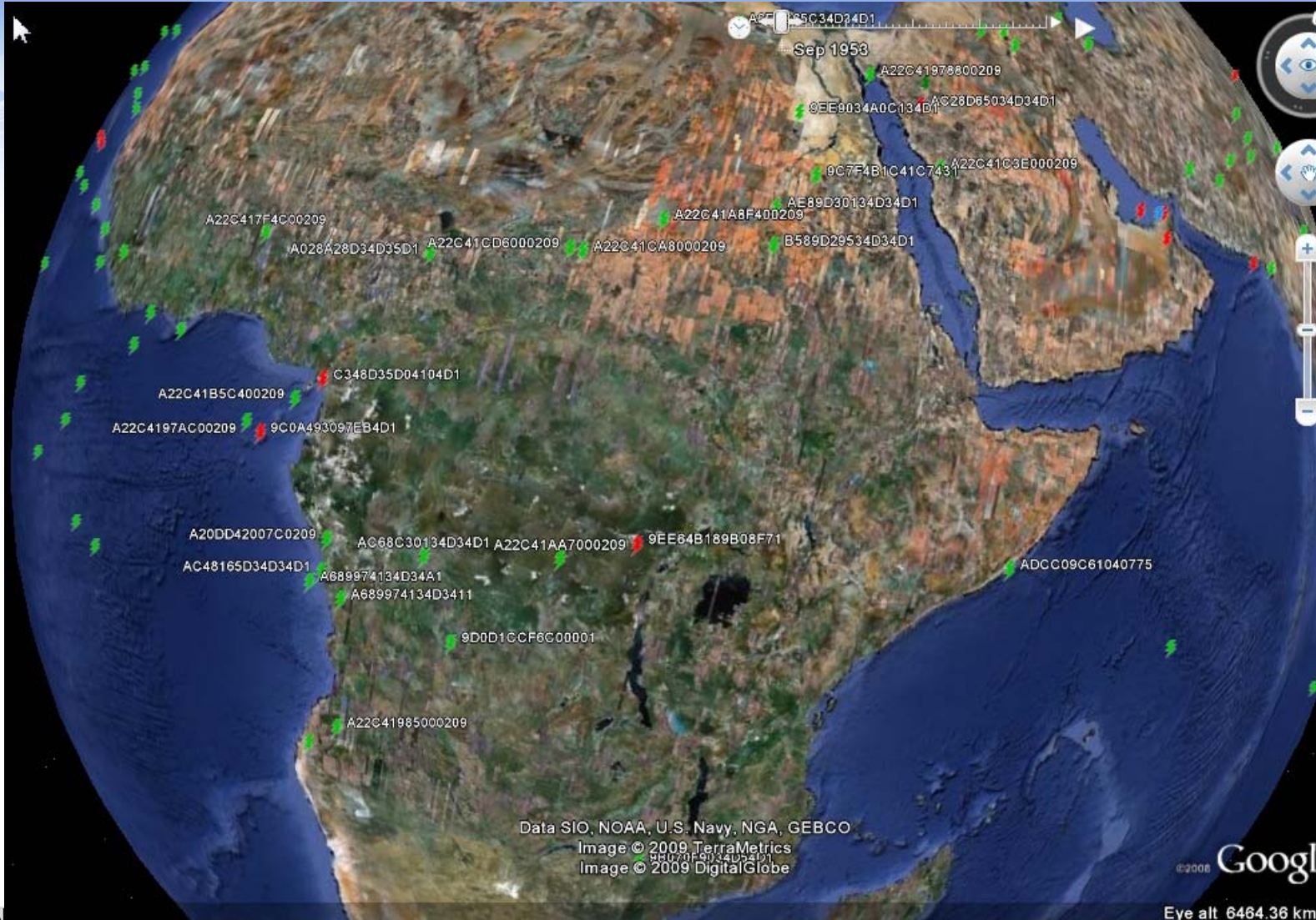
Canadian MEOLUT coverage (with MEO + GEO satellites) North Atlantic / Europe (actual beacons, most are self-tests)



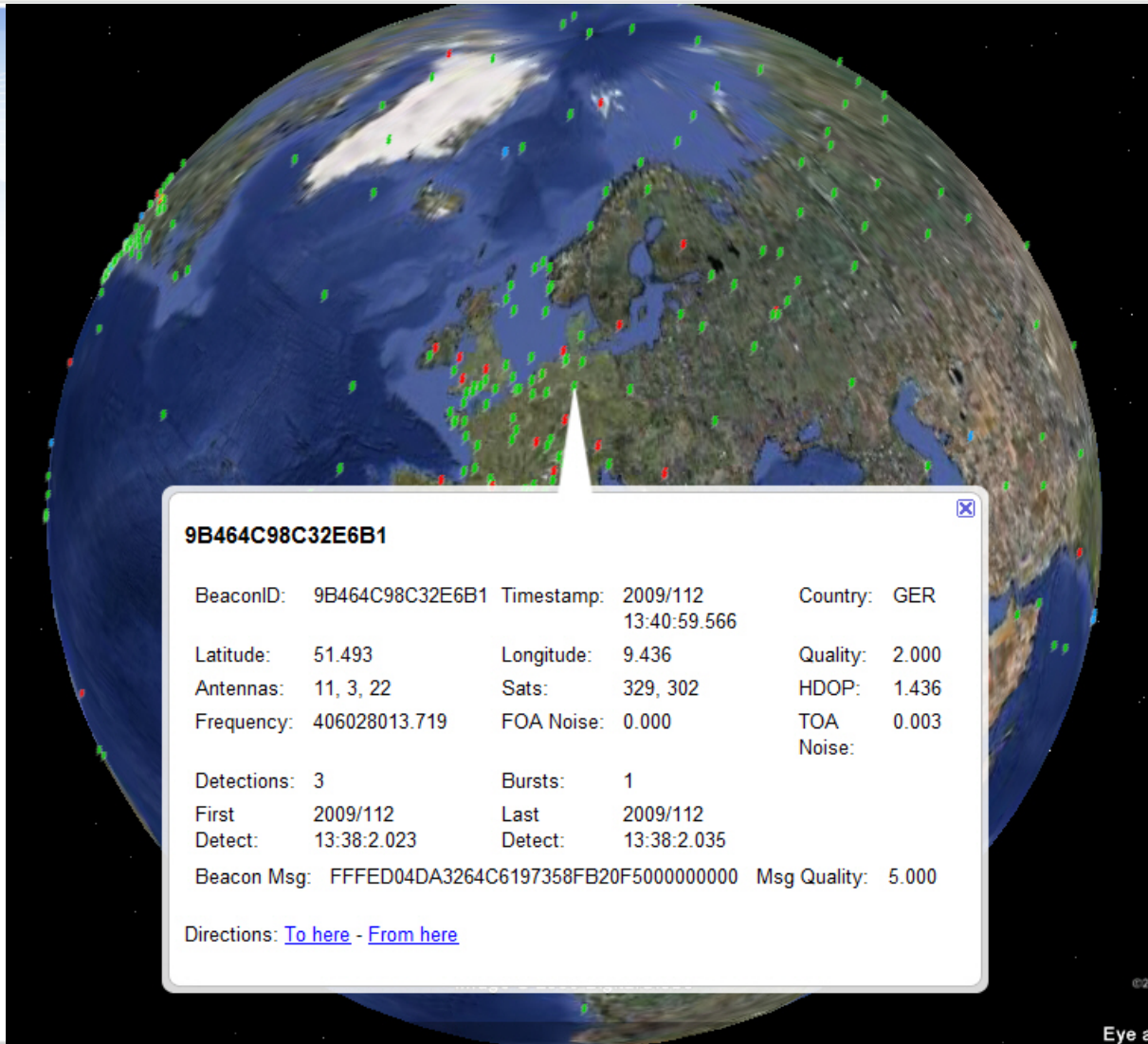
Canadian MEOLUT coverage (with MEO + GEO satellites) South America (actual beacons, most are self-tests)



Canadian MEOLUT coverage (with MEO + GEO satellites) Africa (actual beacons, most are self-tests)



Additional details of German Beacon self-test





Real beacons detected in past 24 hr

Google Earth interface showing a map of the North Atlantic region. A SnagIt Video Capture dialog box is overlaid on the map, displaying the following information:

SnagIt Video Capture

Capture Statistics

Captured Frames:	0
Dropped Frames:	0
File Size:	0
Video Length:	0 Seconds
Capture Length:	0 Seconds

Capture Properties

Frame Size:	1280 x 772
Frame Rate:	12.0 frames/sec
Colors:	True Color
Compression:	Microsoft Video 1
Record Audio:	Disabled

Buttons: Start, Stop, Resume, Cancel

Press <CTRL><SHIFT><P> to stop video capture

Map coordinates: lat 7.832174° lon -129.455512°

Image © 2009 TerraMetrics
Image © 2009 DigitalGlobe
Data U.S. Navy

©2008 Google™

Eye alt 11001.00 km

Real and Self-Test Beacons in Past 24 hr

The screenshot shows the Google Earth interface with a world map. A SnagIt Video Capture dialog box is open in the center, displaying the following information:

SnagIt Video Capture	
Capture Statistics	
Captured Frames:	0
Dropped Frames:	0
File Size:	0
Video Length:	0 Seconds
Capture Length:	0 Seconds
Capture Properties	
Frame Size:	1280 x 772
Frame Rate:	14.0 frames/sec
Colors:	True Color
Compression:	Microsoft Video 1
Record Audio:	Disabled

Buttons: Start, Stop, Resume, Cancel

Press <CTRL><SHIFT><P> to stop video capture

Map details: lat. 2.340255° lon -169.942884°
Image © 2009 TerraMetrics
Data U.S. Navy
Eye alt 11001.00 km

SnagIt Video Capture

Capture Statistics

Captured Frames:	0
Dropped Frames:	0
File Size:	0
Video Length:	0 Seconds
Capture Length:	0 Seconds

Capture Properties

Frame Size:	1280 x 772
Frame Rate:	12.0 frames/sec
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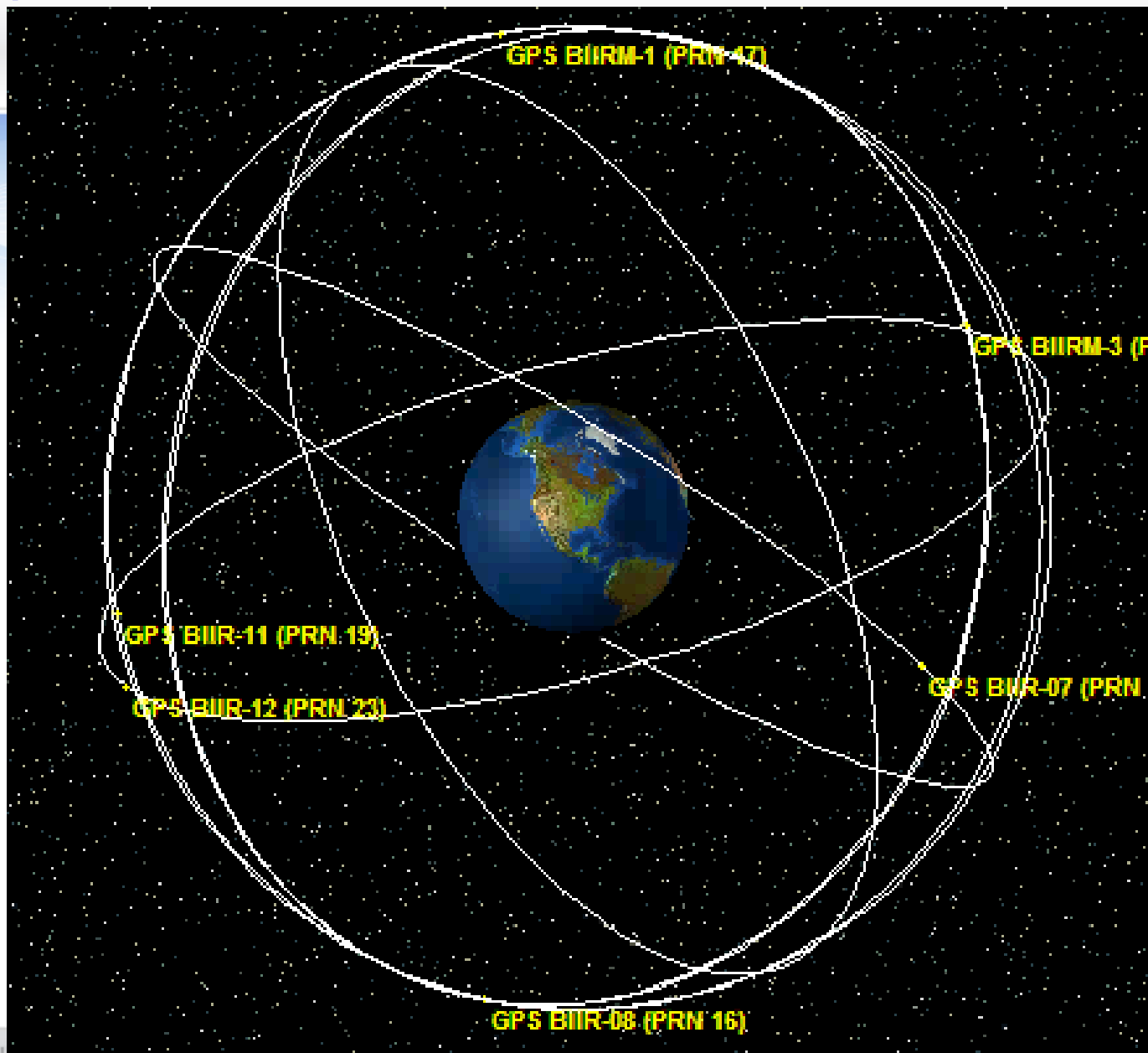
Buttons: Start, Stop, Resume, Cancel

Map Coordinates: lat 27.056418° lon -82.121821°

Map Text: Data U.S. Navy, © 2009 Tele Atlas, © 2009 DMapas, © 2009 Europa Technologies

Map Footer: © 2008 Google, Eye alt 10149.25 km

Experimental MEOSAR on 9 GPS Satellites Today



Conclusions

- Preliminary MEOSAR test results very encouraging
- System will improve with more satellites & MEOLUTs
- More MEOLUTs coming online this year
- Development continues and international testing ongoing

