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# **Global Positioning System Operations Status**

## **CGSIC**

*18 September 2012*

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# *Overview*

- **Who We Are**
- **Constellation Status**
- **Control Segment Status**
- **User Segment**
- **Significant Awards**
- **Summary**



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# Who We Are

## 2d Space Operations Squadron Mission

To provide positioning, navigation, timing effects, nuclear detonation detection, and launch, anomaly resolution, disposal operations by operating and maintaining the Global Positioning System satellite constellation and dedicated ground network.

### Motto

“On Time On Target”





# Who We Are

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- **2d Space Operations Squadron**
  - 113 Personnel
  - Operators, Engineers, Analysts, Maintainers, Cyber Professionals
- **19 SOPS reserve squadron partner with 2 SOPS**
  - Launch, Anomaly and Disposal Operations
  - Modernization continuity and subject matter expertise
  - Fully integrated into 2 SOPS mission
  - Maintain certified operators in all crew positions
- **5 Crews conducting GPS operations**
  - 7 Military & 1 Civilian
  - Navigation Warfare Officer (NWO) on-call
- **AF Technical Application Center (AFTAC) Det 46**
- **GPS User Operations Center (GPSOC)**



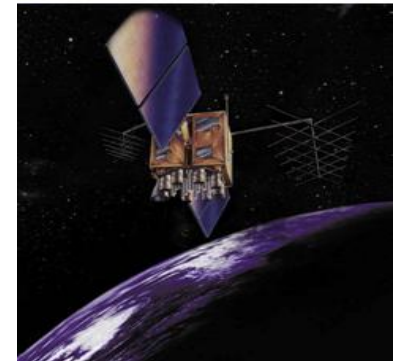


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# Constellation Snapshot

**31 Operational Satellites**  
(Baseline Constellation: 24)

- 10 Block IIA satellites operational
- 12 Block IIR satellites operational
- 7 Block IIR-M satellites operational
- 2 Block IIF satellites operational
- U.S. Government continuously assessing constellation health to determine launch need
  - Newest satellites launched
    - IIF-1/SVN 62 – 27 May 2010
    - IIF-2/SVN 63 – 16 July 2011
  - IIF-3 launch scheduled for 04 Oct 2012
- Global GPS civil service performance commitment met continuously since 1993







## ■ **Architectural Evolution Plan (AEP)**

- Day-to-Day command and control of 31 Satellites
- 4 Dedicated Ground Antennas and AFSCN Capability
- 6 Dedicated and 10 NGA Monitor Stations
- Operating on version 5.8.1:
  - SAASM fidelity upgrade
  - Crypto upgrades for Dedicated Ground Antennae

## ■ **Launch, Anomaly and Disposal Operations (LADO)**

- Day-to-Day command and control of 3 Residual SVs via AFSCN only
- State of health monitoring
- Leverage for some vehicle emergencies
- Launch prep and initial post launch operations



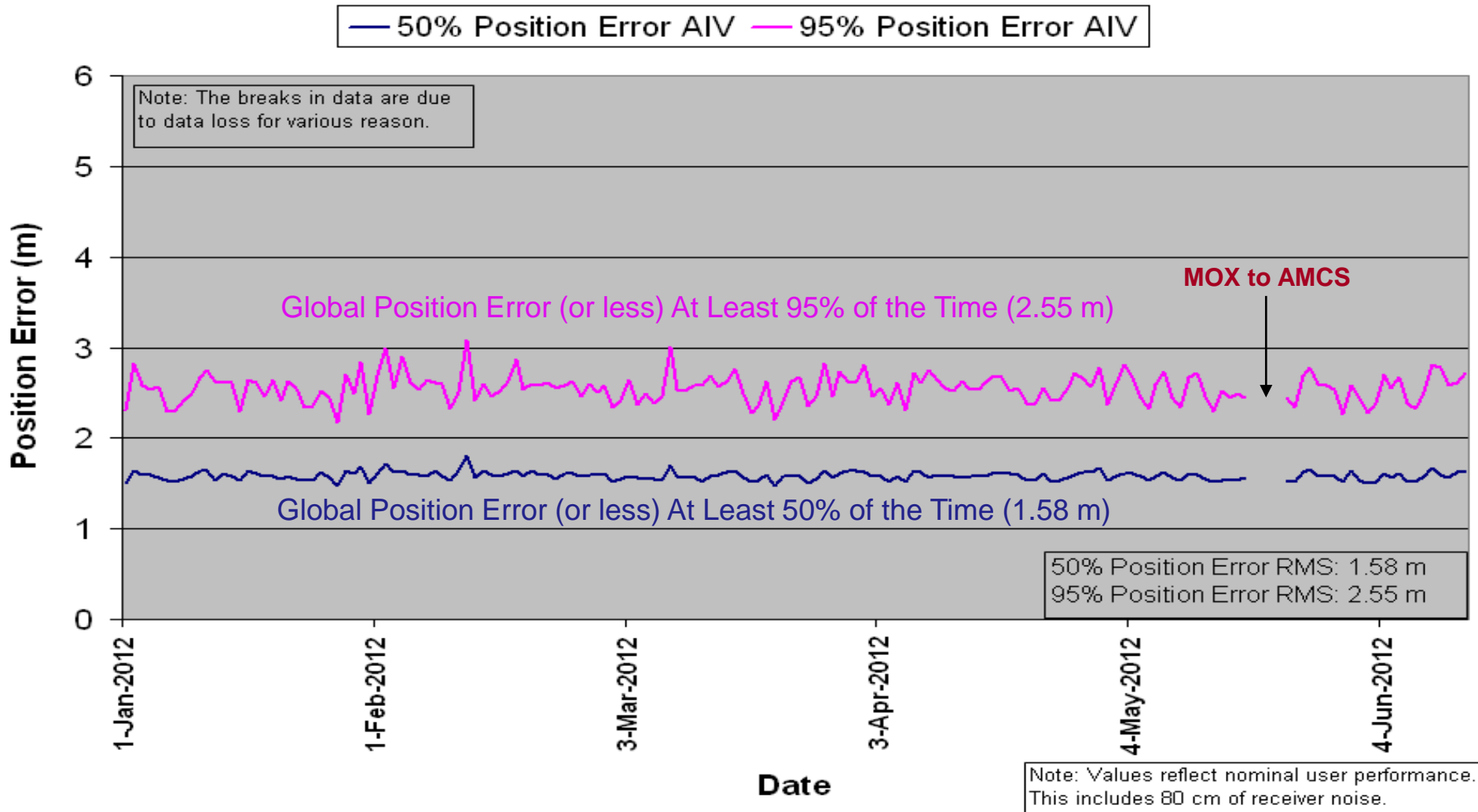


# Accuracy – All in View Solution

## GLOBAL GPS PERFORMANCE (1 Jan – 14 Jun 2012)

### Nominal User Performance

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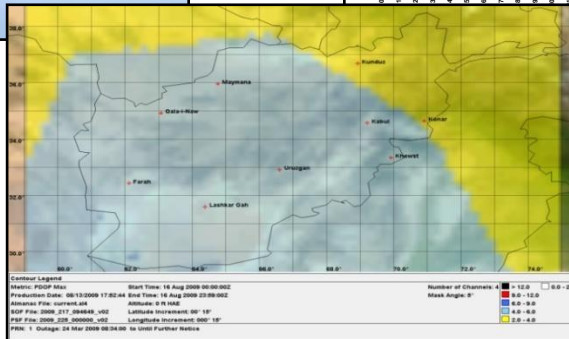
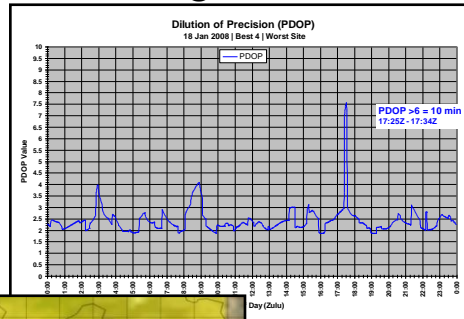




# User Segment: GPSOC

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- DoD's focal point for operational issues concerning military use of GPS
  - Constellation Ops
  - User Ops
- DoD's 24/7 interface to military and civil community
  - 911 for DoD GPS user emergencies
  - Supports FAA/NAVCEN in resolving civil user issues



### Military applications

- Force location
- Navigation
- Force employment
- Weapon guidance
- Satellite positioning
- Comm network timing
- Plus Many Others

### Civilian applications

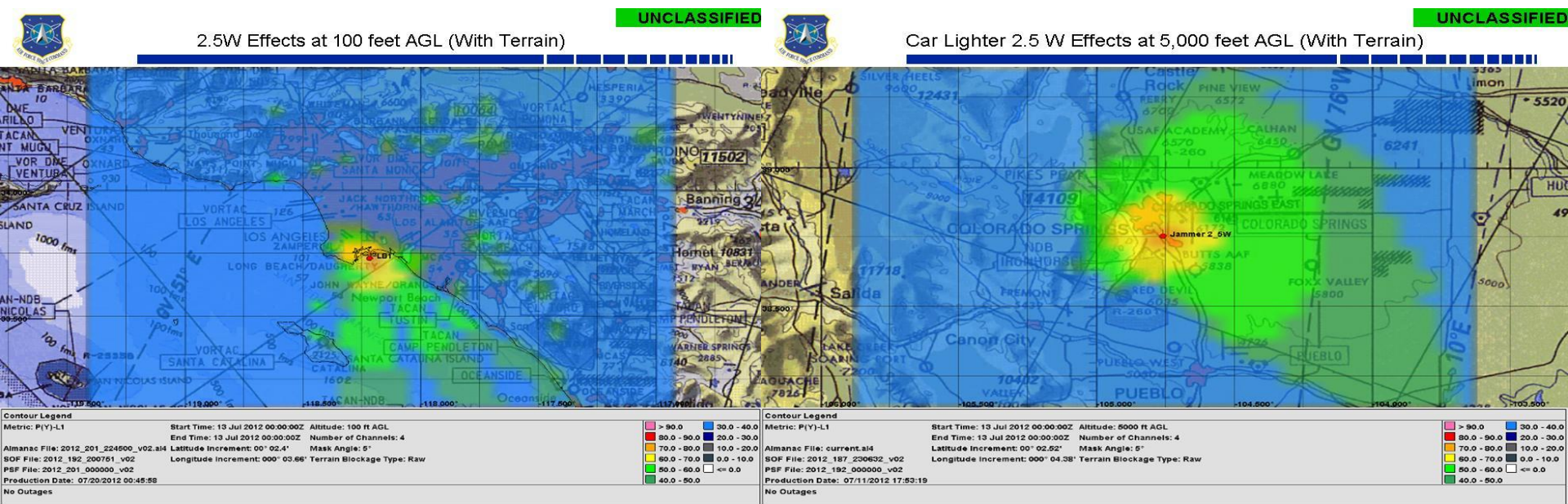
- Aviation / Civil Navigation
- Space Shuttle
- Search and Rescue
- Geodetic Measurements
- Drilling / Mining / Agriculture
- Commercial
- Plus Many Others



# Purposeful Interference Response Team (PIRT) Coordination

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- GPSOC staff coordinates with STRATCOM, DHS, NAVCEN, FBI, FCC, and FAA to prevent, detect and remove sources of intentional GPS interference across CONUS
- The GPSOC produced 51 jammer products highlighting both the capabilities and the potential impacts of these low power portable jammers
- Jammer to signal ratio products are now being run with terrain and future versions of GIANT being developed now will incorporate urban structures in support of the PIRT





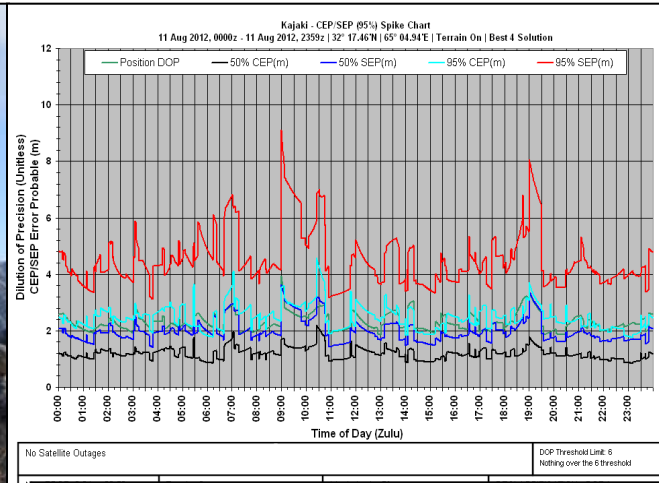
# Marines set GPS-guided record

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- The GPSOC provided circular error predictions, spherical error predictions, and position dilution of precision data to US forces to enable GPS-guided Excalibur strike
- In February 2012, Golf Battery, 2nd Battalion, 11th Marines, delivered a 155mm Excalibur round from an M777 howitzer on a mountainside in Kajaki, onto insurgents in neighboring Musa Qala district 36 kilometers away (more than 22 miles)
- This marks the longest operational artillery shot in history for the Marine Corps, and is also was the longest operational shot using the Excalibur round.



M777 Howitzer



CEP/SEP 50% / 95% Spike Chart for Kajaki



M982 Excalibur Round

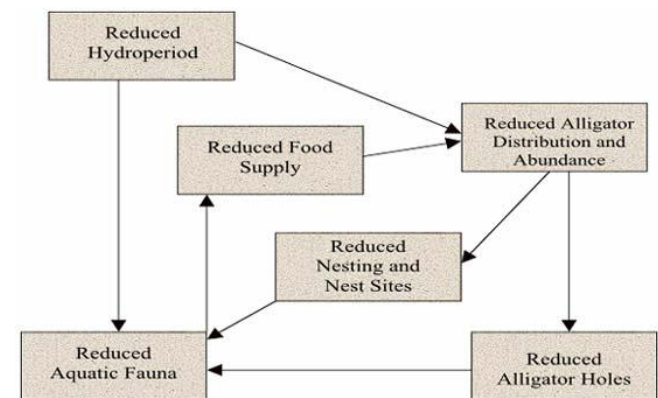
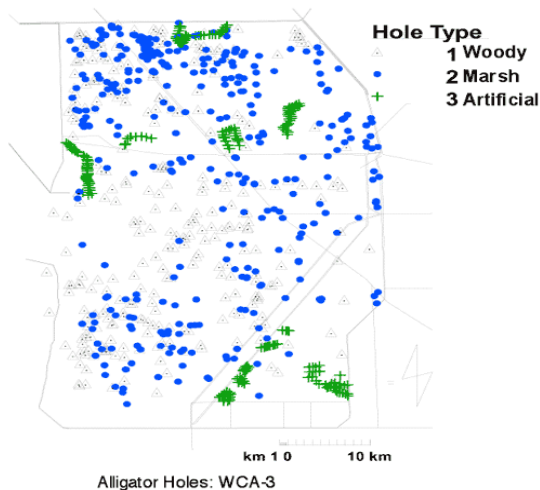




# GPS Tracked Alligator Holes

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- The National Fish and Wildlife Foundation in conjunction with the Everglades Agricultural Area Environmental Protection District conducted research to map hundreds of alligator holes using GPS
- GPS provided the capability to track the holes and map various distinctions of each based on vegetation, location, inhabiting organisms, and alligator territorial behavior.
- Alligator holes provide: water necessary for mating, acts as dry season refuge for aquatic organisms, concentrated area for birds and mammals to forage, provides soil enrichment, and overall increases the diversity of the everglades

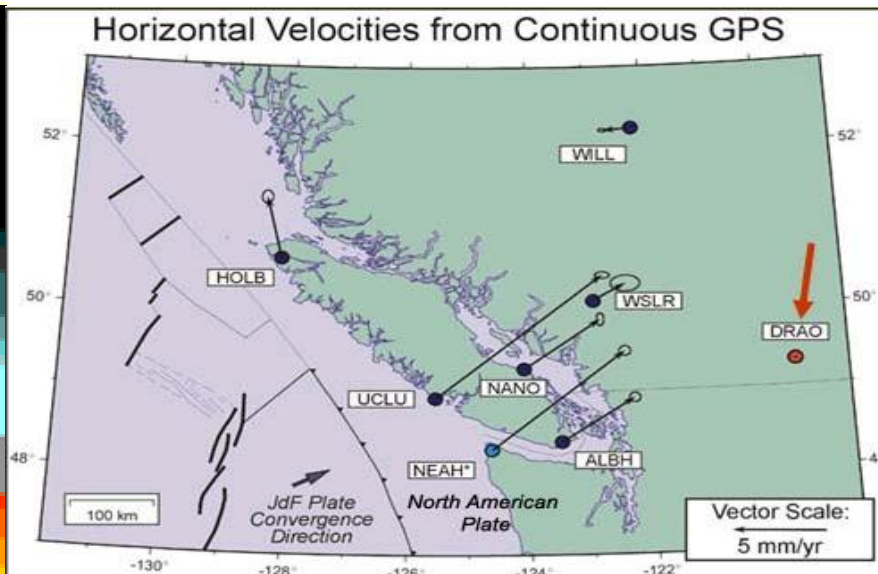
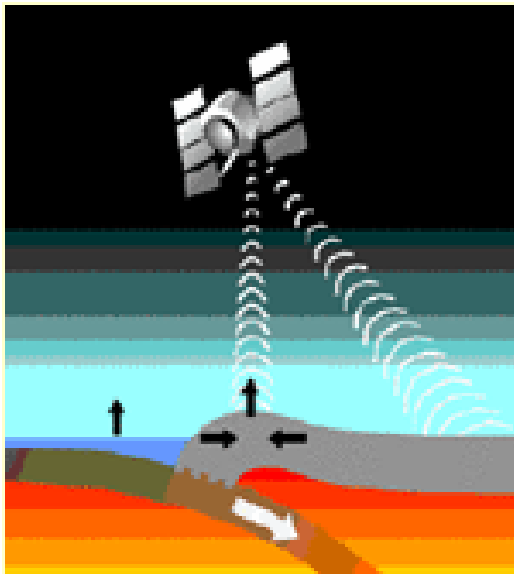




# Measuring Plate Tectonic Movements

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- Global tectonic plate movements can be measured using GPS as accurately as a few millimeters per year
- The Western Canada Deformation Array (WCDA) is a permanent GPS Tracker Network to investigate the seismic hazard in the Vancouver region
- Using these permanently installed GPS receivers, in conjunction with the GPS satellites, the relative motion of points on the Earth's surface can be monitored and measured.





# *Significant Awards/Recognition*

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- **2011 Air Force Chief of Staff Team Excellence Award**
    - GPS IIF-1 Total Force (2/19 SOPS, SMC/GP, Aerospace Corp) Satellite Launch and Early Orbit Team
    - Recognized for 22% increase in manpower efficiency and 60-day redux in launch-to-operational-handover timeline
  
  - **GPS Program recognized by the International Astronautical Federation in Oct 2011**
    - One-time 60th Anniversary Award
    - Recognized GPS as a singular/successful project in the field of Space Applications, Space Science and Exploration, which demonstrates measurable benefit to humanity
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# *Delivering the Best Space-based PNT*

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- ***Operating the gold standard in position, navigation & timing***
- ***Sustaining*** capabilities for civil and military users worldwide
  - Maintain on-orbit satellites, ground systems
- ***Modernizing*** constellation with new signals and capabilities
  - New civil and military GPS signals and control capabilities
  - Launch new satellites
- ***Managing*** GPS systems and supporting stakeholders



**Committed to responsible stewardship of GPS**





