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GICHD Fact Sheet for Mine Action

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Key Tips:

- Average accuracy for handheld GPS units is 10-15 meters, but better accuracy is now common.
- Position averaging is the easiest way to improve accuracy.
- Use WAAS and EGNOS, but only if you are within the proper coverage area.
- Using an external antenna will improve reception.

GPS Tutorial:

www.trimble.com/gps

Other References:

GPS World Online

www.gpsworld.com

GPS Information Resource

gpsinformation.net

Satellite Positioning Systems

Currently there are two operational systems, with a third one under development.

- GPS – Global Positioning System (USA). Operated by the U.S. military, it was completed in 1994 and is continually being upgraded.
- GLONASS – Global Navigation Satellite System (Russia). Similar to the U.S. GPS system, but not all satellites are currently operating. A few GPS receivers can read both GPS and GLONASS signals.
- Galileo (Europe). Global satellite positioning system designed to be independent of U.S. and Russian systems. The first test launch was in early 2006, and the goal is for the system to be operational by 2008

Some GPS FAQs

What are WAAS and EGNOS and can I use them? The U.S. and Europe have developed systems to improve GPS accuracy, especially for aircraft navigation. Japan is also planning a similar system. These systems are known as “satellite-based augmentation systems” (SBAS), and they improve GPS accuracy to 3 meters or better. SBAS services are free, and most handheld GPS units can receive WAAS and EGNOS signals. But, they are only effective within their areas of coverage.

- WAAS (Wide Area Augmentation System)
 - Covers the US, southern Canada, and parts of the Caribbean
 - Currently operational
- EGNOS (European Geostationary Navigation Overlay Service)
 - Covers Europe and parts of northern Africa and the Middle East
 - Planned to be operational in 2006

What is Differential correction? Differential correction (or DGPS) is a way to improve GPS readings by applying corrections from base stations to GPS units in the field. The correction signal can come from broadcast beacons, satellites, or your own base station. However, handheld GPS units have only limited capability to receive and apply DGPS.

When is DGPS accuracy needed?

- When returning to a previously surveyed point for which no ground marker exists
- When a precise survey is required by regulations or operating procedures
- For many or most field mapping activities DGPS accuracy is not necessary.

GPS Books

- Global Positioning System: Theory and Practice (4th ed.), B. Hofmann-Wellenhof, H. Lichtenegger, and J. Collins. Springer-Verlag, 1997.
- Introduction to GPS: The Global Positioning System, Ahmed El-Rabbany. Artech House, 2002.
- The Global Positioning System and GIS: An Introduction (2nd ed.), Michael Kennedy. Taylor & Francis, 2002.
- Understanding GPS: Principles and Applications, Elliott D. Kaplan (ed.). Artech House, 1996.

Contact Us

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What is DOP (Dilution of Precision)? DOP or PDOP is a precision measure that refers to the geometry of the GPS satellites - it varies over the course of a 24-hour period. DOP values range from 1 to 6 or higher. In general, a value of 3 or lower is desired for getting acceptable GPS accuracy. GPS mission planning software and web sites can give predicted DOP values for specific times and locations.

How accurate are handheld GPS units?

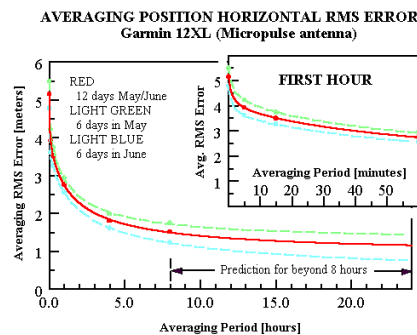
- In general, 10-15 meters (no DGPS, no averaging), but accuracies of 5 meters are now common.
- With WAAS or EGNOS: 3 meters or better

What Blocks the GPS signal?

- Buildings, trees, and even your body can block the signal from one or more GPS satellites
- GPS signals are not blocked by clouds, rain, or snow.

Operational Recommendations

Position averaging. Always use position averaging. The easiest and cheapest way to improve the accuracy of a GPS position is to average your position for several minutes or hours. Most handheld GPS units have the capability to average positions. The Humanitarian Demining Training Center (HDTTC) recommends averaging for 4 hours for benchmarks and 1 hour for turning points. HDTTC reports better than 1-meter accuracy when averaging for one hour or more. However, averaging for as little as 30 seconds will improve GPS positions.



As the graphic on the left shows, even averaging for as little as 5 minutes will improve GPS position significantly.

Antennas. In some cases, such as mapping from a vehicle or under trees, and external antenna will help reception. Remember that your body can block signals from one or more GPS satellites, especially if you hold the GPS unit close to your body, so an external antenna placed on your hat or shoulder may also help.

Forested areas (or other difficult reception areas). "Lock in" your GPS position in an open area that is free of obstructions and then navigate into the forested area while leaving the GPS turned on.

WAAS and EGNOS. Use WAAS or EGNOS corrections, but only if you are located within the area covered by those systems (see above). Otherwise, turn it off.

Datum. In most cases, you should record GPS locations using the WGS 84 datum (the standard datum for GPS). If you use a different datum, be sure to document it.