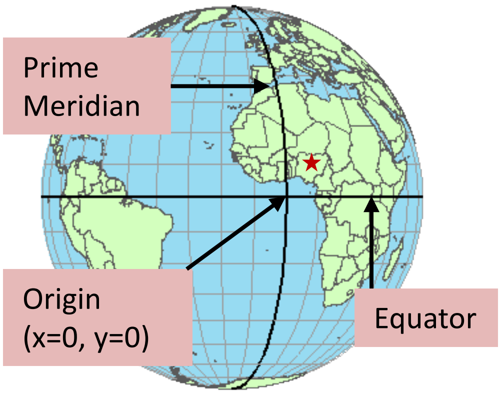
Common types of coordinates collected with a GPS receiver:

"Lat/Long"

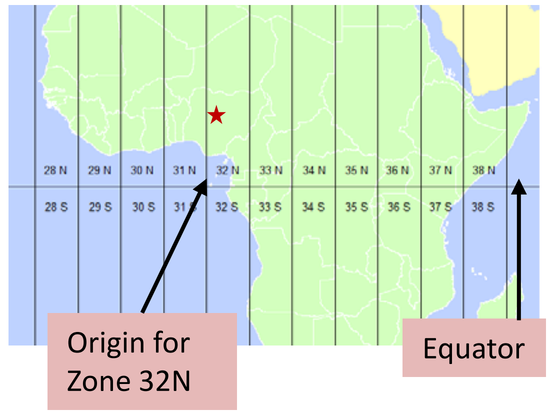
Latitude and Longitude (measured in degrees N, S, E, or W from origin)



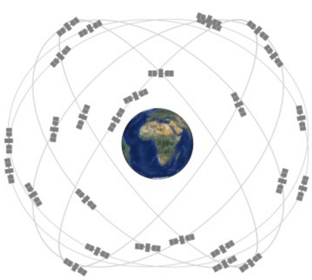
★**Abuja, Nigeria:**
9.05129° N, 7.48482° E
or 9°03'07" N, 7°29'08" E

"UTM"

Universal Transverse Mercator (measured by Zone, in meters from origin)

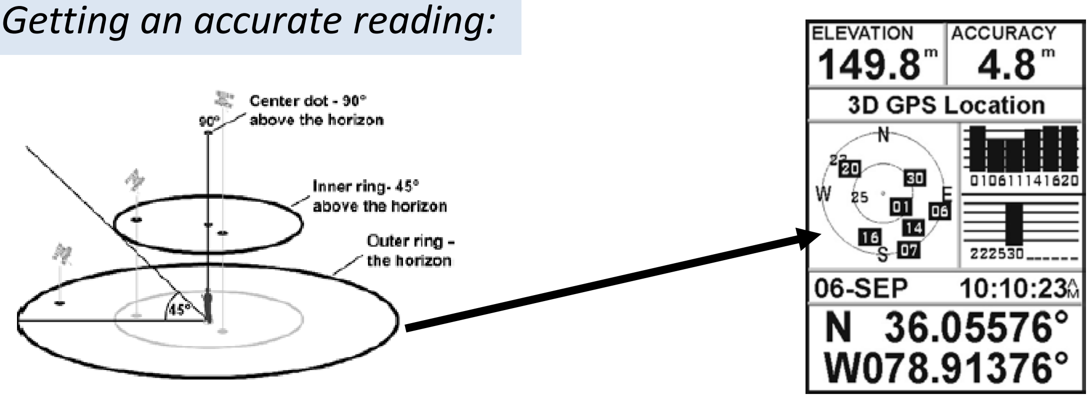


★**Abuja, Nigeria:**
333500 E, 1001500 N, zone 32E



- *GPS stands for Global Positioning System*
- *managed by US dept. of defense*
- *system of 24 or more satellites orbiting earth*
- *every 12 hours, at altitude of 20,200 km*

Getting an accurate reading:



At least 4 satellites need to be "locked in" by the GPS unit with an unobstructed signal: ideally one overhead and 3 closer to the horizon. Unit will not operate properly indoors or too close to buildings or vegetation. Satellite positions change from day to day and at different times of day. Point Averaging can increase position accuracy.

More About Geographic Coordinates

- Lat/Long is given in degrees (x, y are "degrees E, degrees N"), with negative numbers sometimes used for points S of the equator or W of the prime meridian
- UTM is in meters (x, y are "Eastings, Northings", in a certain zone)
- Lat/Long is a description of a point on a sphere--but the Earth is imperfectly shaped, and thus we must use models called "datums" to represent its shape. The most common datum in use around the world today is WGS84. This is the default for GPS receivers and also for Google Earth.
- UTM is a "projection" of the Earth onto a flat surface, which allows us to use meters to measure straight-line distances. This projection is divided into zones around the Earth moving E or W, and the measurements are least distorted nearer to the equator (doesn't work at all near the poles—another projection must be used in that case)

Why is the GPS not perfectly accurate?

- tiny clock or orbit errors
- atmosphere, weather, which cause signal to bend and bounce
- ground interference (terrain, buildings, vegetation) which cause signal to bounce
- poor satellite positioning (high PDOP) will exacerbate these
- user error (not paying attention to settings, not accurately recording coordinates, not using point position averaging or a high sensitivity receiver)

How can we help and plan for better accuracy?

- Recognize when there may be a problem
  - What should "good" readings look like?
  - What is lat/long of the general area? (check this via a digital globe such as Google Earth, or a web search, or by looking at a topographic map)
  - Are receiver units locking onto satellites quickly and easily? (if not, why not?)
- Understand that readings can be inaccurate due to circumstances beyond user control (i.e. obstructions, bad weather, PDOP)
- Make sure units are ready **before** sending out to field
  - Good batteries and cables
  - Check (and if needed, fix) settings (i.e. datum set to WGS84, coordinates set to decimal degrees)
  - Train users to recognize (and wait for) a good signal
  - Make sure users can (and do) properly input ID numbers (surveys must tie to locations)

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MEASURE Evaluation is funded by the U.S. Agency for International Development (USAID) through cooperative agreement GPO-A-00-08-00003-00. The opinions expressed are those of the authors and do not necessarily reflect the views of USAID or the U.S. government. (September 2013, FS-13-83.)