

# The Use of Global Positioning Systems Technology to Locate the Points on the Earth's Surface

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**Abstract:** *This paper addresses the issue of using the global positioning systems that utilize satellite communication system to locate points on the Earth's surface. This system is useful, accurate, reliable and applicable in so many areas.*

**Keywords:** GPS, satellites, tracking, longitudinal, latitude

## 1. Introduction

Global Positioning System." GPS is a satellite navigation system used to determine ground position and velocity (location, speed, and direction). Though it was created and originally used by the U.S. military, GPS is now available to the general public all over the world(1).

The system provides a lot of services such as determining the times of sunrise and sunset, dimensions, trends and roads leading to the goal.

Hover some companies have developed systems providing additional capabilities such as determining the desired latitude and longitude in addition to the possibility to turn on or off any vehicle by telephone.

GPS finds a wide range of applications this includes military areas. It is utilized in troops and equipment positioning and tracking. GPS is also used in transportation, tracking system. This includes trains and ships. During their two trips around the globe satellites send collected information to GPS receiving stations. It is then analysed and utilized in positioning or tracking processes(2).

## 2. Components of the GPS System

GPS positioning system consists of the three main units these are:

- 1) GPS Satellites
- 2) Ground Control GPS Segment
- 3) Receiver

### 2.1 Satellites

It consists of 24 satellites orbiting around the earth twice a day at speeds up to higher than 11 miles per hour. Satellites rely on sunlight, but at sunset batteries are used. Among the above mentioned 24 satellites at least 4 are visible from any point on the Earth's surface. (3)

### 2.2 Ground Control System

The process is performed through the following stages:

- a. Reception and storage of data sent from the control station.
- b. Obtaining the exact timing by hours and rubidium.

- c. Sending the information to the user through different signals.
- d. Modifying the orbit maneuver by ground control.

The system requires an operational control segment that comprises a series of monitor stations located around the world, a number of satellite uplink stations, and a master control station. The next-generation control segment, called OCX, is currently under development. OCX is an essential component of a fully modernized GPS. Aerospace is involved in every aspect of this effort, from information assurance and software management to the design and development of the next-generation monitor stations and the network that will support them. In addition to providing oversight and mission assurance, Aerospace is working on several initiatives to bring some modernized capabilities online in an early test capability. These will reduce risk to the full system and enable more rapid development of new user equipment (4)

### 2.3 Receiver

The receiver is the only machine that enables the user of this system to access information, whether the information on the location or on the satellite, the receiver consists of two main reception equipment. These are hardware and Software treatment programs.

## 3. Methodology

A GPS receiver locates its position by timing precisely the signals sent by GPS satellites high above the Earth. Each satellite continually transmits messages including the time they were transmitted and satellite position at time of the message transmission. The receiver uses the messages it receives to determine the transit time of each message and computes the distance to each satellite using the speed of light. Each of these distances and satellites' locations define a sphere. The receiver is on the surface of each of these spheres when the distances and the satellites' locations are correct. These distances and satellites' locations are used to compute the location of the receiver using the navigation equations.

#### 4. Results

This part presents results obtained during the study. the GPS device was used to identify neighborhoods in the city of Khartoum from Almogran to the Giad industrial city some have been identified in these neighborhoods shows the latitude and longitude and altitude for each district the following\* table illustrates these results

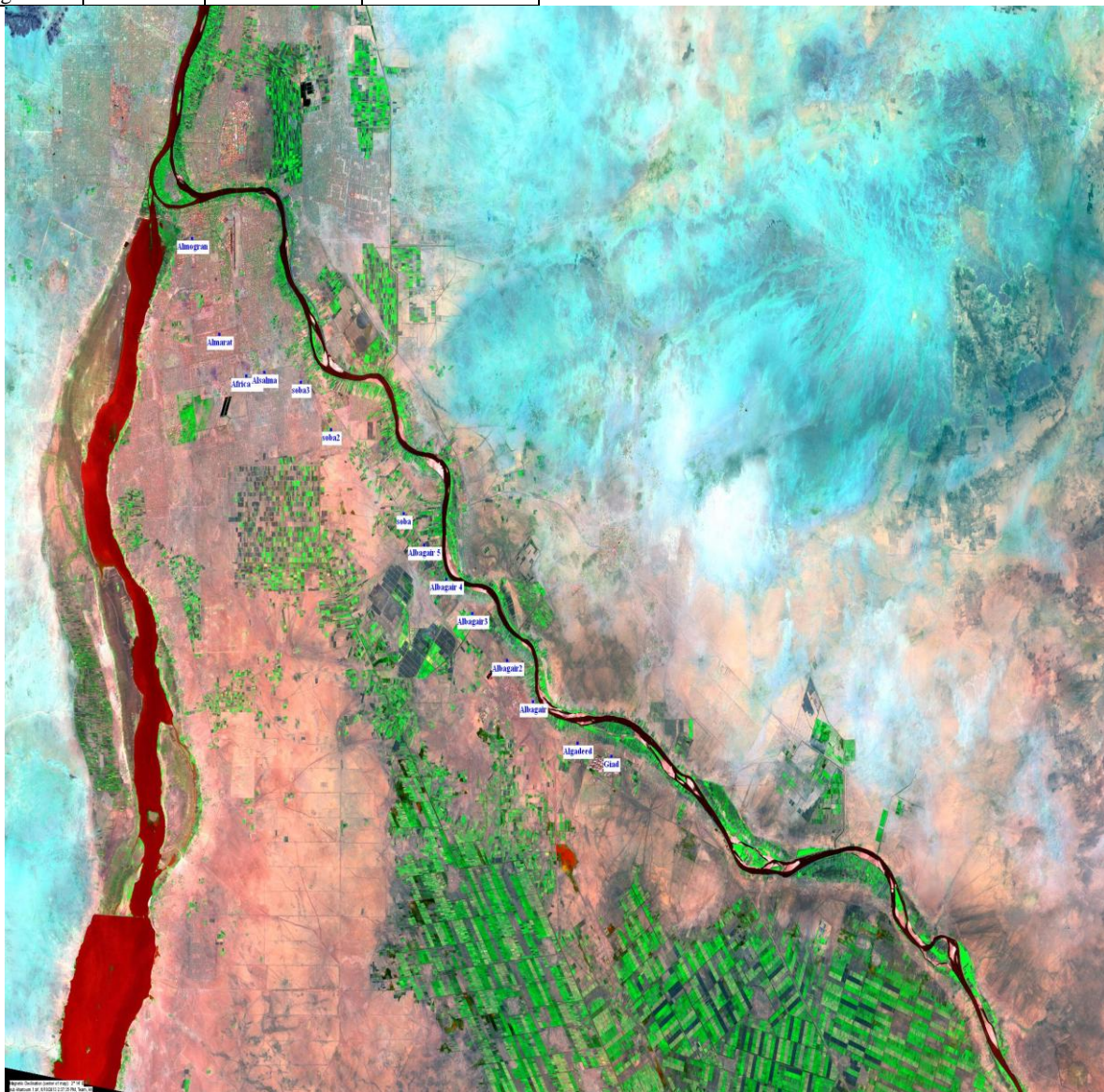
Albagair4	E 32.71014	N15.41475	400
Albagair5	E 32.09406	N15.43258	399
Algadeed	E 32. 80714	N15. 32925	401
Alamarat	E 32. 54258	N15. 54129	393
Almogran	E 32. 52219	N15. 59172	418
Alsalama	E 32. 57575	N15. 52217	393
Giad	E 32. 83192	N15. 32261	393
Soba1	E 32. 67881	N15. 44023	395
Soba2	E 32. 62489	N15. 49231	397
Soba3	E32. 60242	N15.51706	394

**Table 1:**

location	longitude	latitude	Altitude in Above Sea level
Africa university	E 32.56253	N15.52017	395
Albagair	E 32.77439	N15.35097	397
Albagair2	E 32.75523	N15.37225	399
Albagair3	E 32.72947	N15.39658	401

Table 1 shows the results by using simulator Tora Tec (T.T.Q.V3)

The results have been introduced in the program through the GPS device.



**Figure 1:** explains a picture taken from the satellites.

#### 5. Conclusions

This project addresses some neighborhoods of the city of Khartoum. The conduction of this research made use of a positioning system based on GPS. This helps a lot in defining the properties and determining the limits of a land or the boards of real state.

#### References

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