

Space Geodesy

A brief overview pt1...



The product of a functional Global Geodesy Supply Chain is...

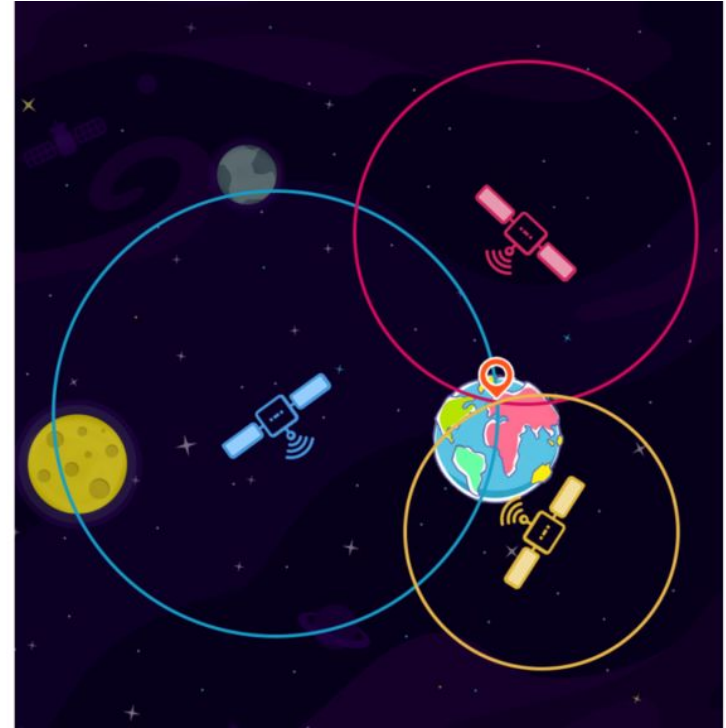
...an accurate time and position service, typically received via the main distribution system of GNSS (GPS + GLONASS + Beidou + Galileo).

What signals do you need from the satellites to calculate the product of time and your position?

The satellite need to transmit:

- the onboard time
- **it's own navigational data (the current predicted orbital value)**
- Other control signals etc.

The navigational data is determined from a combination of ground-based techniques, the resulting predictions are then provided to the satellites.



<https://www.reseau-terria.com/language/en/2021/12/20/positioning-by-gnss-gps-galileo-satellites-how-does-it-work/>

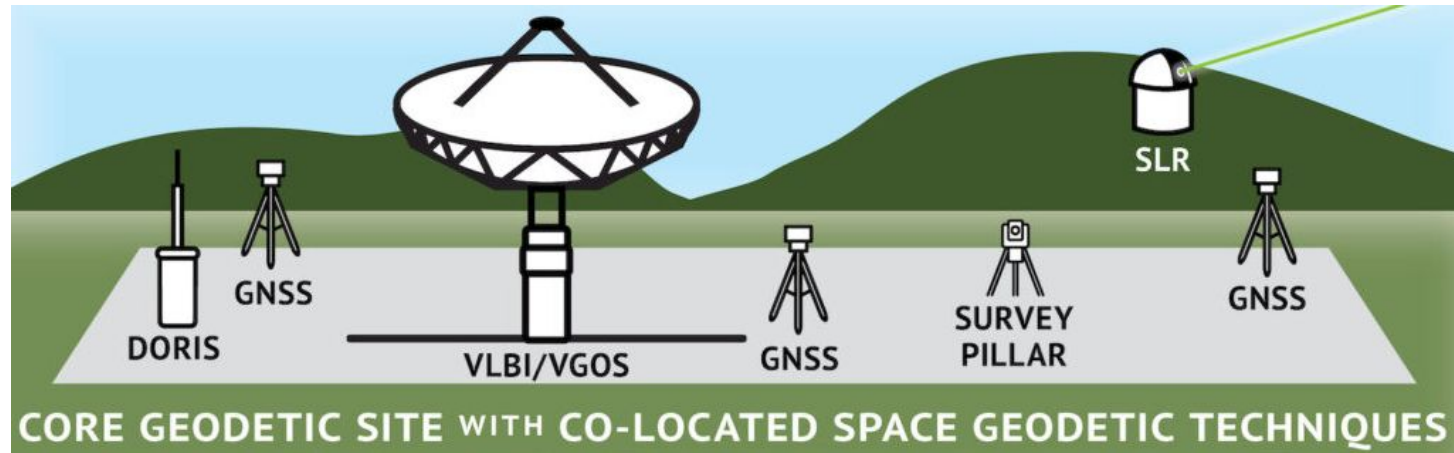
GGOS Core Sites

The Global Geodetic Observing System (GGOS) has several core sites and these provide the fundamental datasets to determine:

- the Celestial Reference Frame
- and the Terrestrial Reference Frame



Space Geodetic Fundamental Sites



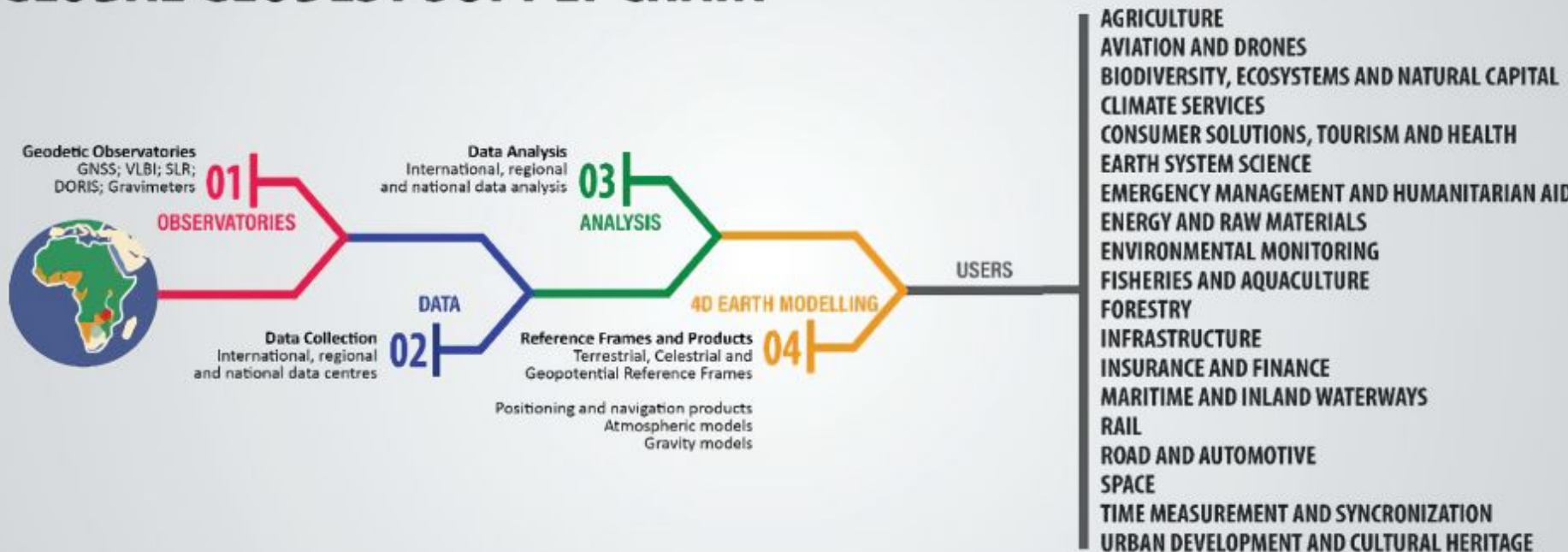
Geodetic VLBI (international network) - quasars at the edge of the observable universe used as reference positions, to determine inter-telescope baselines (and therefore accurate positions within the Celestial and Terrestrial reference frames)

The positions of each of the other instruments on-site can then be determined by terrestrial techniques (eg. Total Station)

The other techniques are then used to determine various position and time values:

- Satellite Laser Ranging: satellite orbit predictions are used as a starting point, to find and track real positions (a small actual orbit segment)
- DORIS transmit reference signals to space, for other satellites to determine their positions from it
- The GNSS reference stations - since the actual position has been determined via VLBI and terrestrial techniques, the offset in the GNSS-derived position is then used to quantify the other influencing factors like atmospheric pressure, ionosphere etc.

GLOBAL GEODESY SUPPLY CHAIN



The UN established the [Global Geodetic Centre of Excellence](#) in order to support the supply chain.

More information at: <https://geodesy.science/>



Video

