

# Marinestar Positioning Service (2023)

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## Marinestar

Marinestar provides centimetre-level real-time positioning globally, using highly reliable correction services for non-oil and gas related projects such as renewables, dredging, hydrographic survey, navy, coastguard, oceanographic survey and more.

## How it works

Marinestar measures satellite ranges from our reference stations, and in processing centres orbit and clock corrections for the GNSS satellites (GPS, Galileo, BeiDou and Glonass) are calculated for various regions around the world. The corrections are sent to two Network Control Centres (NCC's) and from there to satellite uplink locations. The uplinked regional correction data is transmitted from geostationary satellites to users in the field.

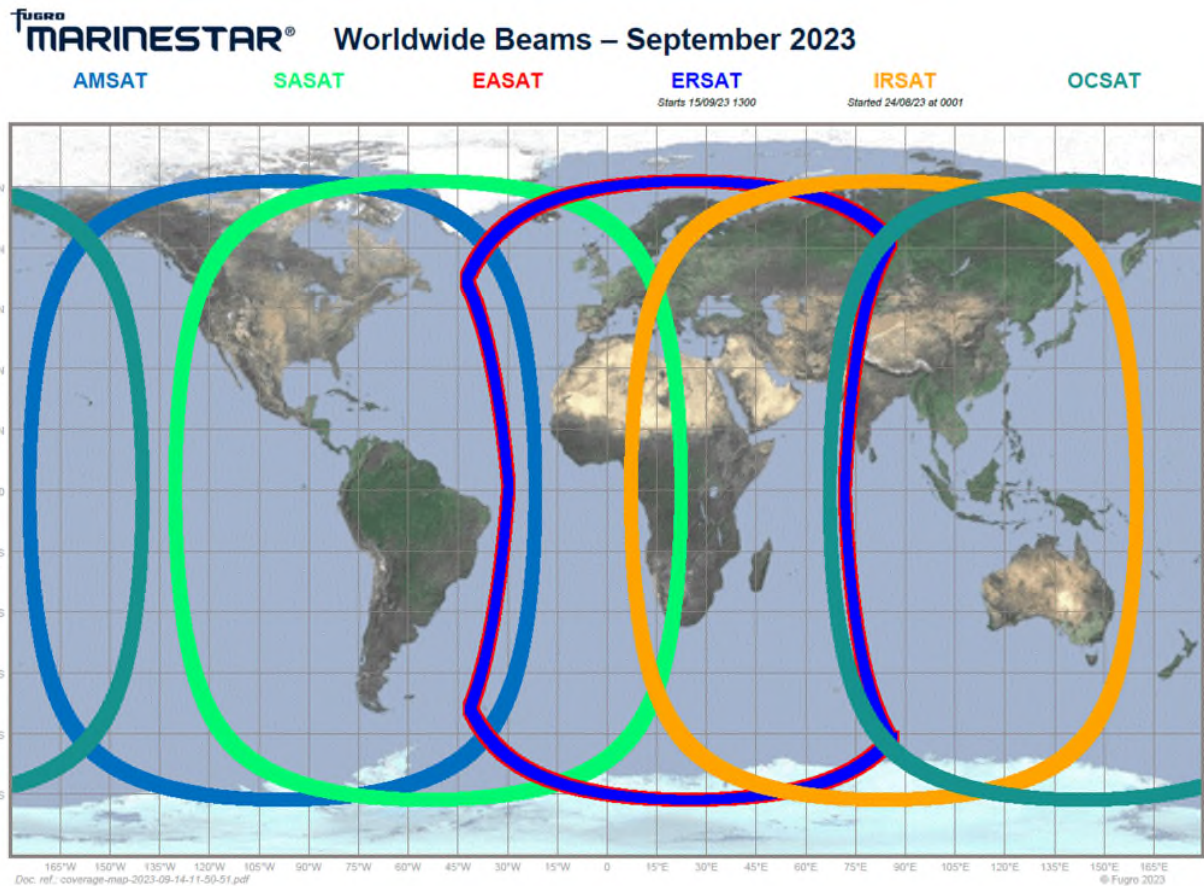


Figure 1: Overview of L-band satellite beams and their coverage areas.

## The Marinestar correction network

To provide a continuous uninterrupted correction service, redundancy and back-up has been built into the correction network infrastructure as follows:

- Three Orbit and Clock calculation centres at various locations
- Multiple independent GNSS receiver brands at the reference stations
- Two main Network Control Centres (Houston, Singapore)
- Two independent backup Network Control Centres. (Cloud, Perth)
- Six primary uplink locations to send the data to the geostationary satellites
- Backup uplink locations in case of severe weather or uplink outages
- Six geostationary L-band Satellites to supply worldwide coverage
- Two Internet NTRIP Casters operated from Houston and Singapore to provide corrections via Internet as backup

### Accuracy

Measurements of 80 GNSS receivers are used to calculate the position accuracy on a global scale with GPS, Galileo, BeiDou2 and BeiDou3 and GLONASS (G4+).



Figure 2: G4+ 95% height accuracy in centimetre. (Results may differ depending on receiver type.)

|        | Worldwide average |          |
|--------|-------------------|----------|
|        | RMS (cm)          | 95% (cm) |
| G4+    |                   |          |
| North  | 1.1               | 1.7      |
| East   | 1.2               | 2.0      |
| Height | 3.0               | 5.2      |

The results also represent dynamic conditions because no position filters are used.

### Convergence time

After switching on the GNSS receiver it takes 1000 seconds to reach 10 cm accuracy level. After 2000 seconds nominal accuracy is reached.

For further information please contact your local office or contact [marinestar@fugro.com](mailto:marinestar@fugro.com)