# Japanese Scientists Test Cosmic Ray GPS That Works Through Walls and Underwater

Scientists from the University of Tokyo in Japan have conducted their first tests of a new navigation system that uses cosmic rays for location tracking rather than the radio waves relied on with GPS.

Ars Technica **reports** the researchers recently published their findings in a paper in the iScience journal.

While the global position system (GPS) has become a mainstay for navigation, tracking, and mapping across general-use applications, it fails to perform under certain conditions.

Because GPS relies on relatively weak satellite radio waves, it struggles with location tracking inside buildings, underground, or underwater.

Cosmic rays, in this case mainly muons, can pass through walls, roofs, the ground, rocks, and water.

These have previously been used to map archaeological structures and scan containers for nuclear materials.

Read more in *article*…
https://mybroadband.co.za/news/science/496813-japanese-scientists-test-cosmic-ray-gps-that-works-through-walls-and-under-water.html
2023-06-19

## RFT Issued For Second SouthPAN Satellite Payload

Geoscience Australia has issued a request for tender (RFT) for a second SouthPAN navigation transponder hosted to be hosted on a satellite in geostationary Earth orbit (GEO).

To be known as the SouthPAN GEO Payload – 02 (SGP-02), it will provide redundancy and resilience and — together with the previously announced payload to be hosted on the Inmarsat I-8 satellite — will be a critical part of the SouthPAN safety-of-life certification for aviation and other applications, scheduled for implementation in 2028.

Read more in *Spatial Source* article. https://www.spatialsource.com.au/rft-issued-for-second-southpan-satellite-payload/?utm_campaign=SS%20-%20Overall%20Publication%20-%20Master&utm_medium=email&_hsmi=262382770&_hsenc=p2ANqtz-9UJ8pXdxtwb76kTG6QRcR7_eeeainmyDSqII4AZfE5DZeNf7Y-0c3bmAbcK_XDDA5ebRjyGuY0AZ0JzFWMZReBuF68pQ&utm_content=262382770&utm_source=hs_email

2023-06-13

### New Galileo Sensor Station Operating in South Pacific

The newest addition to the network of Galileo sensor stations (GSS) is up and running in Wallis and Futuna, a French territory in the South Pacific consisting of three main islands and many tiny islets. It enables increased Galileo coverage in the southern hemisphere.

The European Union Agency for the Space Programme (EUSPA) reported that the decision for the new station was made in June 2020; however, due to COVID-19, its deployment did not begin until summer 2022. In October 2022, the second mission to Wallis and Futana took place to complete the deployment and connect the station to the ground mission segment network for data collection.

Read more in *GPS World* article. https://www.gpsworld.com/new-galileo-sensor-station-operating-in-south-

pacific/?utm_source=Navigate%21+Weekly+GNSS+News&utm_medium=Newsletter&utm_campaign=NCMCD230531002&oly_enc_id=1784A2382467C6V

2023-05-31

**Assessing Alternatives to GNSS for PNT**

In March, the Joint Research Centre (JRC) of the European Commission's Directorate-General for Defence Industry and Space located in Ispra, Italy, released a report into its assessment of alternative positioning, navigation and timing technologies for potential deployment in the European Union. The tests were conducted during 2022.

The JRC reported that viable technologies exist in the private sector. Even if GNSS networks such as Galileo or GPS became unavailable, the alternate technologies would mean services could be maintained, albeit at lower levels of accuracy.

The Australian LocataLite system produced by Locata Corporation in Canberra delivered the best position results in the tests. In static tests, the JRC found that LocataLite could position to within 13 mm 95% of the time. In kinematic tests, it gave 18 mm accuracy.

Locata and six other companies, four European and two from the US, were awarded a competitive tender in October 2021 to participate in the demonstration.

Read more in *Spatial Source* article. https://www.spatialsource.com.au/assessing-alternatives-to-gnss-for-pnt/?utm_campaign=SS%20-%20Overall%20Publication%20-%20Master&utm_medium=email&_hsmi=261271794&_hsenc=p2ANqtz--m4WUfZziOto8EhuVI8qW5UwXbm50X1SPMWnlgW-CBRn2JaMpGM5-HsJ4cknO9GlxA7NK8YAeuuUfonUgROmWiL9AsZw&utm_content=261271794&utm_source=hs_email

2023-06-05

## GNSS Interference: Getting to the Source

GNSS serves several safety-of-life applications in aviation such as precise navigation for landing operations, collision avoidance and Air Traffic Control (ATC). GNSS interference events happening near airports can severely affect safe operations in the airspace and can be hazardous for aircraft on approach or landing. Many interference events occur throughout the year, affecting U.S. air traffic. A notable interference event happened at Dallas-Fort Worth International Airport (KDFW) in October 2022, causing widespread disruption. This incident resulted in multiple aircraft reporting GPS unreliable within 40NM of the airport, closure of a runway and rerouting of air traffic.

Read more in *Inside GNSS* article. https://insidegnss.com/gnss-interference-getting-to-the-source/
2023-05-26

## High-Precision Positioning with Smartphone Measurements

High-precision positioning with smartphones could bring in-demand technologies to users around the world. It would enable applications such as lane-level accuracy for

road users and autonomous cars, precise mapping, indoor positioning, and improved localization in augmented reality-based gaming environments. In the last few years, raw GNSS measurements from smartphone receivers have become more publicly accessible, as demonstrated by the release of the Android GNSS application program in 2016 and the Google open datasets in 2020. More recently, Google launched the Google Smartphone Decimeter Challenge (GSDC) to invest in the development of novel technologies that can obtain high-precision positioning from smartphone measurements.

The current challenge with smartphone receivers is they can only offer 3 to 5 metres of positioning accuracy under good multipath conditions and over 10 m accuracy under harsh multipath environments. Due to limitations in GNSS chipset, size and hardware cost, GNSS measurements from smartphones have lower signal levels and higher noise compared to commercial receivers. However, new opportunities have emerged that can be leveraged to design novel positioning algorithms.

Read more in *Inside GNSS* article. https://insidegnss.com/high-precision-positioning-with-smartphone-measurements/

2023-05-29

## Space Force Sees Further Delays to 'Troubled' GPS Ground Segment

The U.S. Space Force now expects Raytheon to deliver the next phase of its GPS ground system overhaul at the end of this year — nine months later than the program's previous schedule estimate.

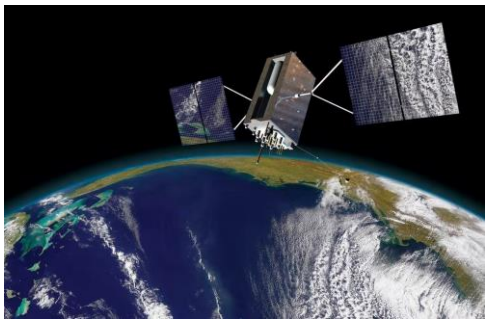
Increments 2 and 3 of the Next-Generation Operational Control System, dubbed OCX, were supposed to be delivered in January, but technical discoveries during testing delayed the effort and caused the program to re-evaluate its schedule.

According to a June 8 Government Accountability Office report, prime contractor Raytheon's delivery delay will push the initial capability date to next spring. A

spokeswoman for Space Systems Command, the Space Force's acquisition arm, told C4ISRNET in a June 8 email the service is awaiting approval of the new schedule.
Read more in *article*…

https://www.c4isrnet.com/battlefield-tech/space/2023/06/09/space-force-sees-further-delays-to-troubled-gps-ground-segment/

2023-06-10



## Talking to the Satellites

*Exclusive interview with Lt. Col. Robert O. Wray, Commander 2nd Space Operations Squadron, Schriever Space Force Base, Colorado.*

The entire Global Positioning System constellation comprised of 38 satellites — with its billions of users and myriad military, commercial, consumer and scientific applications — is controlled from one room in a grey office building on a small military base about nine miles east of Colorado Springs, Colorado. The base is Schriever Space Force Base (SFB) and the room is the "operations floor" of the GPS Master Control Station (MCS). It is staffed by members of the 2nd Space Operations Squadron (2 SOPS), an active-duty unit of the U.S. Space Force, supplemented by members of the 19th Space Operations Squadron (19 SOPS), a unit of the U.S. Air Force Reserve. The two squadrons are known collectively as "Team Blackjack."

Lt. Col. Robert O. Wray is the commander of 2 SOPS and of those 19 SOPS members assigned to the MCS.

Read more in *GPS World* article. https://www.gpsworld.com/forrefgpsmcs/

2023-06-06

## The Critical Nature of Australia's PNT Sector

The List of Critical Technologies covers seven fields of technology, included amongst which are satellite, positioning and timing technologies.
Other technologies covered include AI, quantum, autonomous systems, clean energy and advanced manufacturing.

"This List of Critical Technologies builds on the Government's commitment to expand the number of next generation businesses working at the forefront of our changing economy," said Ed Husic, Minister for Industry and Science.

"The Government is also targeting $1 billion of investment in critical technologies through the National Reconstruction Fund, which will further bolster Australia's industry and economy."

The List's 'Autonomous systems, robotics, positioning, timing and sensing' theme specifically calls out the "satellites and systems that precisely measure position, navigation or timing data".

The List recognises that satellite and PNT systems are needed for:

- Faster and more accurate surveying and mapping from the air and space
- More reliable and accurate navigation in sectors such as agriculture, aviation, construction, transport, and mining and resources
- Safer airline and maritime navigation
- Navigating without GPS
- Improving public safety
- Improving workforce safety and efficiency
- Reliable, efficient transport and logistics for land, sea, air and space
- Autonomous military applications
- Improved animal welfare management.

Read more in *Spatial Source* article. https://www.spatialsource.com.au/the-critical-nature-of-australias-pnt-sector/?utm_campaign=SS%20-%20Overall%20Publication%20-%20Master&utm_medium=email&_hsmi=261271794&_hsenc=p2ANqtz--

wnUENxJrKneK6MgQGSRQCW6SKqAw62ErqvFBE4ZSBcm22tNknnqOkyepgOjsqzCgCvj6qgmAUGfxg2pwBK0fWUG1Bwg&utm_content=261271794&utm_source=hs_email

2023-06-02

**Inmarsat Lands $190m Deal To Boost GPS Accuracy To 10cm**

The 20-year agreement will allow “SouthPAN” to be broadcast from one of the firm’s upcoming I-8 satellites from 2027.

SouthPAN is a Satellite-Based Augmentation System (SBAS) that provides huge improvements to positioning and navigation systems, using a combination of reference stations, telecommunications infrastructure, computing centres, signal generators, and satellites.

Lockheed Martin won a 1.18 billion contract to help oversee the project late last year and will specifically build its ground segment.

The service has been live since 2022, but will only formally broadcast from 2027, with more critical “safety of life” services coming in 2028. An additional satellite is also being procured to provide SouthPAN services.

Geoscience Australia, the lead Australian government agency, said the Inmarsat deal would provide “redundancy and resilience” in SouthPAN that would enable critical applications to use it.

Read more in *article*…

https://www.spaceconnectonline.com.au/satellites/5904-inmarsat-land-190m-deal-to-boost-gps-accuracy-to-10cms?utm_source=SpaceConnect&utm_campaign=30_05_23&utm_medium=email&utm_content=1&utm_emailID=7b4c7db616168fe865f3a2f96500fa1904548b5145c6ae1709d81f43459c19a2

2023-05-29

**Galileo Second Generation Enters Full Development Phase**

The main procurements batch of Galileo Second Generation initiated last summer has been finalised, leaving the system ready for its In Orbit Validation development phase. Today, following the opening session of the European Navigation Conference (ENC), ESA Director of Navigation Javier Benedicto invited Thales Alenia Space (Italy), Airbus Defence and Space (Germany) and Thales Six GTS (France) to sign the respective contracts commencing System Engineering Support for the next generation of Europe's navigation satellite system.

Today, with 28 satellites in orbit, Galileo is the world's most precise satellite navigation system, providing metre-level accuracy to more than four billion users around the globe. There are currently 10 further Galileo satellites due to be launched, after which the first of the Galileo Second Generation (G2) satellites with enhanced capabilities are expected to begin joining the constellation later in the coming years.

Satellite-building contracts have already been awarded in May 2021 to Thales Alenia Space (Italy) and Airbus Defence and Space (Germany) to create two independent families of satellites amounting to 12 G2 satellites in total, as well as separate contracts with Safran Electronics and Defence - Navigation and Timing (France) and Leonardo (Italy) covering the ultra-precise atomic clocks carried aboard.

Read more in *Space Daily* article.
https://www.spacedaily.com/reports/Galileo_Second_Generation_enters_full_development_phase_999.html

2023-06-01