

GNSS INTERFERENCE MONITORING IN GREAT BRITAIN

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Overview of OS Net

114 stations

Mostly Trimble Alloy or Septentrio PolaRx5. Small number of Leica GR50

GPS+GLO+GAL+BDS RINEX 3 data flow

All station logs managed via the M3G web site

Commercial services through OS partners on a royalty basis

SmartNet	VRS Now	TopNET live	FarmRTK	Essentials Net	Case IH
From Leica	From Trimble.	From Topcon.	From AXIO-NET.	By Soil Essentials.	From CNH.



GENS – “GNSS Event Notification Service”

An ESA sponsored project under the NAVISP programme
<https://navisp.esa.int/project/details/116/show>

Project is creating an initial national demonstration capability for GNSS event notification.

OS Net Trimble and Septentrio receivers allow direct access to raw GNSS spectrum data which feeds directly to OS servers for use in the GENS project and other services.

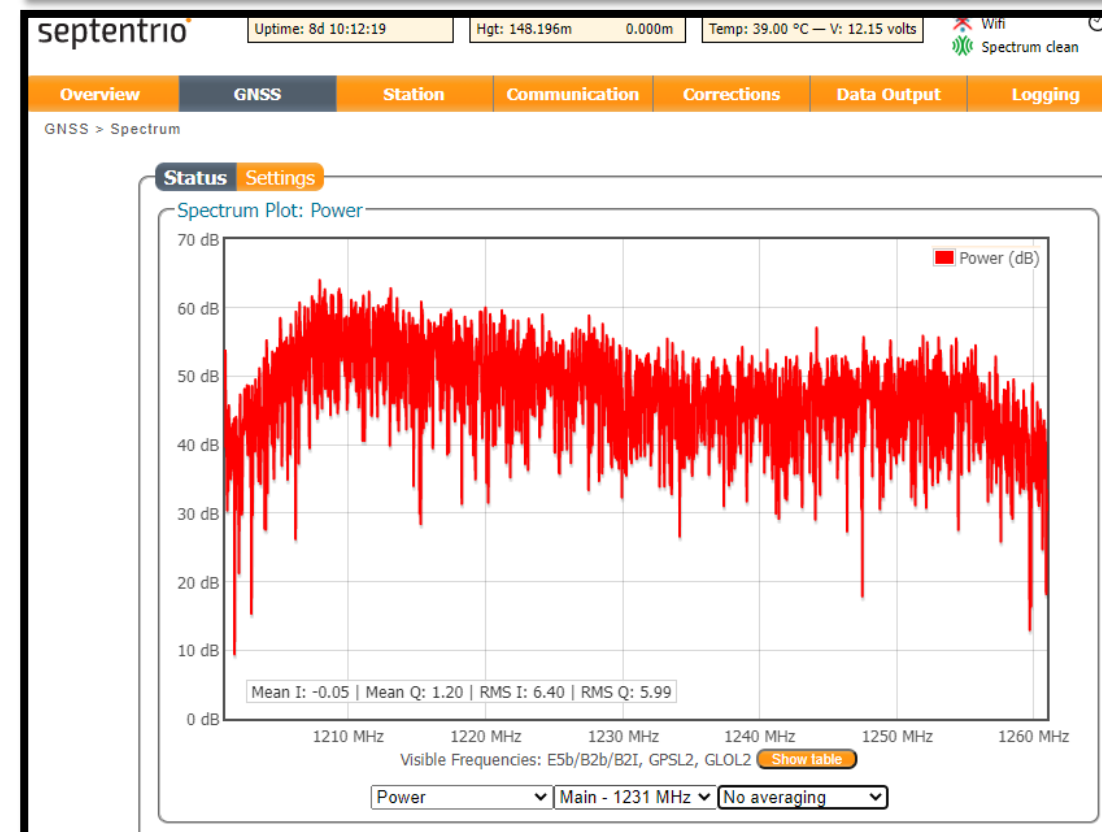
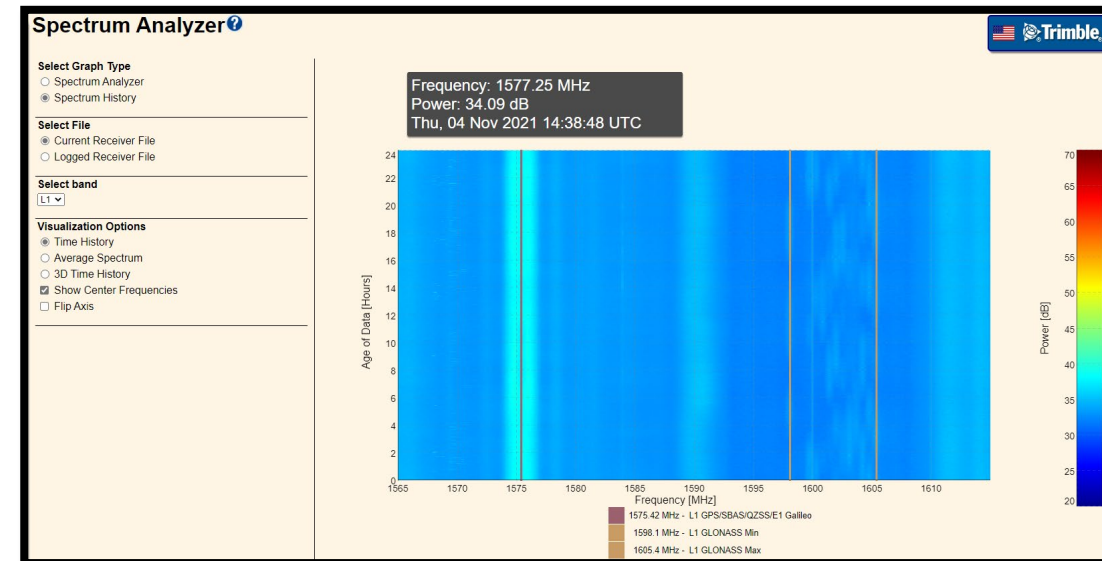
Utilising a suite of nationally available sensors and other data sources (OS Net plus others) GENS is designed to integrate multiple inputs to provide and enable GNSS service threat identification and response.

Data gathering and analysis

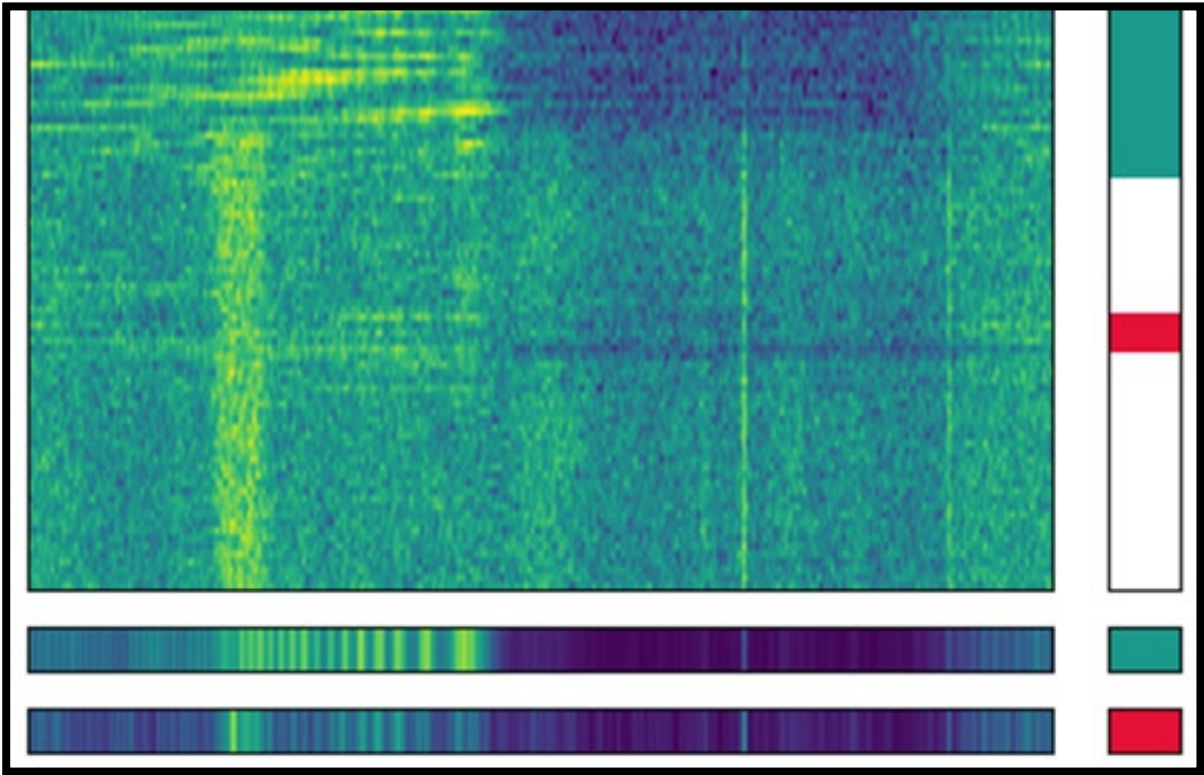
Hourly raw spectrum data files auto ftp-ed from the receivers

Dedicated Azure cloud services server with large storage capacity since spectrum data from OS Net for one week provides over 1TB of data

The spectrum data is analysed using machine learning techniques to automatically determine if interference is present



Example analysis



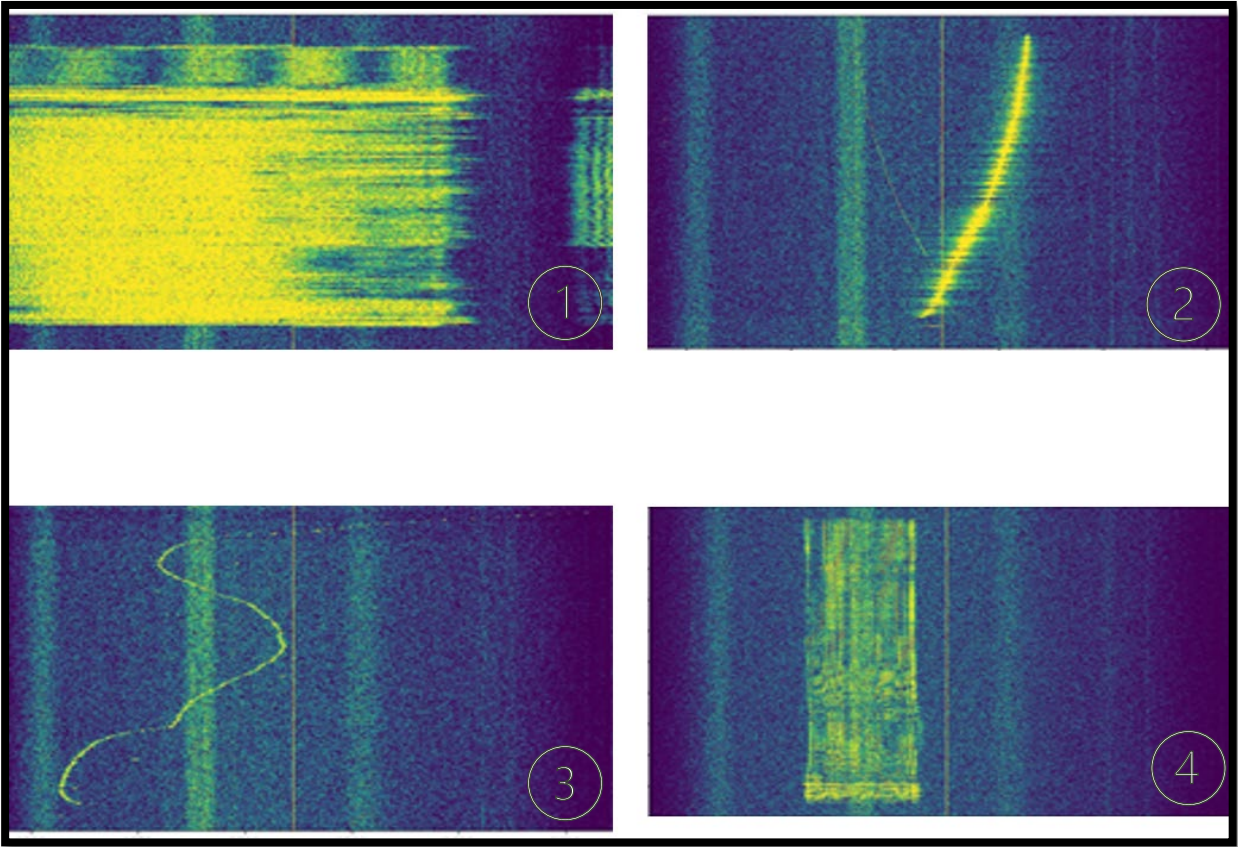
A table displaying detected events with columns for Duration, Band, and Signatures. Each row includes a timestamp, duration, band, a visual signature, and a 'View' button.

Timestamp	Duration	Band	Signatures	View
:52:45.476	9.874	L1	[Signature]	View
:52:20.304	11.524	L1	[Signature]	View
:51:55.869	13.579	L1	[Signature]	View
:45:53.895	29.897	L1	[Signature]	View
:27:30.596	7.219	L1	[Signature]	View
:51:33.612	3.528	L1	[Signature]	View
:48:29.817	2.249	L1	[Signature]	View

This spectrogram is an example of detected events. The green and red side bar highlights show events picked up by different machine learning algorithms.

Events can be collated by date/time, duration or frequency band

Example results



Example interference waveforms from around GB. It is constantly evolving. 1 & 4 are “classic” wideband jammers 2 & 3 more unusual



Example of a rise in detected events at single station as we emerged from lockdown



Example of detected events over a 3 month period in 2021 for 4 OS Net stations – note log scale on y axis.

Conclusions and next steps

Interference / jamming is perhaps more prevalent than expected.

CORS are usually protected to some extent from serious impacts by the robust receiver tracking and multi constellation/observable operation, but the inherent GNSS vulnerabilities remain.

OS continue to further understand and develop resilient PNT capabilities, including interference detection and monitoring

The next steps are currently being explored but will likely include scoping out the potential for a “warning system”

THANK YOU



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