Monthly Newsletter - November 2024

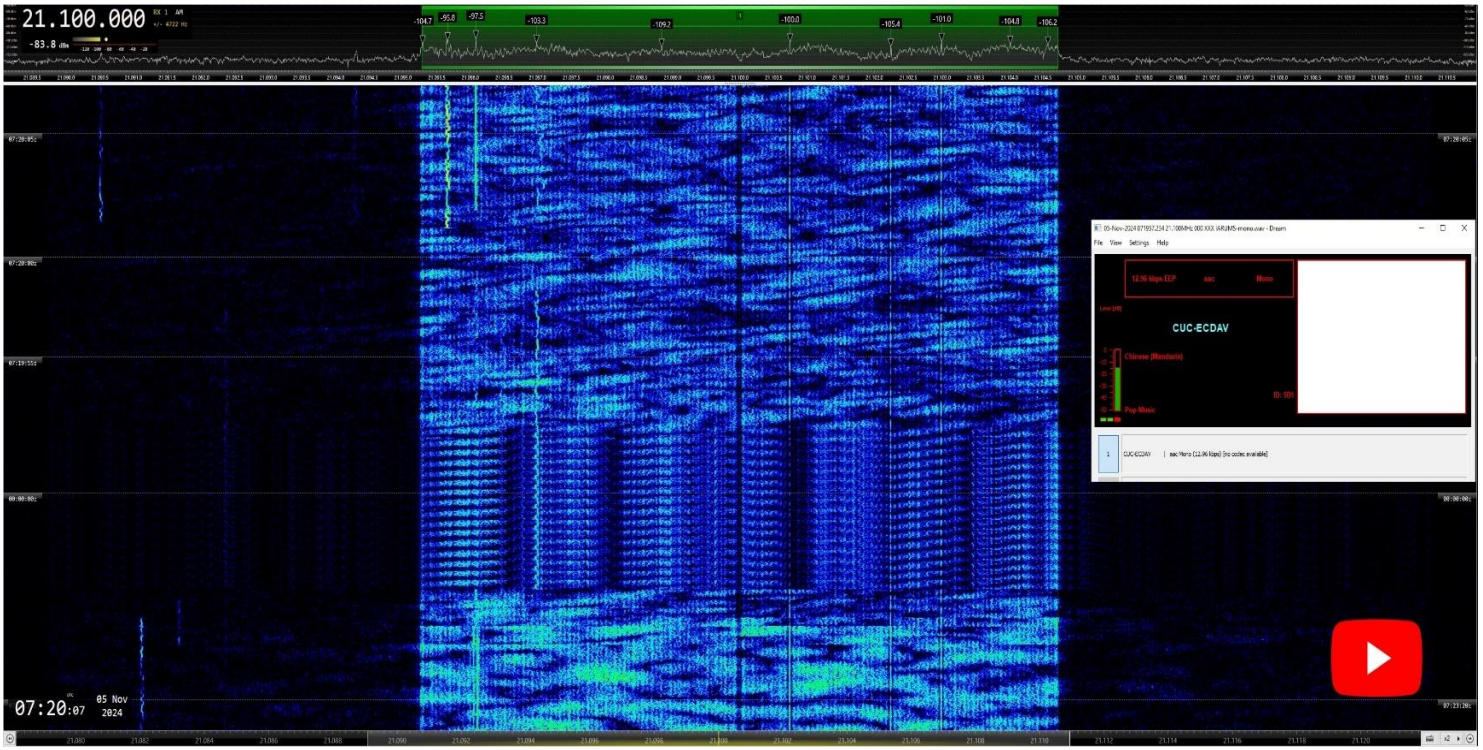
- Video feature: *click on the "play" red icons in the text or in the images of the Newsletter to watch the videos*

- IARUMS Wiki: *find more information, screenshots, videos and recordings of the transmission modes most used by non-amateur stations on the amateur radio bands:* https://www.iaru-r1.org/spectrum/monitoring-system/iarums-wiki/

News and Info

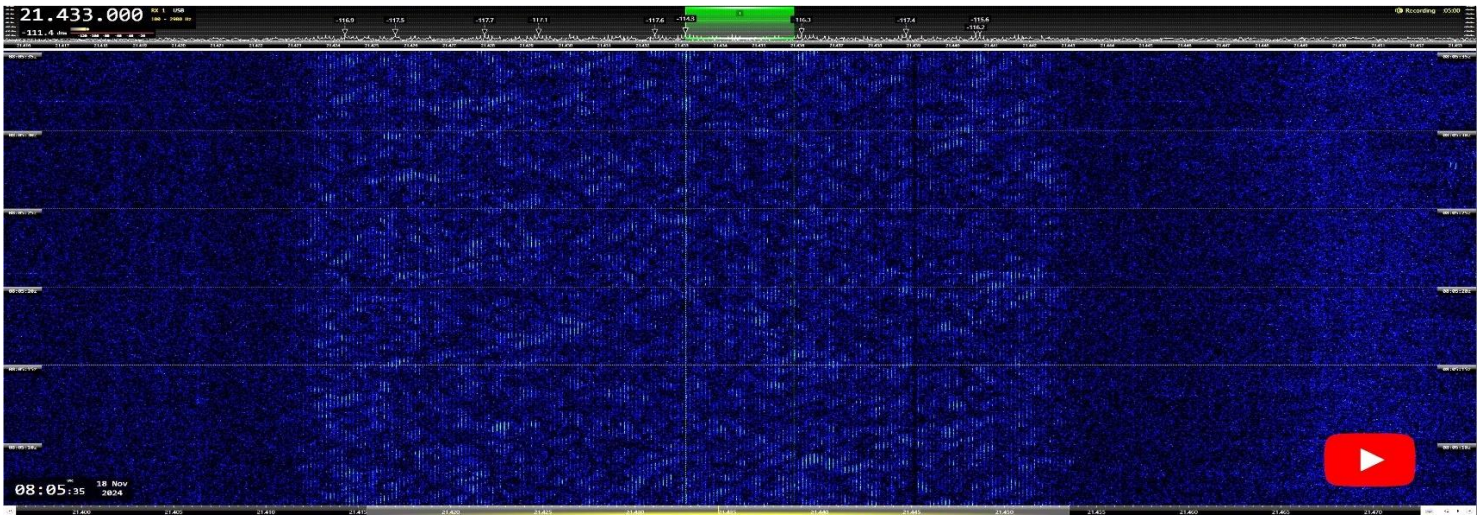
In November 2024, in addition to the numerous and disruptive over-the-horizon radar transmissions and transmissions sent in various military modes—which have regrettably become a recurring issue over the years—other non-amateur transmissions were observed in the HF amateur radio bands. These include transmissions received for the first time or those rarely detected in the amateur radio HF bands, along with others that tend to resurface periodically.

We received several transmissions from the Chinese broadcasting station on 21100 kHz CF, employing DRM (Digital Radio Mondiale) mode OFDM with a bandwidth of approximately 9.5 kHz. The station's identification was '*CUC-ECDAV*' = Communications University of China. Center for Research in Radio and Television Digitalization Engineering of the Ministry of Education.



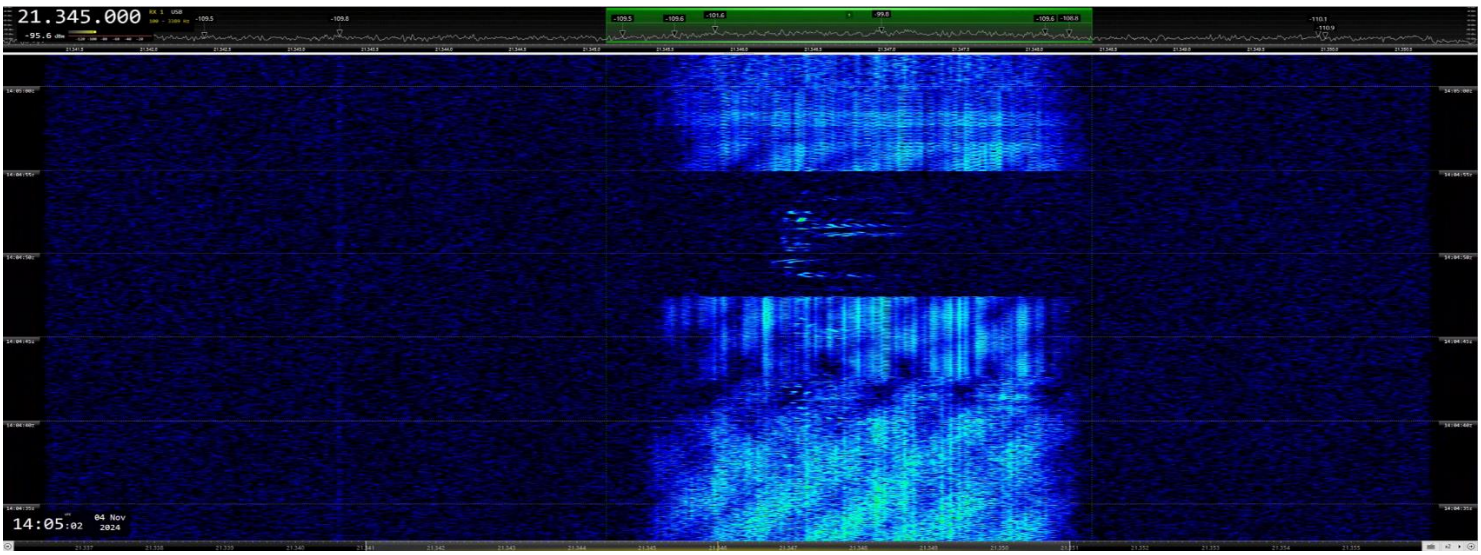
21100 kHz CF. DRM broadcast (OFDM. BW = 9.5 kHz). ITU = CHN. ST: 'CUC-ECDAV' = Communications University of China

Additionally, we had the opportunity to observe the emergence of a new radar. Although we have yet to determine its location using the KiwiSDR TDoA (Time Difference of Arrival) feature, it is likely of Chinese origin. This radar operates with a bandwidth of 20 kHz and a Pulse Repetition Frequency (PRF) of 100 pulses per second (pps). It was detected in the 15-meter band.



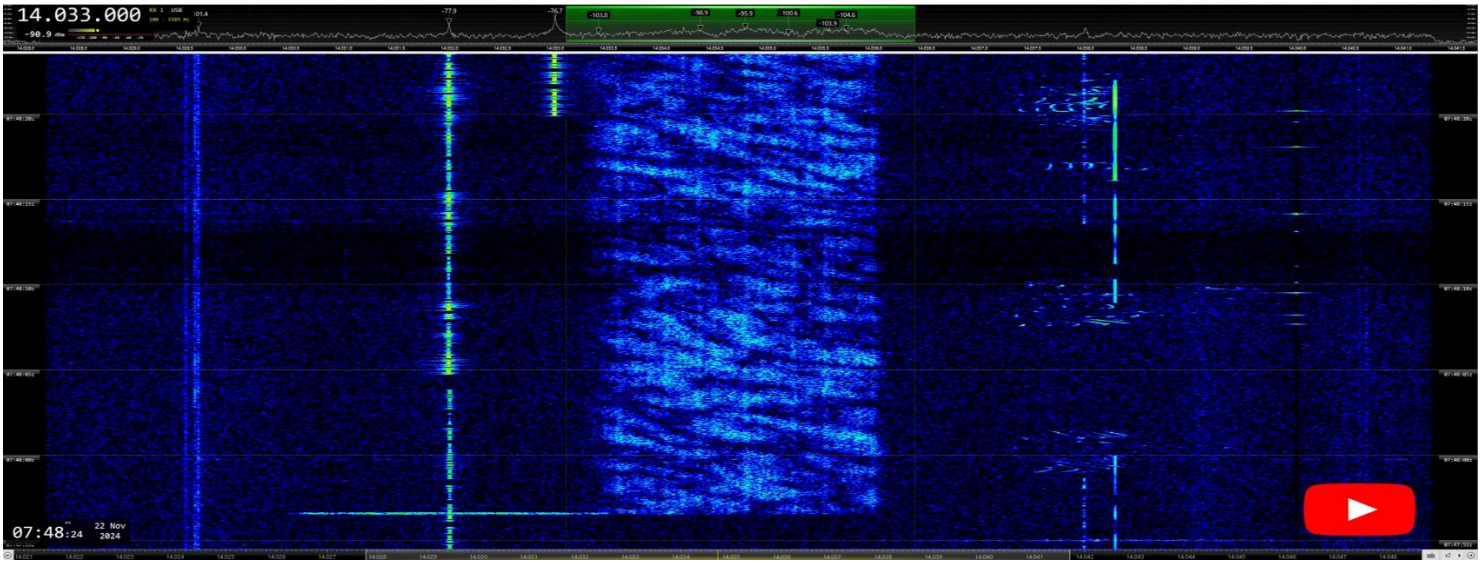
21433 kHz CF: Radar. BW = 20 kHz. 100 pulses per second (pps)

We also intercepted a “mixed modes” transmission using several bursts of different MIL modes, like ALE 3G, MIL-188- 110A and STANAG-4539:



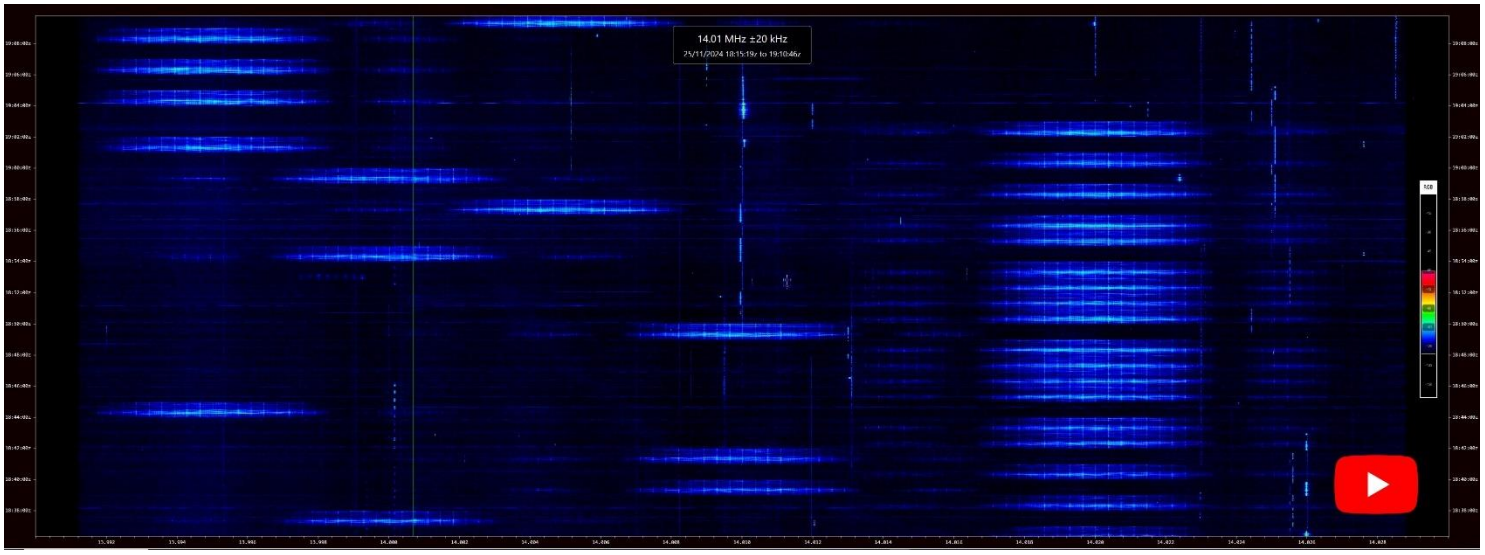
21345 kHz USB: „Mixed modes“ MIL TX, with ALE 3G, MIL-188- 110A and STANAG-4539. BW = 2.4 kHz. 2400 Bd

In the 20-meter band, we occasionally observed transmissions employing an unknown mode that uses MSK bursts at 2400 Bd.



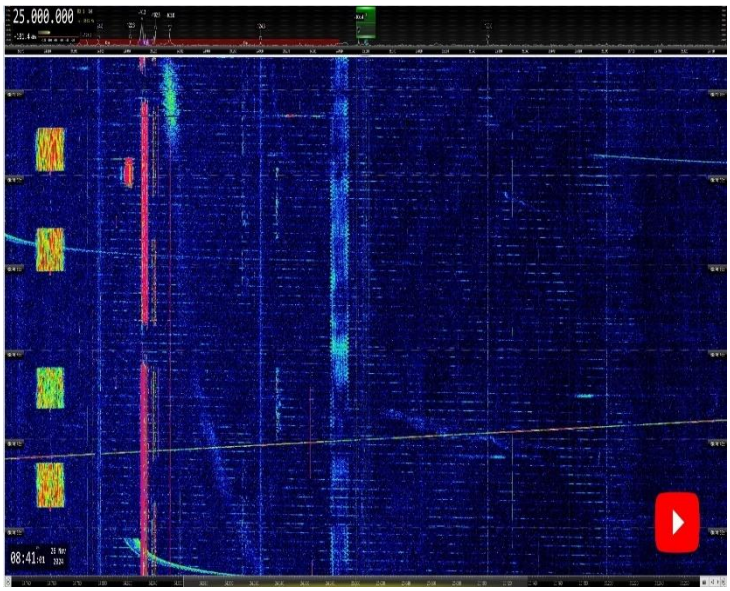
14033 kHz USB. Unid MSK. BW = 2.4 kHz . 2400 Bd

The transmissions of a SuperDARN radar (Super Dual Auroral Radar Network), which have been received in the 20-meter band for several years but had not been reported since April 2024, unfortunately returned at the end of the month. These long-lasting transmissions (bandwidth, approximately 6 kHz) consisted of bursts with frequency hopping and were observed on the same frequencies as in previous instances: 14000 kHz CF, 14005 kHz CF, 14010 kHz CF, and 14020 kHz CF.

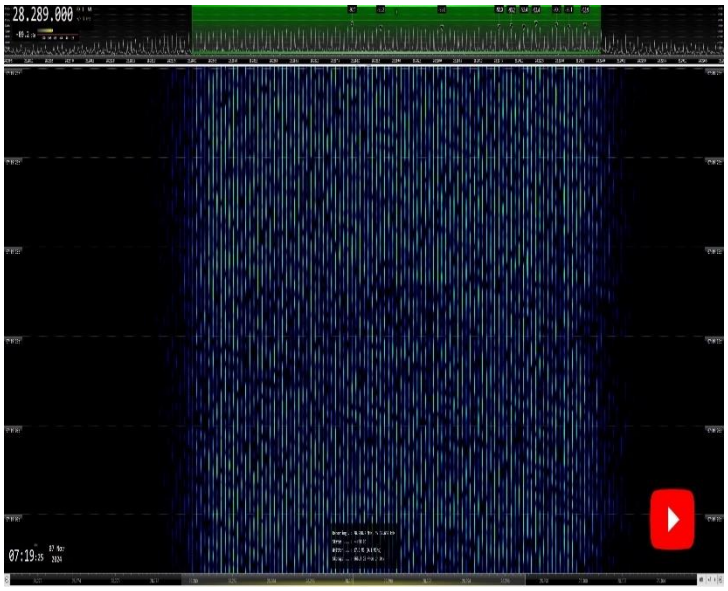


20m: SuperDARN radar bursts. Hopping. Frequencies: 14000 kHz CF, 14005 kHz CF, 14010 kHz CF, and 14020 kHz CF. Long-lasting

The CODAR radar (Coastal Ocean Dynamics Applications Radar), previously reported on 25000 kHz CF with a bandwidth of 200 kHz, has also resurfaced. It continues to interfere significantly with the 12-meter band (24900 kHz to 24990 kHz), leaving only 10 kHz of this band (24890 kHz to 24900 kHz) unaffected during its transmissions. This radar operates with a PRF of 2 pps.



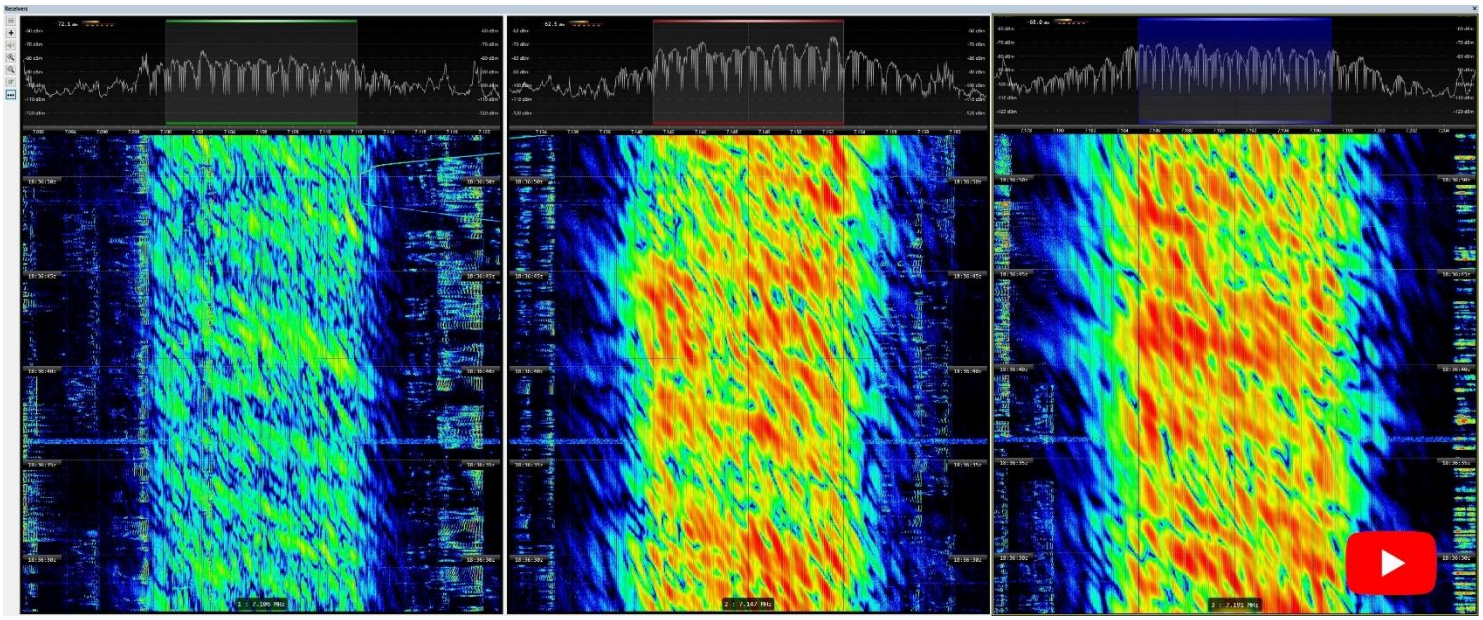
25000 kHz CF: CODAR-like radar. BW = 200 kHz. 2 pps



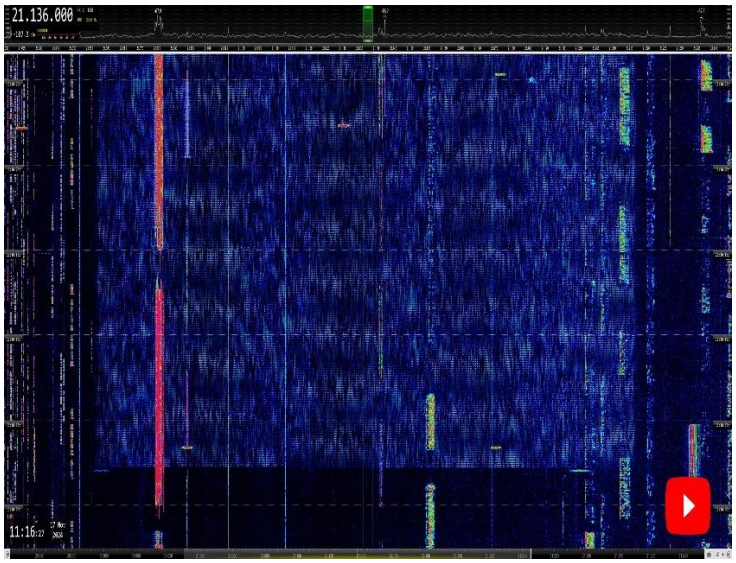
28289 kHz CF: OTHR G (UK SBA, Cyprus). BW: 10 kHz. 100 pps (rare!)

We also had the rare opportunity to observe a transmission from the British radar located in the UK Sovereign Base Area in Cyprus, exhibiting unusual characteristics. During a transmission in the 10-meter band, it switched from its typical bandwidth and PRF (20 kHz, 50 pps) to a bandwidth of 10 kHz and 100 pps (video: above, right).

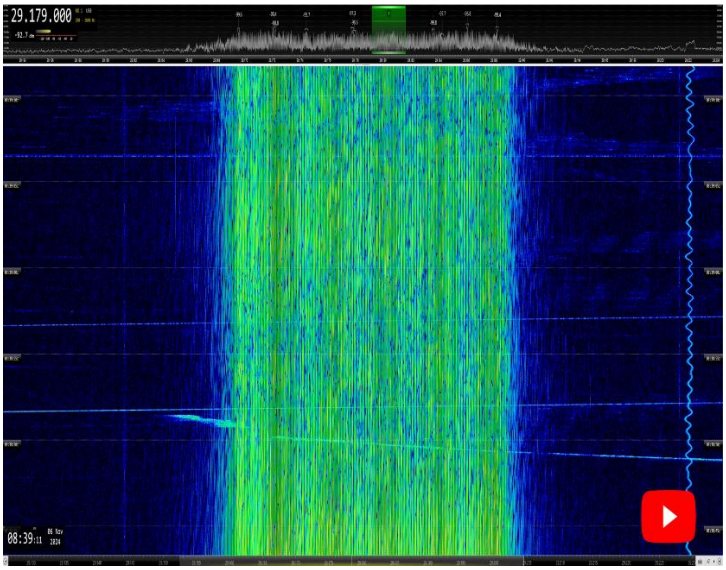
Regarding over-the-horizon (OTH) radars, there was little variation in November compared to the previous month. We continued to experience the now-familiar interference caused by the numerous OTH transmissions, both in terms of quantity and the number of hours logged. Their extensive activity severely impedes amateur radio operators in their rightful use of the HF spectrum allocated to them. Belos, some examples of OTHR transmissions received during November, below.



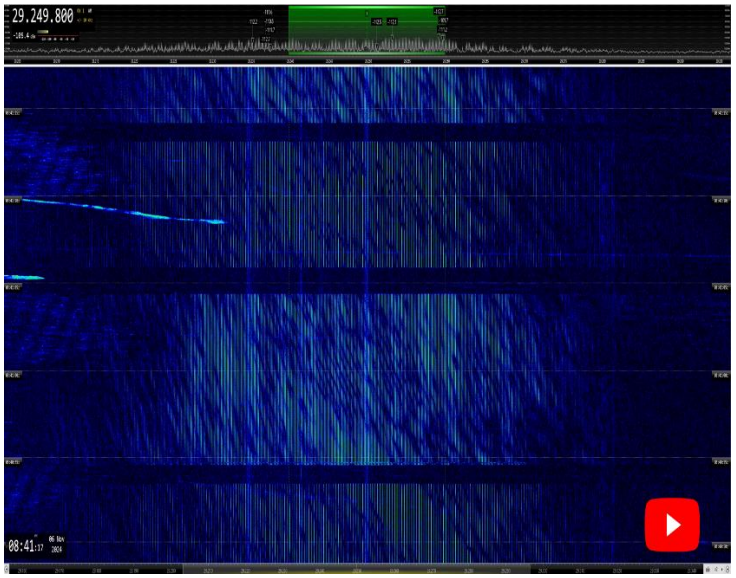
40m: 3 X OTHR Contayner simultaneous TX. RUS. Necessary BW = 12 kHz (can be much wider due to the power used for the TX, 20 kHz and more)



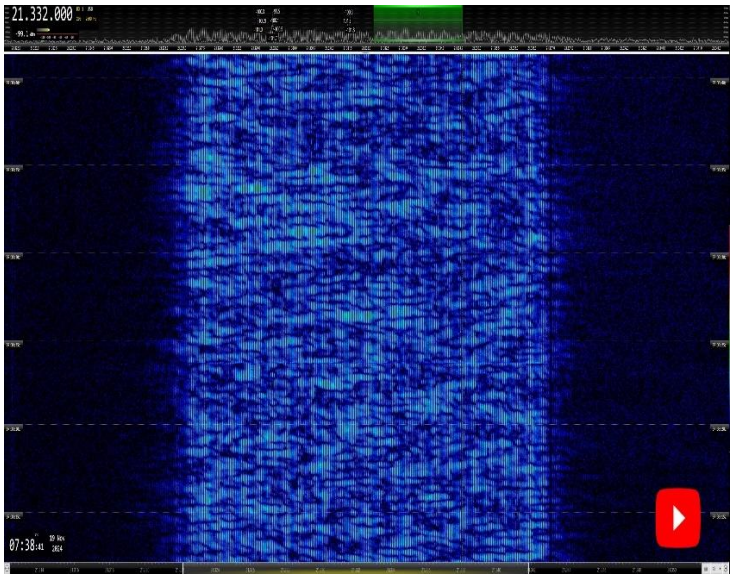
21136 kHz CF. CHN wideband OTHR bursts . BW = 160 kHz. 10 pps



29179 kHz CF: OTHR G (UK SBA, Cyprus). BW = 20 kHz. 50 pps

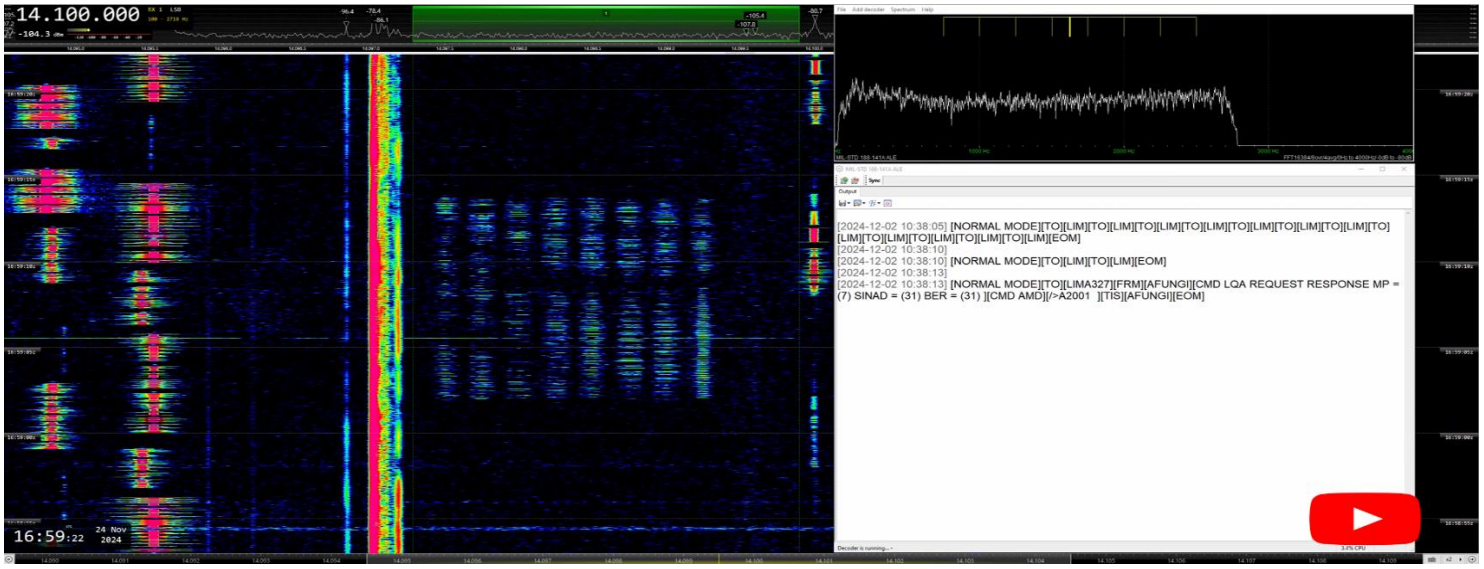


29450 kHz CF: OTHR IRN. BW ca 45 kHz. 150 pps and 313 pps bursts

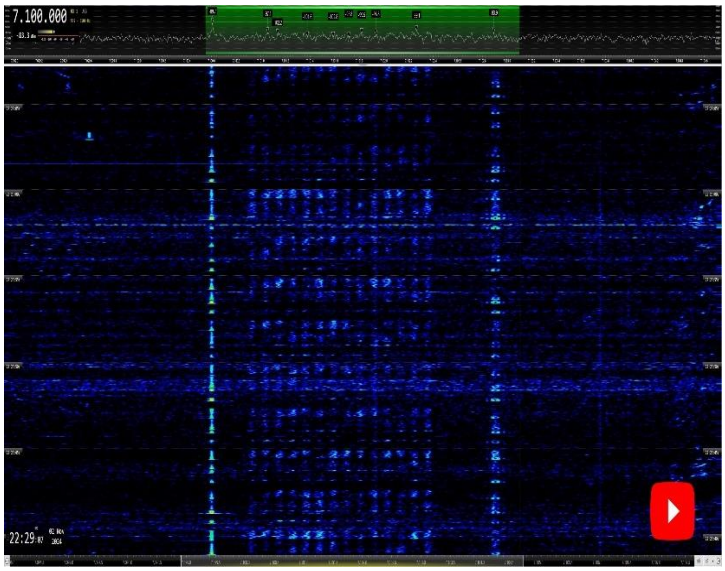


21332 kHz CF: CHN OTHR. BW = 10 kHz. 50 pps

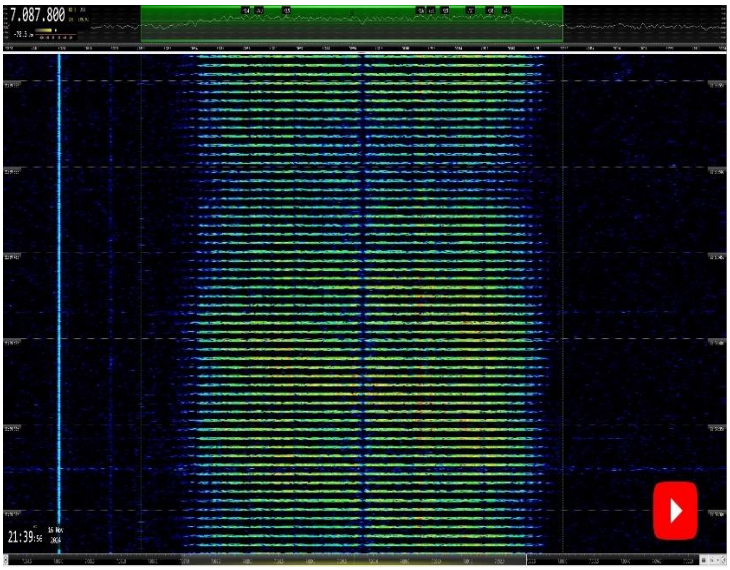
Just a few examples of the different MIL modes we could receive during the last month on the HF amateur radio bands:



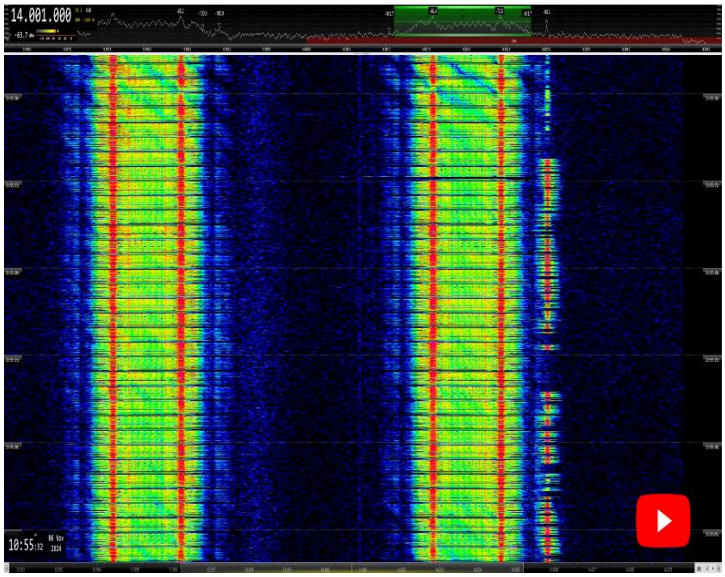
14100 kHz LSB. MIL-188-141A ALE 2G. Inverted spectrum. MFSK-8. J7D. BW = 1.8 kHz. 125 Bd. IDs: AFUNGI, LIMA327



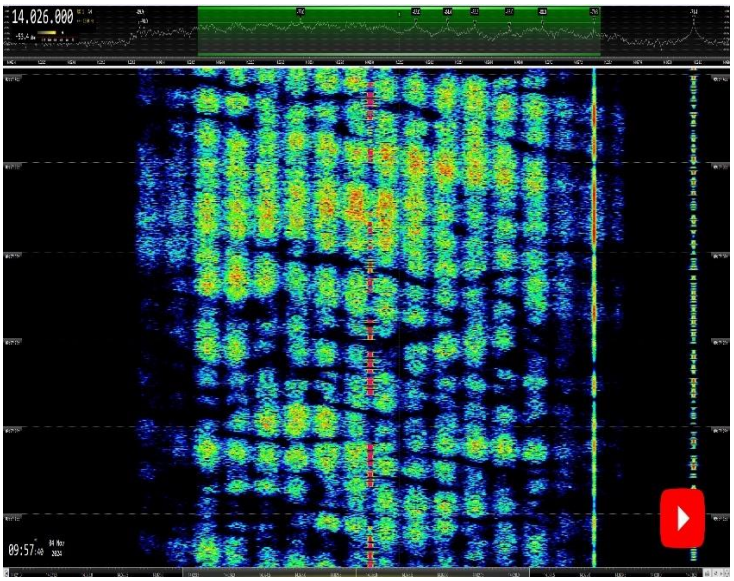
7100 kHz USB: LINK-11 CLEW SSB. G7D. BW = 2.4 kHz. 75 Bd



7088 kHz USB. LINK-11 SLEW. G1D. BW = 2.4 kHz. 2400 bd

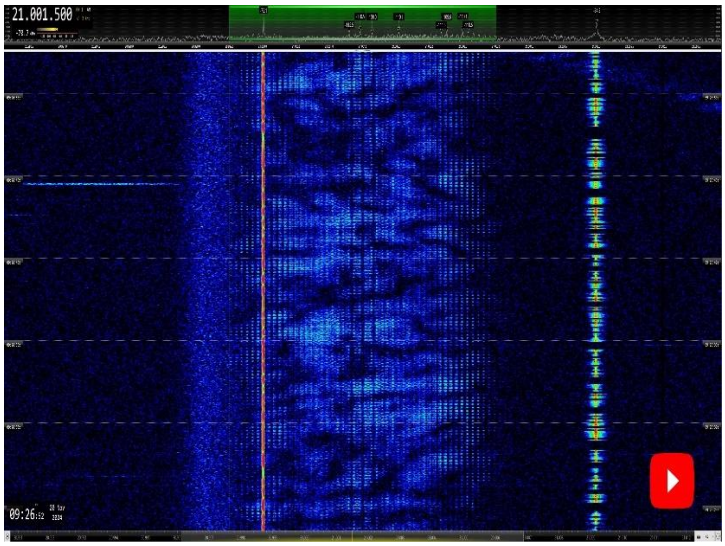


14002 kHz CF: STANAG-4481 bursts. F1B. BW = 850 Hz. 75 Bd

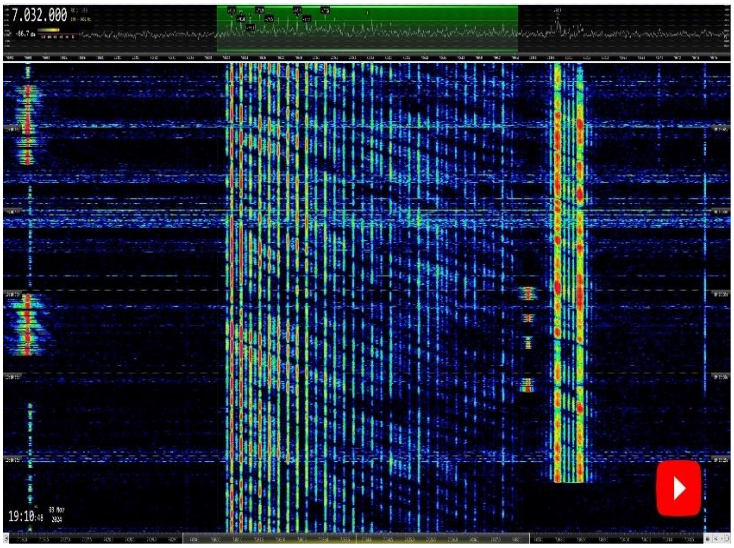


14026 kHz CF: CIS-12. J7D. BW = 2.6 kHz. 12 x 120 bd + piolot tone

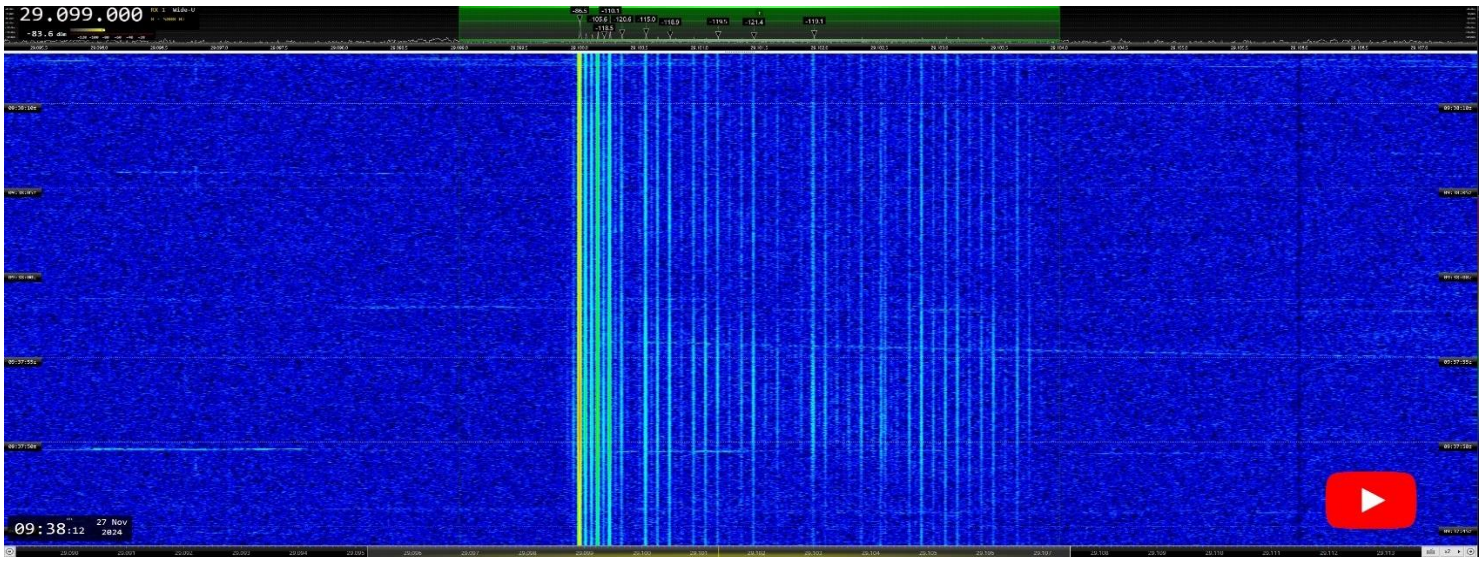
The jammers received during the last months remained very active during November:



21001.5 kHz CF: Jammer. BW = 4 kHz (sometimes, 7 kHz). 85 Hz

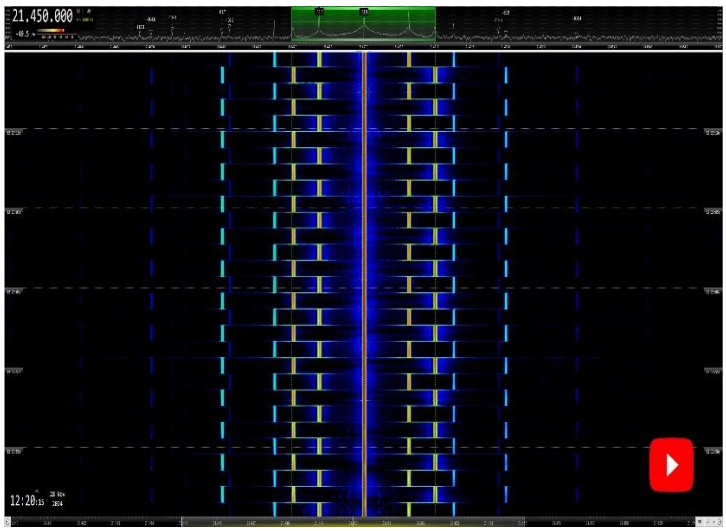


7032 kHz USB. Noise. 50 Hz. BW = 3.3 kHz. Jammer / requency occupation

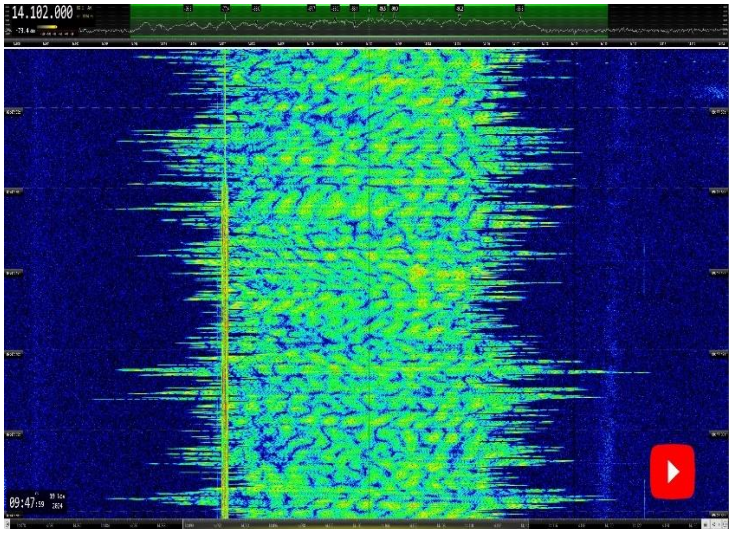


29100 kHz USB: Noise. 50 Hz. Jammer / frequency occupation (similar to the TX on 7023 kHz USB)

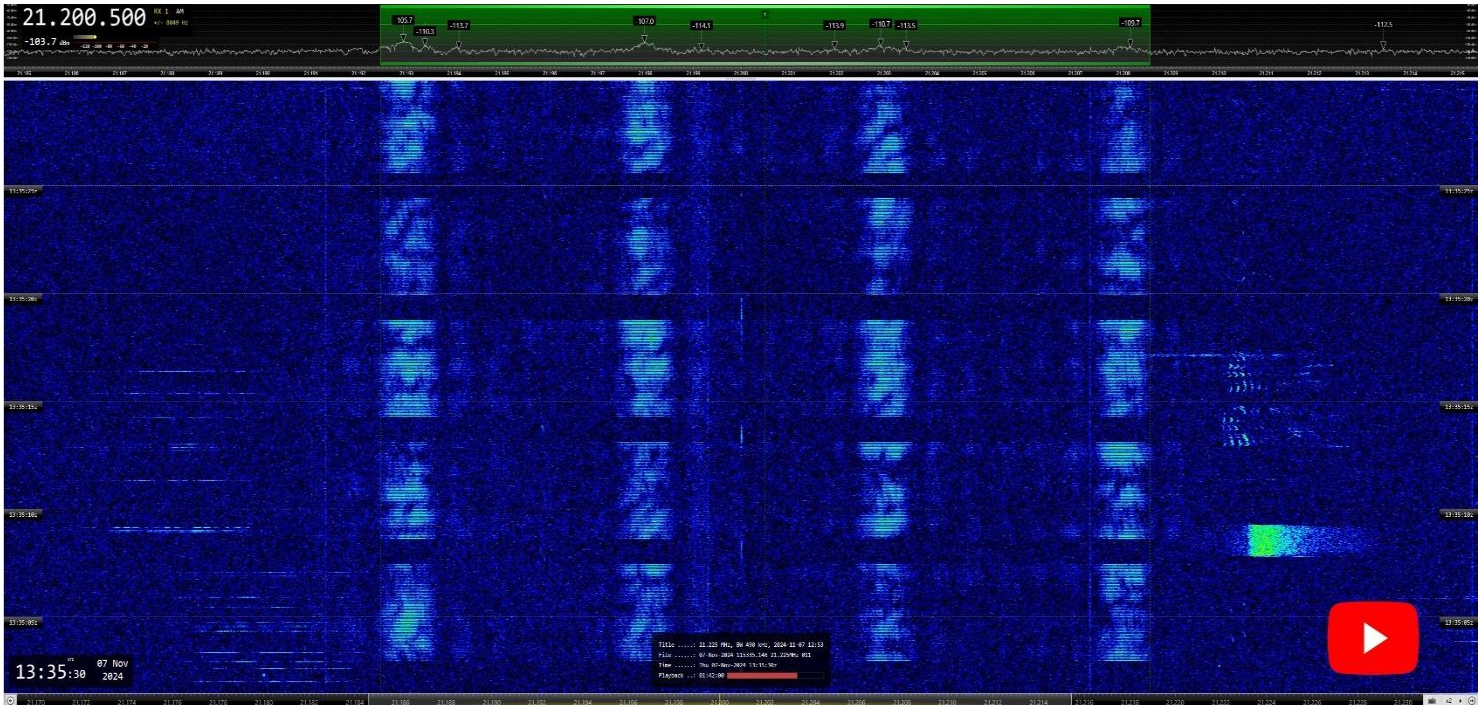
In November 2024, in addition to the numerous and always annoying OTHR, radar and MIL transmissions, we also observed some non-amateur transmissions whose origin and purpose is unknown.



21450 kHz CF: XXX. BW = 2 kHz. DSB or AM + carrier. 4 tones, alternated

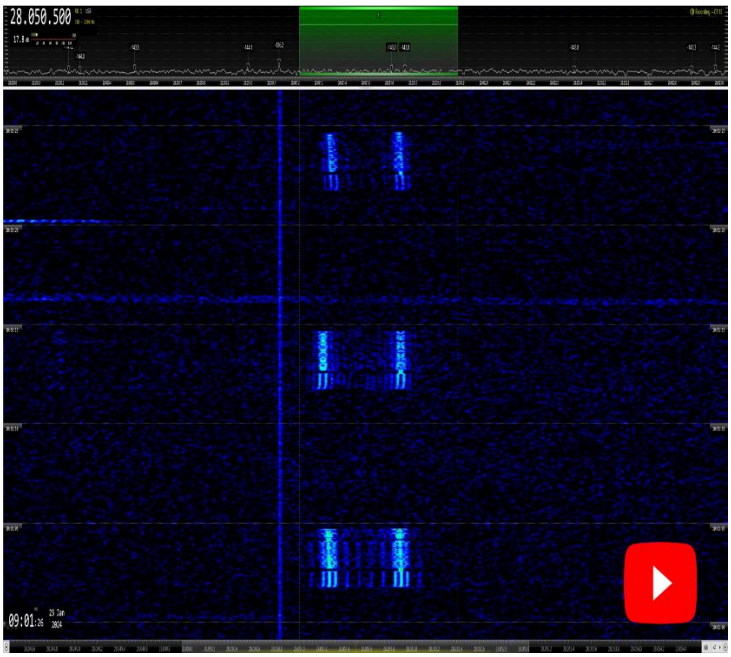


14102 kHz USB. XXX. BW ca 16 kHz. Drifting. RX on several EU KiwiSDR

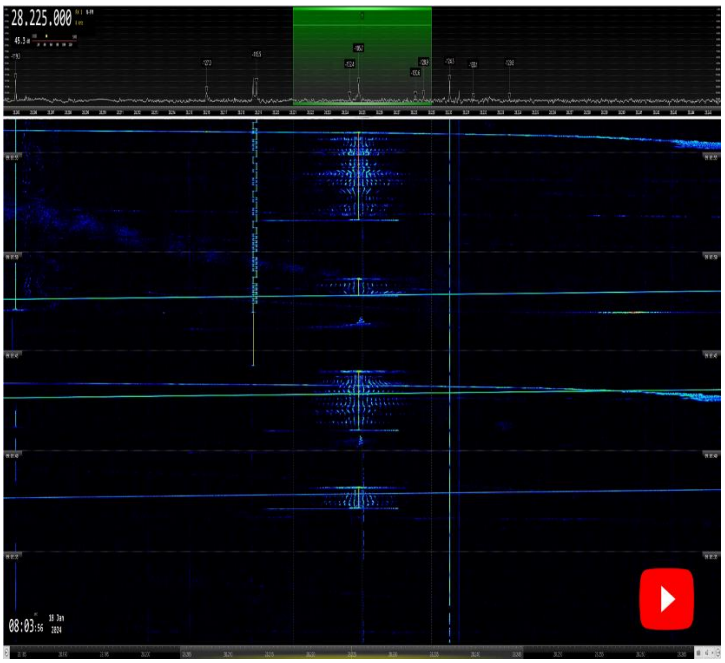


21200.5 kHz CF: XXX. Unidentified bursts. BW = 16 kHz. 4 channels. 14 pps

Besides all these non amateur transmissions, we also received fishing buoys, Cbers, txai dspatch stations, pirates and village radio transmissions in our HF bnadas, some of them like the examples proposewd below.



28050 kHz CF: F1B fishing buoys. Shift = 300 hz. 51 Bd



28225 kHz CF: FM. BW ca 6 kHz. Female voice. Slavic language. Taxi

All these hundreds of non-amateur transmissions - the najority of them, long-lasting - are a a big annoyance for the amateur radio operators that try to enjoy their hobby in the bands that are allocated to them for that purpose, as they drastically reduce the usable spectrum in these bands.

- Find other videos and screenshots about the transmissions received during November at the end of this Newsletter -

Detailed reports of national coordinators

Abbreviations used (as per IARUMS definitions)

aka = also known as **| BC** = Broadcast | **Bd** = Baud | **BD** = Burst duration) | **BRI** = Burst repetition interval. **BW** = Bandwidth | **ca** = approximate | **CHN = PRC** = People´s Republic of China | **CF** = Center frequency **DF** = Direction finding (radio location; see also TDoA) | **FMCW** = frequency modulated continuous wave **FMOP** = frequency modulated on pulse | **OTHR** = over the horizon radar | **SH** = Shift (Hz) | **sps** = sweeps per second | **TDoA** = Time difference of arrival | **ui** = **unid** = unidentified.

DARC; Harald, DL9NDW and the DARC IW team

kHz	UTC	DD	MM	ITU	IDENT	MODE	BD /sps	SH / BW	DETAILS
6990.0	18:13	16	11	RUS		RADAR	40	12K0E	OTHR Container, splattering heavily up to 7005
7000.0	00:20	29	11			N0N			carrier 6999.96 kHz , unid , long lasting, not local
7009.0	19:45 vt*	26 vd*	11	CHN		RADAR	66.7	10K0E	OTHR Bursts , * also in other SPS and other QRG in 40m Band. Mostly Afternoon or early evening. 33 Reports .
7016.0	10:53	20	11	RUS		J7D	120	2K60E	CIS-12
7034.0	20:04 vt*	03 vt*	11			XXX		3K0E	Jammer, Carrier with 100hz spaced subcarriers 3Khz USB orientation. Daily , * all day long changing between Russian Hymn and Jammer. Sometimes UNID Digital mode in Background
7038.0	19:27	07	11			XXX	0.2	3K0E	Jammer, sweeping noise
7054.0	15:50	05	11	RUS		F1B	50	200H	F1B
7054.0	19:20	25	11	RUS		F1B	50	200H	F1B
7055.0	18:29 vt*	11 vt*	11			J3E-L		2K70E	Radiowar, Music, NON Ham Voice : UKR vs RUS. * Daily. Sometimes on 7050 or 7058, 7060,
7064.0	20:01	10	11	RUS		J7D	120	2K60E	CIS-12
7065.0	21:21 vt*	22 vd*	11	RUS		RADAR	40	12K0E	OTHR Container, * often. 9 reports across 40m Band
7109.0	19:19	04	11			J7D	125	1K75E	MIL-188-141A
7119.0	20:02	10	11	RUS		J7D	120	2K60E	CIS-12
7119.0	10:40	13	11	RUS		J7D	120	2K60E	CIS-12
7120.0	16:52	24	11			J7D	125	1K75	MIL-188-141A
7129.0	00:19	27	11			J7D	125	1K75	MIL-188-141A
7134.0	15:00	17	11	RUS		F1B	50	200H	
7148.0	11:36	23	11			J7D	125	1K75	MIL-188-141A
7155.0	20:02	03	11			XXX		2K70E	Jammer or some idle data mode
7175.0	16:00	20	11			J7D	125	1K75	MIL-188-141A
7176.0	17:17 vt*	03 vd*	11	RUS		J7D	120	2K60E	CIS-12, * also 13.11 16:15 (submode idle)
7187.0	17:46	21	11			J7D	125	1750	MIL-188-141A
7189.0	20:11	20	11	RUS		J7D	120	2K60E	CIS-12
7196.0	10:54	19	11	RUS		F1B	50	200H	
7200.0	15:18	08	11	CHN		XXX		20K0E	Jammer
7200.0	14:14	22	11	CHN		A3E		9K0E	TX on 7200, spreading 7kHz into 40m Band
10117.0	15:20	25	11			RADAR	86	32K0E	OTHR ? long lasting - shared band
10121.0	10:30	28	11	CHN		RADAR	86	54K0E	OTHR , 10094 ? 10148 kHz

DARC; Harald, DL9NDW and the DARC IW team

kHz	UTC	DD	MM	ITU	IDENT	MODE	BD /sps	SH / BW	DETAILS
14000.0	11:50	07	11			XXX		10K0E	Jammer
14046.0	10:19	17	11	CHN		RADAR	42	10K0E	OTHR Bursts. *also in other SPS and other QRG in 20m Band. 5 reports
14050.0	20:31	27	11	G		RADAR	50	20K0E	OTHR Cyprus UK SBA
14111.0	19:51 vt*	04 vd*	11	RUS		RADAR	40	12K0E	OTHR Container. *4 reports across 20m Band
14123.0	09:17	24	11			USB		2K70E	Radiowar, Music, NON Ham Voice : UKR vs RUS
14220.5	12:07	11	11			F1D	600	600H	DPRK-FSK 600
14298.0	12:19	22	11			F1D	600	600	DPRK-FSK600
14298.8	13:11	13	11			F1D	600	600H	F1D
21000.0	11:48	06	11			XXX		3K70E	Jammer, qtf = Krim
21063.0	09:30 vt*	27 vd*	11	RUS		RADAR	40	12K0E	OTHR Container. *14 reports across 20m Band
21100.0	10:50	17	11			J3E-U		2K4E	Far East Pirates
21158.0	08:38 vt*	20 vd*	11	CHN		RADAR	66.7	10K0E	OTHR Bursts. * also in other SPS and other QRG in 20m Band. 6 reports
21247.0	11:59	11	11	CHN		RADAR	10	160K0E	OTHR Wideband
21280.0	16:22	18	11			XXX		9K0E	Seems a multifrequency digital mode. Very much quick qsb
21335.0	12:21	15	11	CHN		RADAR	10	160K0E	OTHR Wideband 21255 - 21415
28025.1	16:16 vt*	04 vd*	11			F1B	51	300H	Enagal GPS fishing buoys , *very often on first 120KHz of 10m Band, QTE 200 to 240 degrees, 28 Reports
28150.0	12:50 vt*	10 vd*	11	G		RADAR	50	20K0E	OTHR Cyprus ,UK SBA. *14 reports across 10m Band
28190.0	10:31	01	11			RADAR	1000	50K0E	OTHR, weak , strange
28235.0	12:30	02	11			F3E		8K0E	Far East Pirates
28249.0	10:50	09	11	IRN		RADAR		46K0E	Iranian radar - 150 sps and 313 sps alternating , * daily when band open to east, mostly morning times. 11 reports , sometimes alternative SPS (333 / 695). Also 28300,28350,28400,29000
28275.0	15:16	08	11			F3E		7K0E	Far East Pirates
28550.0	08:17	27	11	IRN		RADAR		46K0E	Iranian radar - 150
28675.0	14:29 vt*	28 vd*	11			RADAR	0.2	CA90K0E	Slow radar traces, all 10 seconds 1 trace abt. 5 sec. long, often when band open to far east, unclear source

IRTS; Michael, EI3GYB

kHz	UTC	DD	MM	ITU	IDENT	MODE	BD /sps	SH / BW	DETAILS
3717	1000	4	11	MM		USB			Male voices chatting in Japanese. Very strong. Also heard on the 12th at 0650z.
7032	2140	1	11			USB			Jammer. Huge and persistent. Audible every day all day long.
7055	1900	1	11	RUS/ UKR		LSB			Russian-Ukrainian radio war. Daily all day long.
7060	645	12	11	RUS/ UKR		LSB			Russian-Ukrainian radio war. Huge signals.
7062	2330	30	11	MRC /MM		USB			Moroccan fishermen. Strong signals.
7103.5	1930	15	11			PSK			Link-11 Clew. Strong and persistent.

IRTS; Michael, EI3GYB

kHz	UTC	DD	MM	ITU	IDENT	MODE	BD /sps	SH / BW	DETAILS
7180	2250	15	11	E or MM		USB			Spanish fishermen, medium signals.
14192	1200	1	11	RUS		F1B			Russian navy in Kaliningrad. Daily, all day long.
18165	1545	9	11	G		RADAR			Radar from 18165 to 18200 kHz. Huge and persistent. British base in Cyprus.
21115	1030	11	11			RADAR			Radar from 21115 to 21140 kHz. Strong and persistent.
21155	1025	11	11			RADAR			Radar from 21155 to 21185 kHz. Huge and persistent.
21365	1600	15	11			RADAR			Radar from 21365 to 21380 kHz. Medium signal, persistent.
21400	1020	11	11			RADAR			Radar from 21400 to 21415 kHz. Huge and persistent.
21410	1125	12	11			RADAR			Radar from 21410 to 21430 kHz. Strong and persistent. Also on the 13th at the same time.
21438	1200	1	11	UKR		CW			Russian Navy, Sevastopol. Daily all day long with a medium to strong signal.
24950	1120	17	11			RADAR			Radar from 24950 to 25115 kHz. Huge and persistent.
28280	1015	9	11	RUS		FM			Russian taxi service, female voice. Strong.
28390	1330	4	11	IRN		RADAR			Radar from 28390 to 28520 kHz. Huge and persistent. Heard also on other days.
28550	1215	19	11	IRN		RADAR			Radar from 28550 to 28590 kHz. Huge and persistent. Heard also on other days.
28620	1145	5	11	IRN		RADAR			Radar from 28620 to 28670 kHz. Huge and persistent. Heard also on many other days at various times.
28755	1150	3	11			AM			Fishermen in Arabic, male voices.Medium signals.
28930	1350	5	11			RADAR			Radar from 28930 to 28955 kHz. Huge and persistent.
29000	1240	3	11	B		AM			Brazilian CBers. Male and female voices. Roger beeps. Heard on many days during the month with weak to medium signals.
29005	1235	11	11			RADAR			Radar from 29005 to 29035 kHz. Huge and persistent.
29100	1245	1	11			FM			Carrier. Heard daily in the mornings and early afternoons with a medium to strong signal.
29175	1530	2	11			FM			SE Fishermen. Medium signals.
29350	1155	10	11			RADAR			Radar from 29350 to 29450 kHz. Huge and persistent.
29450	1150	10	11			RADAR			Radar from 29450 to 29490 kHz. Huge and persistent.

PZK; Mirek, SP5GNI

kHz	UTC	DD	MM	ITU	IDENT	MODE	BD /sps	SH / BW	DETAILS
7032.0	1310	6	11			USB		3K0	Military songs in Russian language
7120.0	1930	29	11			RADAR		10K0E	3 sec burst foghorn
7173.0	1740	27	11			RADAR		14K0E	S9 +10

PZK; Mirek, SP5GNI

kHz	UTC	DD	MM	ITU	IDENT	MODE	BD /sps	SH / BW	DETAILS
14111.0	1000	27	11			RADAR		14K0E	S9
14244.0	1220	6	11			RADAR		10K0E	3 sec burst foghorn
14295.5	1213	2	11			UI		2K0E	S9+
14298.5	1215	8	11			UI		1K0E	short bursts like RTTY 600
14331.0	1219	29	11			RADAR		10K0E	3 sec burst foghorn
18167.0	vt	vd	11			RADAR		12K0E	S8
21028.0	0905	28	11			RADAR		10K0E	Foghorn
21060.0	1235	20	11			RADAR		12K0E	S9+20 looks like Cyprus
21063.0	0935	27	11			RADAR		12K0E	S9+20
21104.0	1035	16	11			RADAR		12K0E	S9+
21129.0	0905	28	11			RADAR		12K0E	S9+10
21130.0	vt	vd	11			RADAR		12K0E	S9+20
21132.0	0855	1	11			RADAR		12K0E	S9+
21161.0	1240	29	11			RADAR		12K0E	S9+10
21163.0	1645	9	11			RADAR		14K0E	S6
21171.0	1048	5	11			RADAR		10K0E	12 sec. burst strong
21174.0	1200	2	11			RADAR		12K0E	S9+ also at 21128.0
21175.0	1444	22	11			RADAR		12K0E	S9 also 21408.8
21305.0	1217	2	11			RADAR		10K0E	12 sec. burst strong
21308.0	0950	25	11			RADAR		10K0E	3 sec burst foghorn 21282.0 21328.0
21316.0	1015	3	11			RADAR		12K0E	S9+
21325.0	1215	29	11			RADAR		10K0E	3 sec burst foghorn
21333.0	1433	17	11			RADAR		14K0E	S5 foghorn later at 21174.0
21344.0	1100	15	11			RADAR		12K0E	S9+20
21374.0	1543	15	11			RADAR		14K0E	S5 foghorn
21379.0	1215	29	11			RADAR		12K0E	S9+10
21410.0	1445	30	11			RADAR		14K0E	S7 foghorn
21420.0	vt	4	11			RADAR		14K0E	S9+25dB!
21420.0	1230	5	11			RADAR		20K0E	S8
21430.0	1210	8	11			RADAR		20K0E	S9+
24880.0	0948	13	11			RADAR		12K0E	partially in the band
24897.0	1120	4	11			RADAR		14K0E	S9
24900.0	0948	25	11			RADAR		12K0E	S8
24905.0	1125	13	11			RADAR		12K0E	S6
28050.0	1055	12	11	IRN		RADAR		60K0E	S7
28059.0	0855	6	11			RADAR		20K0E	S9+
28090.0	1043	20	11			RADAR		20K0E	S9+
28115.0	0910	6	11			F3E		6K0	In Russian (radio taxi)
28150.0	vt	vd	11	IRN		RADAR		60K0E	S9
28350.0	1155	7	11	IRN		RADAR		60K0E	S9
28600.0	vt	vd	11	IRN		RADAR		60K0E	S9
28670.0	0950	12	11			RADAR		20K0E	S9+ also 28334.0
28850.0	0935	12	11			RADAR		20K0E	S9+
29186.0	1210	26	11			RADAR		20K0E	S9+
29245.0	0920	5	11			RADAR		20K0E	S9+
29272.0	1310	9	11			RADAR		20K0E	S9+

PZK; Mirek, SP5GNI

kHz	UTC	DD	MM	ITU	IDENT	MODE	BD /sps	SH / BW	DETAILS
29504.0	1115	19	11			RADAR		20K0E	S9+
29620.0	0950	29	11			RADAR		20K0E	S9+

SRAL; Pekka, OH2BLU

kHz	UTC	DD	MM	ITU	IDENT	MODE	BD /sps	SH / BW	DETAILS
7 MHz	1530-0415	*	11	RUS		RADAR	40 sps	13k0E	*) Days: 7. 11. 17. 19. 20. 23. 24. 26. 27. 29. 30. (WebSDR 28d)
7000.0	1230-1900	11 - 30	11	CHN		A3A		4k0E	Time sig Chinese version
7006.5	0740-0900	07 15	11	RUS		F1B		200/250 H	
7008.5	0700-0900	05 15	11	RUS		J7D	120	2k60E	
7010.0	0615-1830	15 17	11	RUS		F1B		200H	
7014.0	1010-1830	*	11	RUS		F1B		200H	*) Days: 9. 10. 13. 14. 28. 29. 30.
7016.0	1015-1200	*	11	RUS		J7D	120	2k60E	*) Days: 5. 16. 20. 27.
7019.0	0600-1830	*	11	RUS		F1A/ N0N		200H	*) Days: 19. 20. 25. 28. 29. 30.
7030.0	1540-1730	04 11	11	RUS		F1B		250H	
7032.0	0600-1830	01 - 30	11	RUS		J3E-u		3k60E	Non-stop Russian anthem / mx,
7032.0	0000-2400	01 - 30	11	RUS		J3E-u		3k60E	Brum when no music.
7035.1	0600-1930	02 - 30	11	RUS		J3E-l		3k60E	240 Hz ticking carriers
7054.0	0900-1500	27 28	11	RUS		F1B		200H	
7062.0	0630-1415	*	11	RUS		J7D	120	2k60E	*) Days: 1. 2. 5. 6. 15.
7065.0	1030-1145/	11	11	RUS		F1B/ N0N		250H	
7066.0	0545-1930	*	11	RUS		F1A/B/ N0N		200H	*) Days: 17. 18. 19. 21. 22. 23.
7068.0	1230-1440/	19 21	11	RUS		J7D	120	2k60E	
7077.0	0900-1130	08	11	RUS		J7D	120	2k60E	
7081.0	0900-1130	08	11	RUS		J7D	120	2k60E	
7088.5	0605-1730	24	11	RUS		J7D	120	2k60E	
7089.0	0715-1555/	*	11	RUS		J7D	120	2k60E	*) Days: 4. 8. 10. 12. 19. 26.
7100.0	1315-1900	*	11			G7D		2k40E	*) Days: 1. - 5. 14. - 19. 28. 29. LINK11 usb
7101.0	0715-1435	*	11	RUS		A1A	14-18 wpm	40H	*) Days: 4. 5. 26. MR 5BL
7122.0	0830-1015	01 06	11	RUS		F1B		250H	

SRAL; Pekka, OH2BLU

kHz	UTC	DD	MM	ITU	IDENT	MODE	BD /sps	SH / BW	DETAILS
7134.0	1135-1900	*	11	RUS		F1B		200H	
7159.0	1000-1400	08	11	IW		G7D		2k40E	LINK11 usb
7159.0	0750-0900/	07	11	RUS		F1B		200H	
7160.0	0600-1725	19 20	11	RUS		N0N		40H	
7182.0	0600-1710	*	11	RUS		F1A/ N0N	16wpm	200H	*) Days: 21. 22. 23. 26. - 29. 5BL
7185.0	0750-1310	*	11	RUS	ROSA	A1A	14 - 21 wpm	40H	@kx + msg
7193.0	1015-1550	01 - 11	11	RUS		F1B		200H	
7200.0	0600-1530	06	11	RUS		J7D	120	2k60E	
7200.0	1050-1430/	*	11	TWN	N unity r	A3E		9k0	*) Days: 1. - 4. 12. 15. 29. 30. Korean px
7200.0	1050-1515	*	11	KRE		XXX/ jam		10k0E	*) Days: 8. 9. 12. 13. 19. 29.
10 MHz	0430-0710/	15	11	G		RADAR	50sps	20k0	(WebSDR 3d)
10 MHz			11	RUS		RADAR	40sps	13k0E	(WebSDR 16d)
10130A	1200-1257/	*	11	GUM		spurious		5k0E	*) Days: 14. 17. 20. 24. from 9910 kHz
14 MHz	0600-1730	*	11	RUS		RADAR	40sps	13k0E	*) Days: 8. 17. 19. 23. (WebSDR 18d)
14 MHz	0945-1800	*	11	CHN		RADAR	50/67sps	10k0E	*) Days: 1. 2. 4. 8. 13. 14. 15. 20. 23. 24. 25. 29. 'foghorn'
14000.0	1100-1230	30	11			RADAR		6k0E	SuperDARN, jumps +/- 25 kHz
14026.0	1110-1230	02	11	RUS		J7D	120	2k60E	
14050.0	0820-0935/	13	11	RUS		F1B		200H	
14160.0	0835-0910	15 23	11	RUS		F1B		250H	
14171.0	0900-0955/	27	11	RUS		J7D	120	2k60E	
14192.0	0545-1900	01 - 30	11	RUS		F1B		200H	
14220.0	1035-1135	02 09	11	RUS		J7D	120	2k60E	
14292.0	1115-1120/	15	11	RUS		F1B		500H	
18 MHz	1500-1600	12 25	11	G		RADAR	50 sps	20k0	(WebSDR 5d)
18 MHz	0600-1445	*	11	RUS		RADAR	40 sps	13k0E	*) Days: 2. 7. 27. (WebSDR 5d)
21 MHz	0545-1515	*	11	G		RADAR	50/25 sps	20k0	*) Days: 4. 5. 8. 13. 14. 15. 17. 21. 28. (WebSDR 14d)
21 MHz	0530-1645	*	11	RUS		RADAR	40 sps	13k0E	*) Days: 1. - 6. 8. 11. - 17. 20. - 30. (WebSDR 26d)
21 MHz	0630-1000	17 19	11	CHN		RADAR	50 sps	10k0E	(WebSDR 18d)

SRAL; Pekka, OH2BLU

kHz	UTC	DD	MM	ITU	IDENT	MODE	BD /sps	SH / BW	DETAILS
21 MHz	0600-1400	*	11	CHN		RADAR	50/67sps	10k0E	*) Days: 2. 4. - 8. 10. 12. 15. 16. 19. 20. 21. 25. 26. 28. 29. 30. 'foghorn'
21001.5	0600-1730	*	11			XXX/ jam		5k0E	*) Days: 1. - 12. 20. - 30.
21100.0	0600-0821/	*	11	CHN		DRM	9.08 kbps	9k60	*) Days: 6. 16. 28.
21433.0	0750-1020	18 19	11			RADAR	100 sps	20k0	
21438.0	/0830-1600	01 - 30	11	RUS	RCV	A1A	16 - 22 wpm	40H	Navip etc.
24 MHz	0800-1155	10 15	11	G		RADAR	50sps	20k0	(WebSDR 2d)
24 MHz	0545-1400	*	11	RUS		RADAR	40sps	13k0E	*) Days: 1. 2. 3. 6. 15. 22. 27. 28. 31. (WebSDR 17d)
25000.0	0600-1425	26 - 30	11			RADAR	2 sps	200k0	Codar
28 MHz	0530-1500	*	11	G		RADAR	25/50sps	20k0	*) Days: 1. 2. 3. 5. - 13. 16. 18. - 23. 25. - 30. (WebSDR 27d)
28 MHz	0530-1600	*	11	IRN		RADAR	150/313	60k0E	*) Days: 1. - 7. 9. - 16. 18. - 23. 29. 30. (WebSDR 29d)
28 MHz			11	IRN		RADAR	333/695	60k0E	(WebSDR 0d)
28 MHz	0645-1130	*	11	RUS	Taxi disp.	F3E		3k0E	*) Days: 8. 10. 15. 22. 25. - 29. 18 reports

URE; Gaspar, EA6AMM. Team members: EA4021SWL, EB4APL (Radars activity: summarized per band)

kHz	UTC	DD	MM	ITU	IDENT	MODE	BD /sps	SH / BW	DETAILS
7000.0*	vt**	vd**	11	RUS		RADAR	40	12K0E	OTHR Contayner TX *on 40m **Very Often. 53 reports 2 simultaneous TX on 40m = 7 3 simultaneous TX on 40m = 4
7000.0*	vt**	vd**	11	CHN		RADAR	41.7 50 66.7	10K0E	OTHR “Foghorn”. Bursts. TX *on 40m **Very often: 30 reports
7000.0	19:52	12	11			XXX		2K80E	7000 kHz USB. XXX. Unknown continuous signal
7000.0	17:43 vt*	20 vd*	11			OTHER	2400	2K40E	7000 kHz USB. LINK-22 NILE (NILE = NATO Improved LINK-Eleven). *Also on 25/11 and on 27/11, vt
7007.0	16:17	20	11			XXX			WHARQ. HF Hybrid Automatic Repeat Request (ARQ). Burst system. Several BW, modulation types and QRG
7010.0	18:00	17	11			J7D	120	2K70E	CIS-12
7028.0	16:15	08	11			XXX	4800	6K0E	WHARQ
7032.0	06:51 vt*	02 vd*	11			J3E-U		3K30E	Noise. Jammer / QRG occupation *Almost daily. 22 reports
7032.7	20:00	12	11			XXX		C1K0EA	Unid MFSK mode; similar to OLIVIA
7036.0	19:12 vt*	03 vd*	11	RUS		F1B	50	250H	*Often. 4 reports
7040.0	19:44 vt*	11 vd*	11			XXX		2K0E	Jammer. 85 Hz *Also on 18/11, 2049Z
7054.0	17:09 vt*	06 vd*	11	RUS		F1B	50	200H	*Often 8 reports

URE; Gaspar, EA6AMM. **Team members: EA4021SWL, EB4APL** **(Radars activity: summarized per band)**

kHz	UTC	DD	MM	ITU	IDENT	MODE	BD /sps	SH / BW	DETAILS
7067.0	12:02	11	11			J7D		2K70E	CIS-12. Submode idle
7070.0 USB	18:05	26	11			J7D	125	1K80E	MIL-188-141A ALE 2G
7089.8	17:44 vt*	02 vd*	11			G1D	2400	2K40E	LINK-11 SLEW *Also on 16/11, 2120Z
7098.0	12:55	25	11			F1B	75	250H	
7100.0 USB	21:46 vt*	02 vd*	11			G7D	45.45 75	2K40E	LINK-11 CLEW SSB *Very often. 14 reports
7119.0	22:28	13	11			J7D		2K70E	CIS-12. Submode idle
7134.0	22:26	02	11	RUS	RDL	F1B	50	200H	*Also on 12/11 and on 28/11, vt
7155.0	19:00	03	11			XXX		4K0E	Jammer. 85 Hz
7159.0 USB	19:04	03	11			G7D	75	2K40E	LINK-11 CLEW SSB
7193.0	12:15	10	11	RUS	RDL	F1B	50	200H	*Also on 11/11, 1200Z
7198.0	15:09	24	11			J7D	120	2K70E	CIS-12
10155.0	*18:42*	*06*	*11*	*RUS*		*RADAR*	*40*	*12K0E*	*OTHR Contayner. Splatter down to 10142 kHz*
13998.0	11:57	20	11			J3E-U		2K80E	Unid sts. Male voices. Unid language
13998.0	09:05	22	11			J3E-U		2K80E	Unid sts. Male voices. Arabic language. Engine sound. Probably fishermen
*14000.0**	*vt***	*vd***	*11*	*RUS*		*RADAR*	*40*	*12K0E*	*OTHR Contayner TX *on 20m **Often: 37 reports 2 simultaneous TX on 20m: 6 3 simultaneous TX on 20m: 2*
*14000.0**	*vt***	*vd***	*11*	*CHN*		*RADAR*	*41.7 50 66.7*	*10K0E*	*OTHR "Foghorn" (bursts) TX *on 20m **Almost daily. 74 reports*
*14000.0**	*vt***	*vd***	*11*			*RADAR*		*Ca6K0E*	*SuperDARN bursts (SuperDARN = Super Dual Auroral Radar Network) TX *on 20m. **Often. 12 reports Bursts on 14000, 14005, 14010 and on 14020 kHz CF. Long-lasting*
14000.0 USB	11:27 vt*	01 vd*	11				2400	CA3K0E	MIL-188-141C ALE 3G bursts *Very often. 18 reports
14000.0 USB	18:20 vt*	03 vd*	11			J7D	125	1K80E	MIL-188-141A ALE 2G *Also on 04/11, 1838Z
14000.0	08:00	08	11			A3E J3E-U		CA6K0E 2K80E	AM (first 2 exchanges) and USB. Air traffic. Male voice. German language
14000.0 USB	11:28	11	11			XXX	4800	6K0E	WHARQ. HF Hybrid Automatic Repeat Request (ARQ). Burst system. Several BW, modulation types and QRG
14000.0 USB	12:53 *vt*	11 vd*	11				2400	CA3K0E	MIL-188-141C ALE 3G complete link *Also on 12/11, 1209Z
14000.0 USB	09:44	13	11			G1D	2400	2K40E	STANAG-4197 bursts
14000.0 USB	08:56	26	11			XXX	2400	2K40E	Unidentified MSK bursts. Same as on November 22, 14033 kHz USB, 0738Z
14002.0	10:41	06	11			F1B	75	850H	STANAG-4481 bursts. Sometimes, TX is sent at the same time on 13998 kHz CF (out of band)
14021.0	17:51	06	11			F1B	50	200H	
14026.0	10:22 vt*	02 vd*	11			J7D	120	2K70E	CIS-12 *Also on 04/11, 1022Z

URE; Gaspar, EA6AMM. **Team members: EA4021SWL, EB4APL** **(Radars activity: summarized per band)**

kHz	UTC	DD	MM	ITU	IDENT	MODE	BD /sps	SH / BW	DETAILS
14033.0 USB	07:38	22	11			XXX	2400	2K40E	Unid MSK bursts
14044.0 USB	07:34	20	11			J7D	125	1K80E	MIL-188-141A ALE 2G
14050.0	08:57	03	11			F1B	50	200H	
14089.0	08:32	22	11			J3E-U		3K30E	Non amateur comms after end of CIS-60 TX on 14090.9 kHz CF. Male voice, Slavic language
14089.5	12:32 vt*	23 vd*	11			F1D	600	600H	DPRK-FSK 600 ARQ *Often. 9 reports
14090.9	08:26	22	11			W7D	30	2K80E	CIS-60
14100.0 LSB	16:28 vt*	22 vd*	11	MOZ	LIMA327 AFUNGI	J7D	125	1K80E	MIL-188-141A ALE 2G. Inverted spectrum. *Often 6 reports
14102.0	09:45	19	11			XXX		CA16K0E	Unidentified signal. Also RX on EU KiwiSDRs. Drifting
14108.0	09:33	24	11			J3E-U		2K80E	UKR/RUS radiowar. Long-lasting
14110.0	11:27 vt*	17 vd*	11			J3E-U		2K80E	UKR/RUS radiowar. Long – lasting. *Also on 27/11, 1127Z
14115.0	10:08	24	11			J3E-U		2K80E	UKR/RUS radiowar
14117.0 LSB	08:45	22	11			W7D	44.44	2K40E	CHN OFDM 39
14143 LSB	13:38	08	11			W7D	44.44	2K40E	CHN OFDM 39
14147.0	15:45	09	11			J3E-U		2K80E	UKR / RUS radiowar. Audio loops, music, propaganda, insults, etc
14153.0 LSB	07:43	22	11			W7D	44.44	2K40E	CHN OFDM 39
14160.0	08:22	23	11			F1B	50	250H	
14169.0	07:16 vt*	11 vd*	11			F1B	50	200H	*Also on 13/11, 0746Z
14171.0	08:21 vt*	06 vd*	11			J7D		2K70E	CIS-12. Submode idle *Also on 13/ and on 27/11, vt
14192.0	08:29 vt*	01 vd*	11	RUS		F1B	50	200H	*Almost daily. 27 reports
14198.5	12:31	21	11			F1D	600	600H	DPRK-FSK 600 ARQ
14206.0	15:07	17	11			J3E-U		2K80E	Music
14220.0	10:45 vt*	02 vd*	11			J7D	120	2K70E	CIS-12 *Also on 09/11 and on 18/11, vt
14220.5	08:14 vt*	02 vd*	11			F1D	600	600H	DPRK-FSK 600 ARQ *Often. 10 reports
14235.0 USB	15:15	04	11	CHN	BC5 DB5	J7D	125	1K80E	MIL-188-141A ALE 2G
14242.0	07:14	11	11			J7D	120	2K70E	CIS-12
14248.5	07:10 vt*	07 vd*	11			F1D	600	600H	DPRK FSK 600 ARQ *Also on 08/11, 0707Z
14291.0 LSB	13:18	11	11			W7D	44.44	2K40E	CHN OFDM 39
14296.0	15:44	08	11			XXX	50	20K0E	Radar?
14298.5	12:03 vt*	01 vd*	11			F1D	600	600H	DPRK-FSK 600 ARQ Very often. 19 reports
14308.0	11:17	12	11			F1B		500H	Short FSK bursts and carrier on 14307.75 kHz

URE; Gaspar, EA6AMM. **Team members: EA4021SWL, EB4APL** **(Radars activity: summarized per band)**

kHz	UTC	DD	MM	ITU	IDENT	MODE	BD /sps	SH / BW	DETAILS
14308.0	11:22 vt*	12 vd*	11			F1B	75	500H	*Also on 19/11, 0904Z
14310.0	09:17	26	11			J7D		2K70E	CIS-12. Submode idle
14331.5	07:00	08	11			F1D	600	600H	DPRK-FSK 600 ARQ
14340.0	07:57	14	11			XXX	21.5	CA3K0E	Unidentified continuous signal. BW ca 30K0E, 21.5 pps. Radar?
*18068.0**	*vt***	*vd***	*11*	*RUS*		*RADAR*	*40*	*12K0E*	*OTHR Contayner TX *on 17m: 1 rprt*
*18068.0**	*vt***	*vd***	*11*	*G*		*RADAR*	*50*	*20K0E*	*OTHR (UK SBA, Cyprus) TX *on 17m **2 reports*
*21000.0**	*vt***	*vd***	*11*	*RUS*		*RADAR*	*40*	*12K0E*	*OTHR Contayner TX *on 15m **Almost daily: 258 reports 2 simultaneous TX on 15m: 47 3 simultaneous TX on 15m: 2 Sometimes, observed jumping every 2 minutes along the whole band*
*21000.0**	*vt***	*vd***	*11*	*CHN*		*RADAR*	*41.7 50 66.7*	*10K0E*	*OTHR "Foghorn" (bursts) TX *on 15m **Almost daily. 126 reports*
*21000.0**	*vt***	*vd***	*11*	*CHN*		*RADAR*	*50*	*10K0E*	*OTHR TX *on 15m **Often 8 reports*
*21000.0**	*vt***	*vd***	*11*	*CHN*		*RADAR*	*10*	*160K0E*	*Wideband OTHR (bursts) TX *on 15m **Often 4 reports*
*21000.0**	*vt***	*vd***	*11*	*G*		*RADAR*	*25 50*	*20K0E*	*OTHR (UK SBA; Cyprus) TX *on 15m **Often. 25 reports*
21000.0	14:13 vt*	11 vd*	11			XXX		2K0E	Jammer. 84 Hz *Also on 14/11, 1314Z
21001.5	08:29 vt*	01 vd*	11			XXX		4K0E	Jammer. 85 Hz *Almost daily. 23 reports
21008.5	07:26 vt*	02 vd*	11			F1D	600	600H	DPRK-FSK 600 ARQ *Often. 9 reports
21010.0	11:58	01	11			A3E		9K0E	AM. BC. TX (carrier, time tones) at 1158Z. Broadcast start (voice, male and female speakers, French language) at 1200Z. Unid st. "*Côte d'Ivoire*" (Ivory Coast Republic) heard several times
21010.0	13:15	14	11			XXX		2K0E	Jammer. 85 Hz
21030.0	07:16	14	11			XXX		5K0E	Jammer. 85 hz
21060.0	13:21	14	11			XXX		2K0E	Jammer. 85 Hz. *Also on 21061.5 kHz CF. 2 simultaneous TX on 15m
21069.0 LSB	11:10	08	11			G7D	75	2K40E	CHN 4+4 a.k.a. PRC 4+4
21061.5	13:20	14	11			XXX		2K0E	Jammer. 85 Hz
21080.0	13:21	14	11			XXX		2K0E	Jammer. *Also on 21061.5 kHz CF. 2 simultaneous TX
21094.0 LSB	06:59	16	11			G7D	75	2K40E	CHN 4+4 a.k.a. PRC 4+4
21100.0	07:20 vt*	05 vd*	11	CHN	CUC-ECDAV	W7D		9K50E	DRM (Digital Radio Mondiale) broadcast. ST: "CUC-ECDAV" = *Communications University of China. Center for Research in Radio and Television Digitalization Engineering of the Ministry of Education*. *Often. 6 reports

URE; Gaspar, EA6AMM. **Team members: EA4021SWL, EB4APL** **(Radars activity: summarized per band)**

kHz	UTC	DD	MM	ITU	IDENT	MODE	BD /sps	SH / BW	DETAILS
21118.5	07:19	23	11			F1D	600	600H	DPRK-FSK 600 ARQ
21118.5	11:17	23	11			F1D	600	600H	DPRK-FSK 600 ARQ
21121.1	18:01	09	11			J3E-U		2K40E	Unid sts talking. Male voices. Unid lang (sounds Arabic). Engine sound. Probably fishermen
21143.5	07:13 vt*	13 vd*	11			F1D	600	600H	DPRK-FSK 600 ARQ *Also on 20/11, 0731Z
21145.0 USB	07:46 vt*	02 vd*	11	MRC		J7D	125	1K80E	MIL-188-141A ALE 2G *Almost daily. 25 reports
21200.5	13:35	07	11			XXX	14	16K0E	Unidentified digital bursts. 4 channels
21205.5	09:06	11	11			XXX	14	16K0E	Unidentified digital bursts. 4 channels
21208.5	14:45	05	11			F1D	600	600H	DPRK-FSK 600 ARQ
21225.0 USB	08:10 vt*	17 vd*	11				2400	2K40E	MIL-188-141C ALE 3G *Also on 21/11, 0808Z
21233.5	12:47 vt*	07 vd*	11			F1D	600	600H	DPRK-FSK 600 ARQ *Also on 21/11, 0919Z
21297.0	10:40	01	11			F1B	50	850H	
21318.5	07:30	20	11			F1D	600	600H	DPRK-FSK 600 ARQ
21318.5	08:26	21	11			F1D	600	600H	DPRK-FSK 600 ARQ
21348.5	08:06	12	11			F1D	600	600H	DPRK-FSK 600 ARQ
21421.0	07:55	15	11			A1A			Encrypted message, looped. 'WRK ROSA ROSA 45678 67890 BEREZA 2534 0596 @KB @KX ROSA ROSA 67890 BEREZA 2534 0596 K'
21433.0	07:47	18	11	CHN ?		RADAR	100	20K0E	OTHR. TX starts with a 30 sec + long carrier. *Also on 19/11, 0819Z
21435.0	14:04	04	11			XXX		CA3K0E	21435 kHz USB. Transmissions using ALE 3G, MIL-188- 110A and STANAG-4539 bursts (“Mixed mode”; name: unknown)
21438.0	08:32 vt*	01 vd*	11	RUS	RCV	A1A			RUS navy QTC *Almost daily. 25 reports
21447.0 LSB	07:12 vt*	16 vd*	11			G7D	75	2K40E	CHN 4+4 a.k.a. PRC 4+4 *Also on 17/11, 0813Z
21446.0 USB	15:53	08	11			G1D	2400	CA3K0E	MIL 188-110A / MIL 188-110B App. C. RFSM 8000
21448.5	14:18	19	11			F1D	600	600H	DPRK-FSK 600 ARQ
21450.0	12:18	28	11			XXX		1K0E	AM (or DSB with center carrier) signal, alternating 2 tones. QRT: 1226Z
*24890.0**	*vt***	*vd***	*11*	*RUS*		*RADAR*	*40*	*12K0E*	*OTHR Contayner TX *on 12m ** 4 reports*
*24890.0**	*vt***	*vd***	*11*	*G*		*RADAR*	*50*	*20K0E*	*OTHR (UK SBA, Cyprus) TX *on 12m ** 1 report*
*24890.0**	*vt***	*vd***	*11*	*CHN*		*RADAR*	*41.7 50*	*10K0E*	*OTHR “Foghorn” (bursts) TX *on 12m **Often. 14 reports*
24912.0	09:55	11	11			XXX		CA2K0E	Jammer bursts. 85 Hz
24990.0	08:38	26	11			XXX		7K0E	Jammer. 85Hz
25000.0	*08:56 vt**	*25 vd**	*11*			*RADAR*	*2*	*200K0E*	*CODAR-like radar *Often. 6 reports*
*28000.0**	*vt***	*vd***	*11*	*IRN*		*RADAR*	*150 313*	*Ca45K0E*	*OTHR bursts alternating 150 and 313 pps *on 10m. **Almost daily Long-lasting on single QRG: 6 reports Hopping (long-lasting): 24 reports Hopping after every burst: 2 reports*

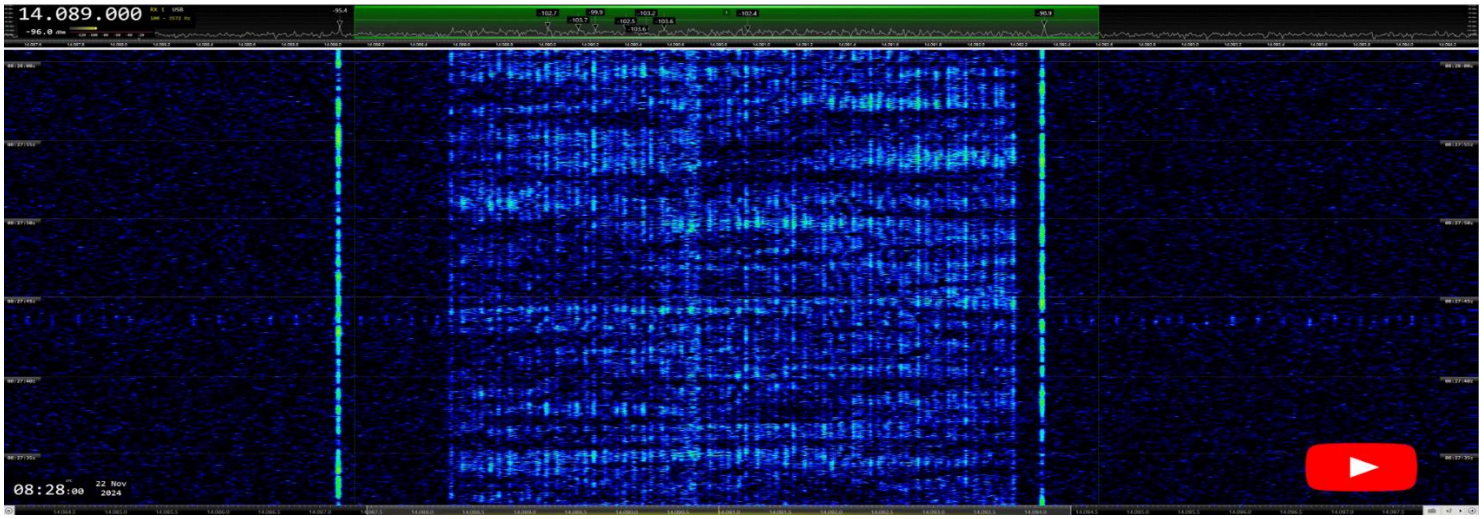
URE; Gaspar, EA6AMM. Team members: EA4021SWL, EB4APL (Radars activity: summarized per band)

kHz	UTC	DD	MM	ITU	IDENT	MODE	BD /sps	SH / BW	DETAILS
									313 pps bursts only: 2 reports
*28000.0**	*vt***	*vd***	*11*	*G*		*RADAR*	*25 50*	*20K0E*	*OTHR (UK SBA, Cyprus) TX *on 10m **Very often. 88 reports 2 simultaneous TX on 10m: 12*
*28000.0**	*vt***	*vd***	*11*	*G*		*RADAR*	*100*	*10K0E*	*OTHR (UK SBA, Cyprus) TX *on 10m 1 report*
28025.0	09:14	19	11			F1B	51	300H	Fishing buoy
28050.0	09:16 vt*	19 vd*	11			F1B	300		Fishing buoy *Often
28062.1	17:15 vt*	06 vd*	11			F1B	51	300H	Fishing buoy *Often
28082.0	17:17 *vt*	06 vd*	11			F1B	51	300H	Fishing buoy *Often
28115.0	09:17 vt*	01 vd*	11			F3E			Non-amateur traffic. Male voices. Slavic language. *Often
28155.0	09:18 vt*	01 vd*	11			F3E			Non-amateur traffic. Female voice. Slavic language. *Often
28175.0	09:19 vt*	01 vd*	11			F3E			Non-amateur traffic. Female and male voices. Slavic language. *Often
28195.0	09:17 vt*	01 vd*	11			F3E			Non-amateur traffic. Female voice. Slavic language. *Often
28215.0	09:16 vt*	01 vd*	11			F3E			Non-amateur traffic. Female voice. Slavic language. *Often
28595.0	12:03	16	11			A3E		6K0E	Unid sts. Male voices. Unid language
29100.0	09:03	24	11			XXX			29100 kHz USB: XXX. Group of carriers. Spacing abt 50 Hz (similar to 7032 USB). First RX on October 2023. Then, daily and long-lasting, with sometimes USB BW 3K3E non amateur comms in Slavic language *Also on 26/11 and on 27/11, vt
29750.0	*07:43 vt**	*05 vd**	*11*	*RUS*		*RADAR*	*1592*		*29750 kHz CF: Kazan Federal University Meteor Radar. RUS. Lower side lobe to 29500 kHz. *Often. 8 reports*

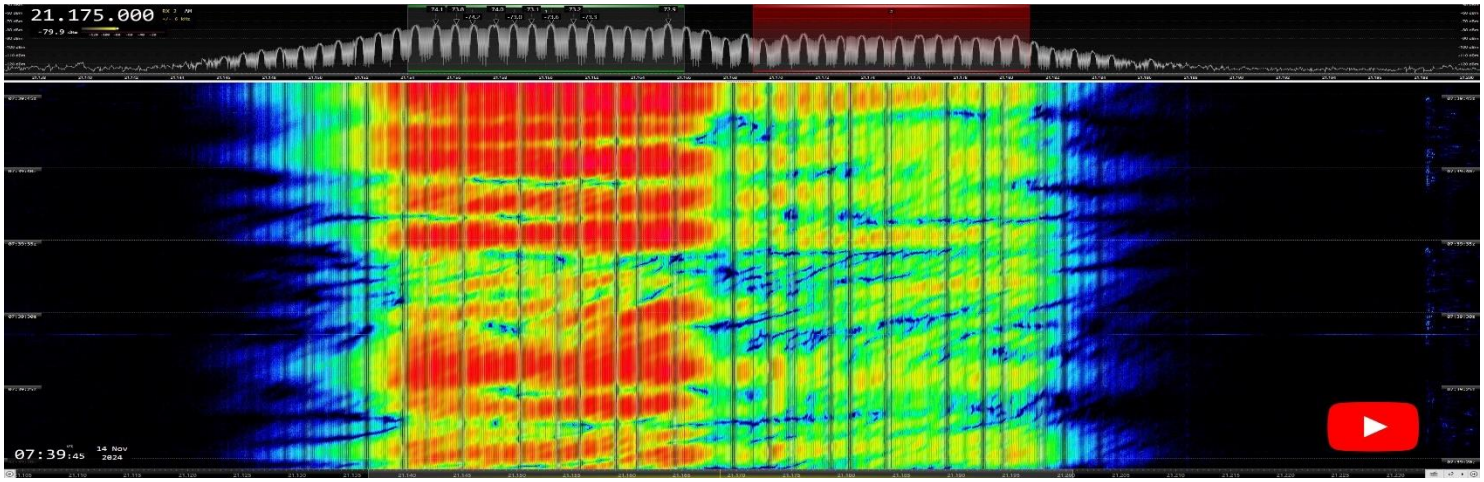
VERON; Ruud PG1R, Credits to observer Dick PA0GRU

kHz	UTC	DD	MM	ITU	IDENT	MODE	BD /sps	SH / BW	DETAILS
7032.1	1532	09	11	RUS		J3E-U		3K30E	100Hz brum; S9
7034.0	0600	08	11	RUS		A3E			Marching music; extremely distorded audio
7035.0	1900	08	11			A3E			Music & UKR/RUS war propaganda
7055.0	1818	10	11	UKR		J3E-L		2K70E	UKR-RUS radiowar; slogans in loop; S9
14192.0	0826	29	11	RUS		F1B		250H	UiPtr
21160.0	0832	29	11			RADAR		20K0E	CF; OTHR
21410.0	1447	30	11	RUS		RADAR	40	12K0E	CF; OTHR Container
21411.0	0833	29	11			RADAR		20K0E	CF; OTHR

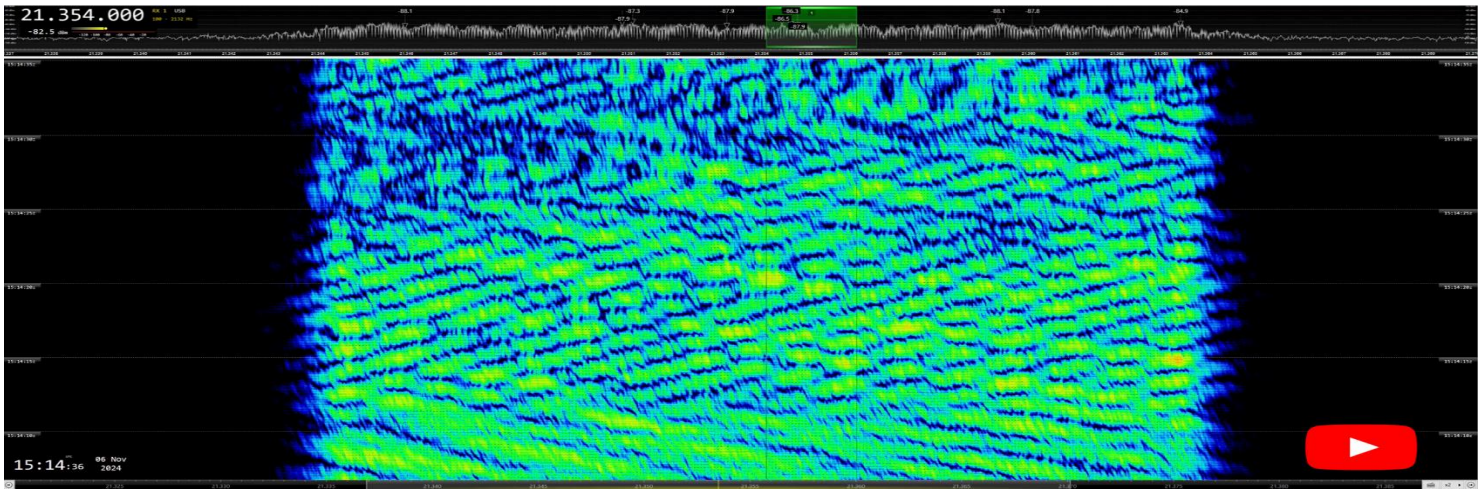
IARUMS R1 Coordinators: https://www.iaru-r1.org/spectrum/monitoring-system/iarums-region-1-coordinators/
Visit our website: https://www.iaru-r1.org/about-us/committees-and-working-groups/iarums/



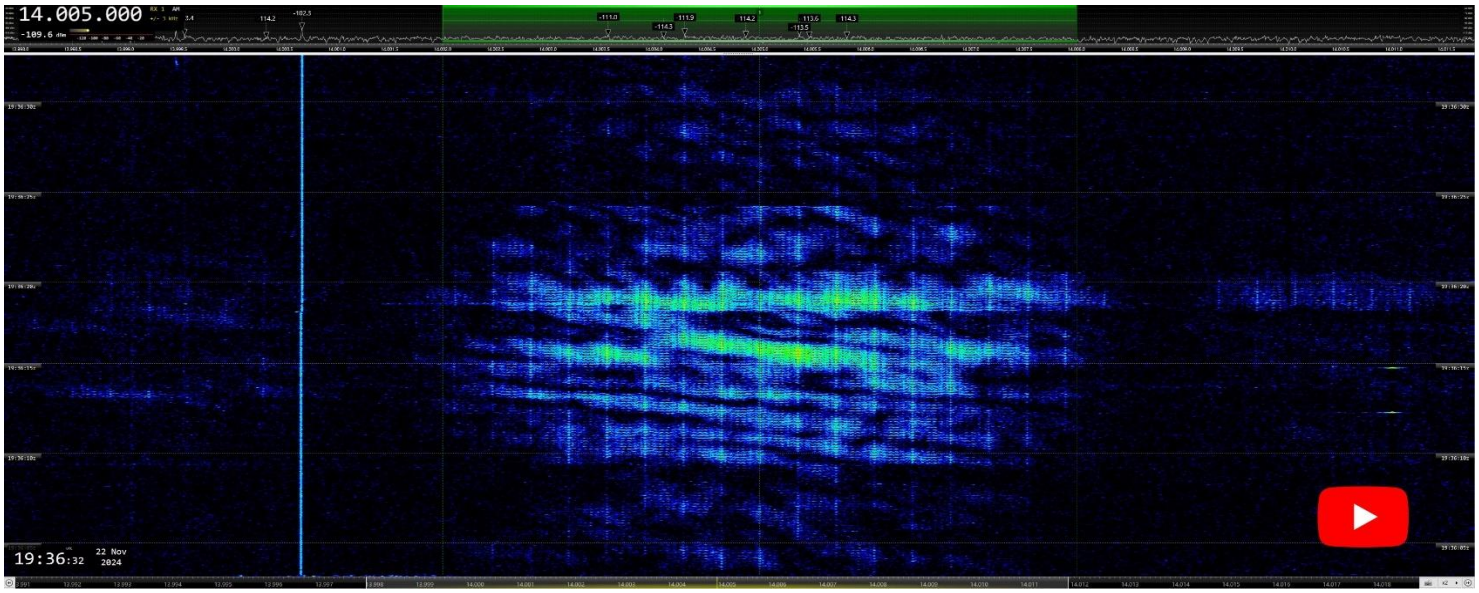
14091 kHz CF: CIS-60.. OFDM. W7D. 60 channels + pilot tone. BW = 2.8 kHz. 60 x 30 Bd. After the CIS-600 TX, MIL USB (J3E-U) TX BW = 3.3 kHz



15m. OTHR Contayner. RUS. BW = 12 kHz. 40 pps. 2 simultaneous TX on 15m, overlapping

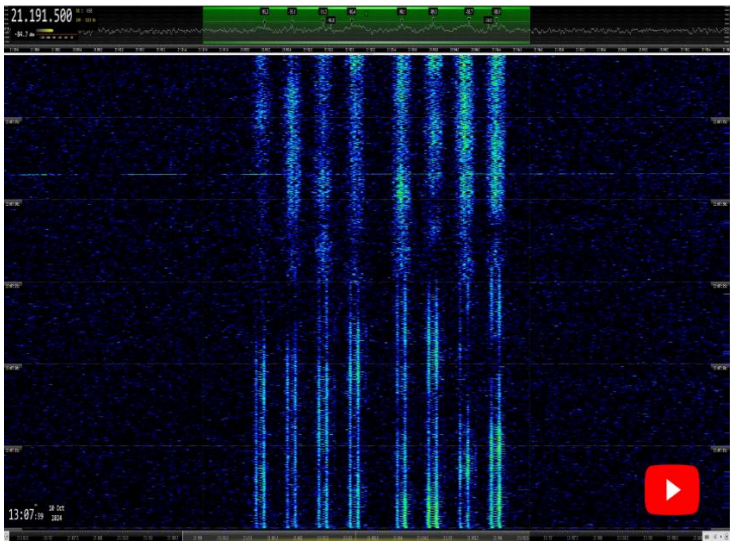


21354 kHz CF. OTHR G (UK SBA, Cyprus). BW = 20 kHz. 25 pps

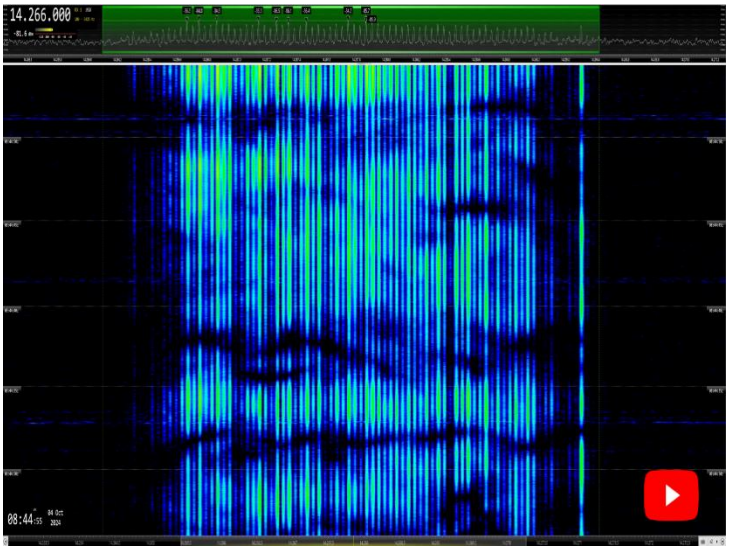


14005 kHz CF. SuperDARN(Super Dual Auroral Radar Network) radar bursts. Detail

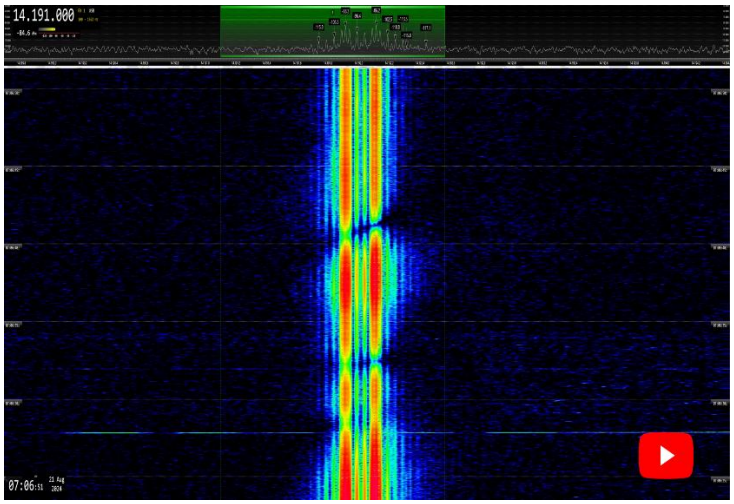
Examples of MIL and DIPLO modes transmissions also received during November 2024



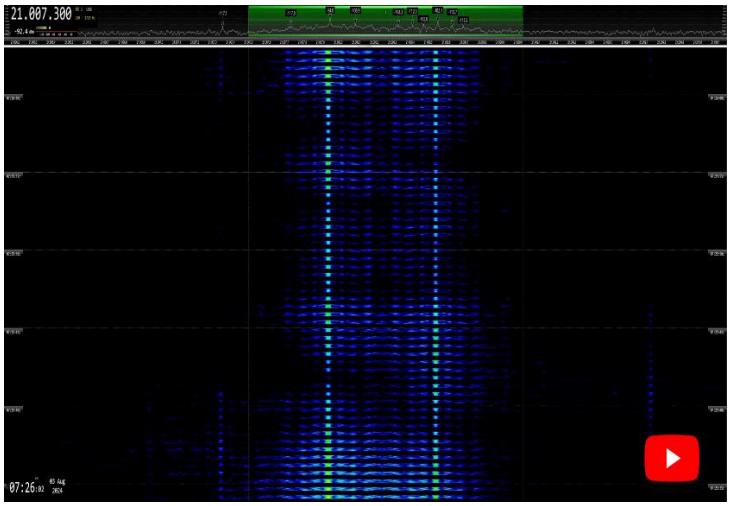
CHN 4+4 a.k.a PRC 4+4. PSK-4. G7D. Bw = 2.4 kHz. 75 bd



CIS-12, submode idle. J7D. Bw = 2.7 kHz



CIS-## FSK transmissions. 14192 kHz CF. RUS. Shift = 200 Hz. 50 Bd



DPRK-FSK 600. F1D. Shift = 600 Hz. 600 Bd