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To: EDGES group

From: Alan E.E. Rogers

Subject: Identification signals from amateur radio beacons seen in EDGES-3 data

During the conditions of high refraction and reflection from the ionosphere some signals in the 6m ham radio band are seen which last a few minutes and repeat every 15 or 30 minutes. These signals repeat commencing at 2 minutes past the hour and are used to test the propagation conditions. Examples of these repeating signals are centered at 54.0 and 50.5 MHz are shown in Figure 1 which is waterfall plot of the data from 2026 day 82 from EDGES-3 at the Murchison Radio Observatory in Western Australia.

In the event of “sporadic E” conditions these signals are likely come from distant ground-based transmitters via “trans-equatorial propagation” (TEP) at large distances from the EDGES antenna.

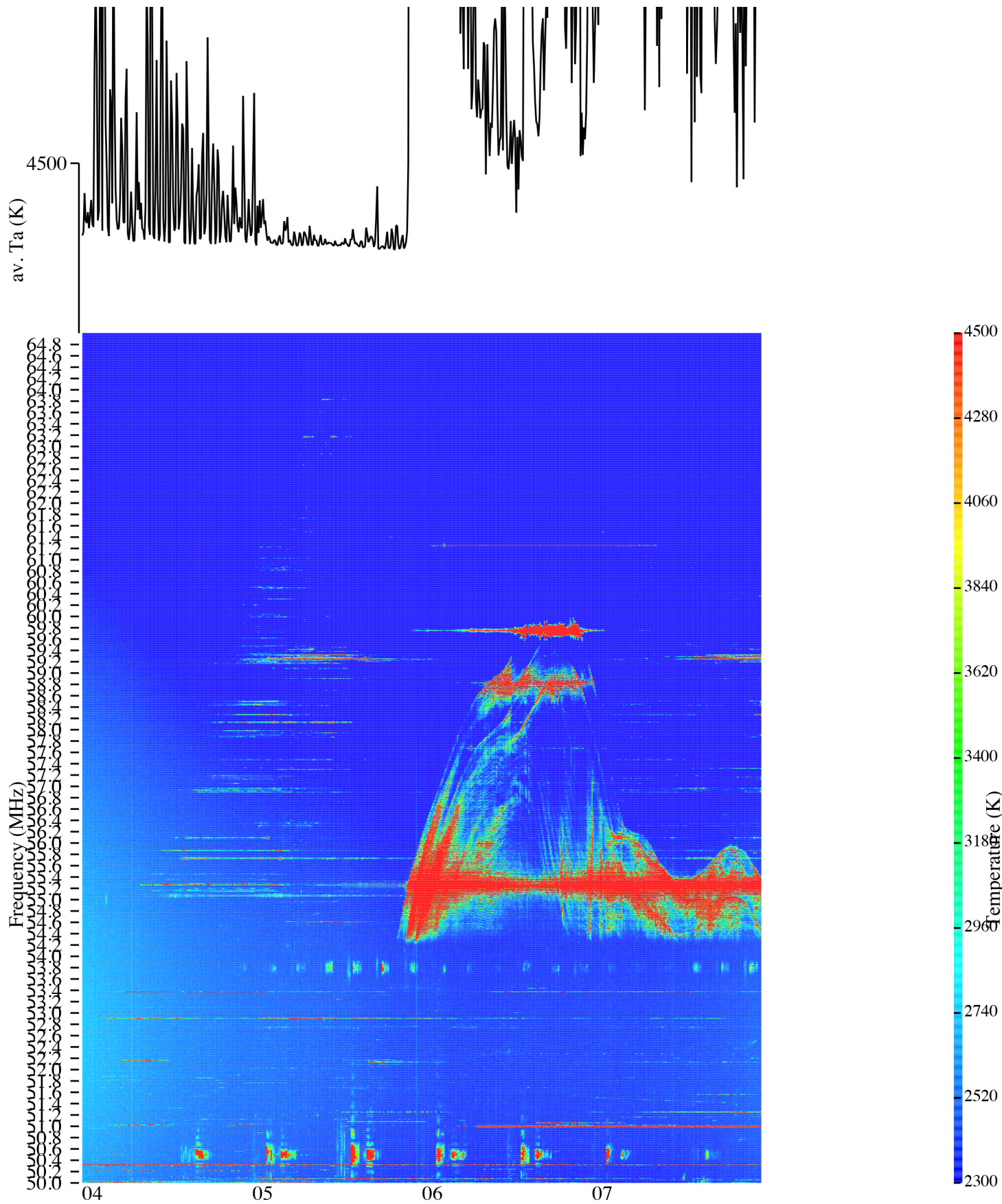
Figure 1 also shows a strong signal from what is most likely a TV carrier at 55.25 MHz from one of the several countries that still have analog TV at this frequency like Saudi Arabia, Egypt, Libya, Lebanon and Indonesia. Day 82 has an usually strong event at 55 MHz, probably from an analog TV station.

The beacons are only present in the daytime primarily from 4 to 8 UT which is 12 to 16 hours local time in Western Australia. The frequency scale is expanded in Figure 2 to show the large variety of signals involved all of which are most likely from transmitters on the ground and not from satellites or reflections of ground based signals by satellites.

Plots of the calibrated spectra are shown in Figure 3. In many cases calibrated spectra for a given day was not available owing to a high level of solar emission. The low end of the spectra is set at 50.4 MHz to exclude the strong carrier signals below 50.4 MHz which are shown in figures 1 and 2. These plots which only cover days 70 to 85 show that the precisely timed amateur radio beacons are present in about 50% of the days in 2026, 2025, 2024 less frequently in 2023. Separate tests show that these beacon signals are seen at the equinox in the day range of about 60 to 90 days which corresponds to March and April and the other equinox in September/October. Figure 4 shows the spectra from every fifth day of 2025 which shows beacon signals from about day 270 to 300 to confirm that the beacons are also seen at the other equinox.

In IARU Region 1 (Europe, Africa, Middle East, and Northern Asia), the 50 MHz (6-meter) band plan has been updated to designate the 50.400–50.500 MHz segment specifically for propagation beacons.

The details of the beacons for each site have been changing are difficult to find and identify. In summary these signals are only present when the sun is above the horizon which currently is not used for the global 21-cm owing to the strong emissions from the sun.



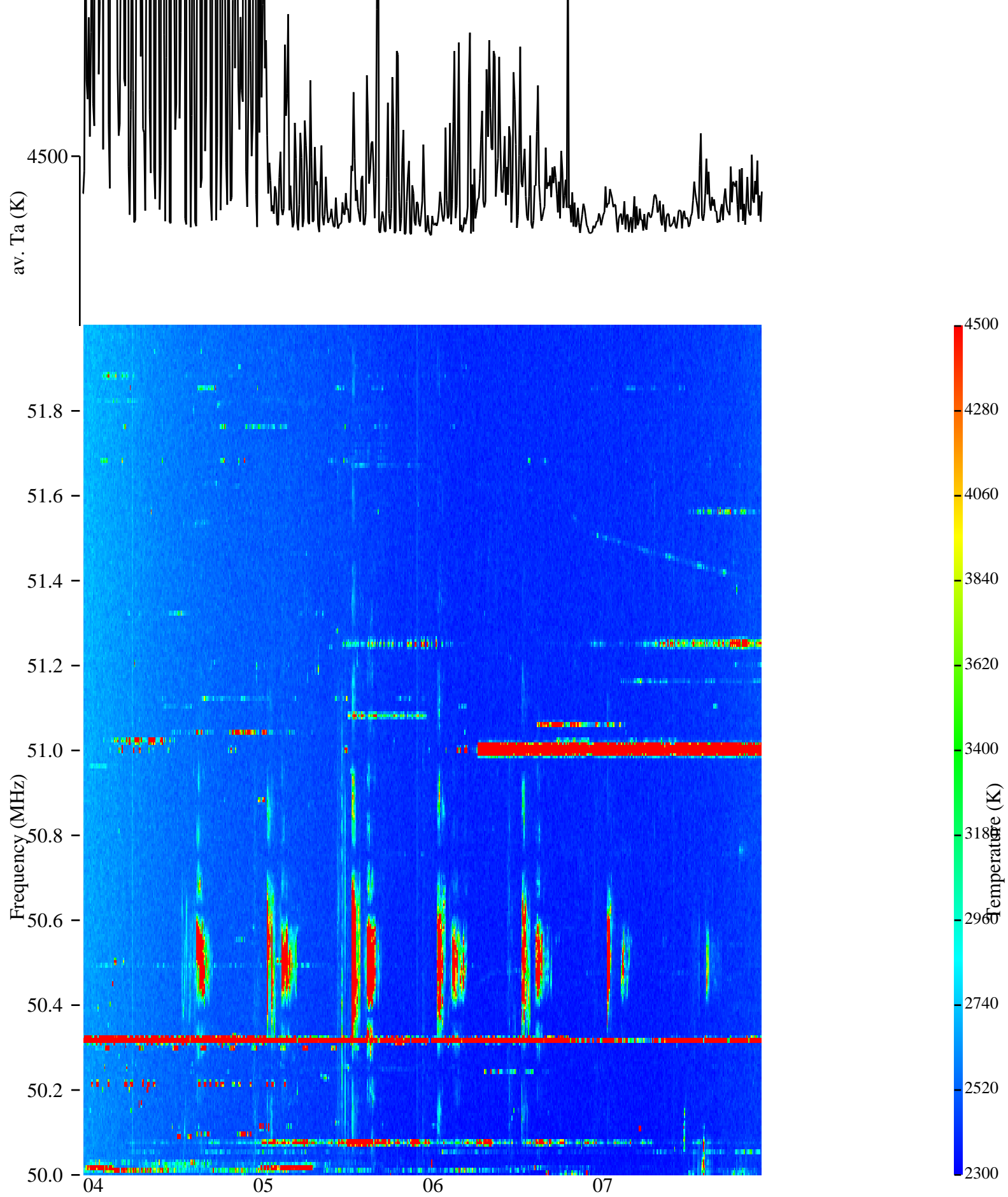
UT 4.00 to 8.00 2026:082

file: temp.acq

Wed Apr 1 17:54:07 2026

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Figure 1. Waterfall plot of the data from 2026 day 82 from EDGES-3 50-65 MHz and 04-08 UT

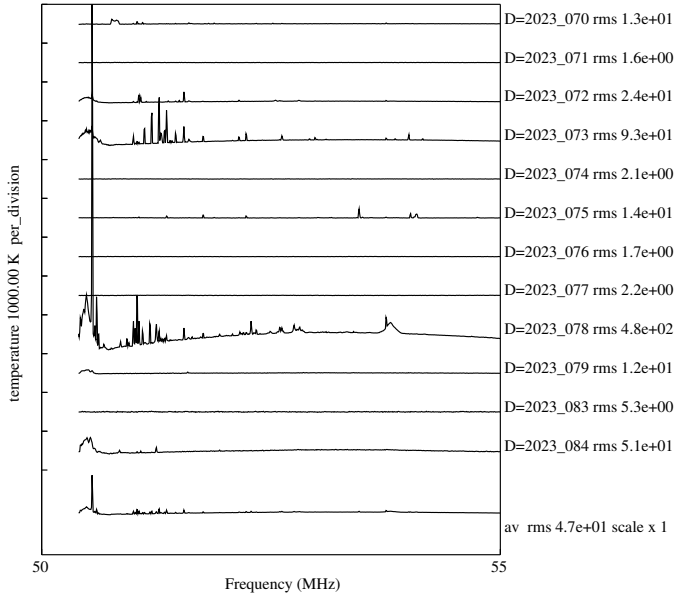


UT 4.00 to 8.00 2026:082

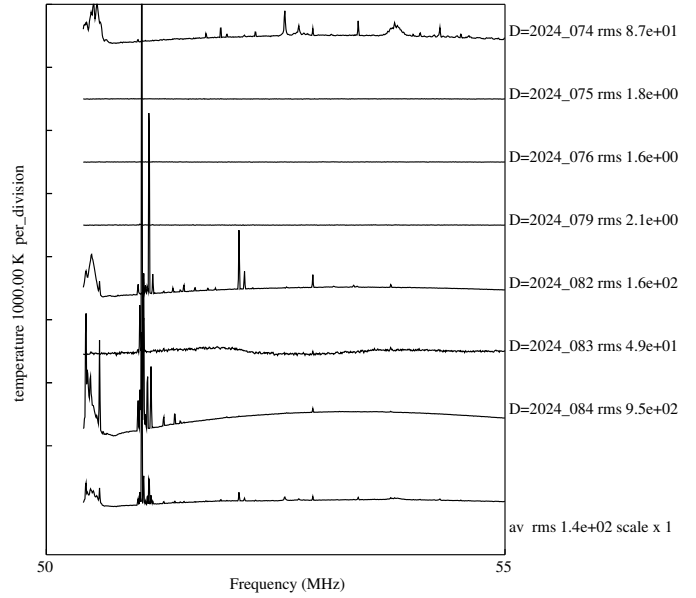
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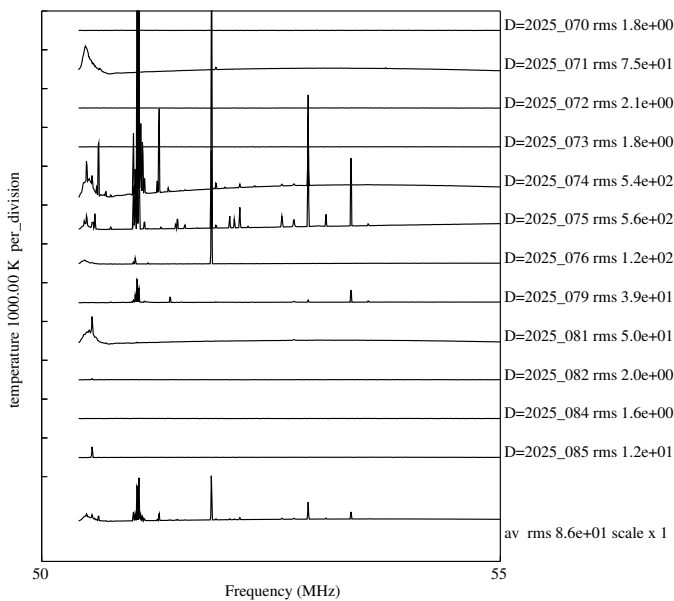
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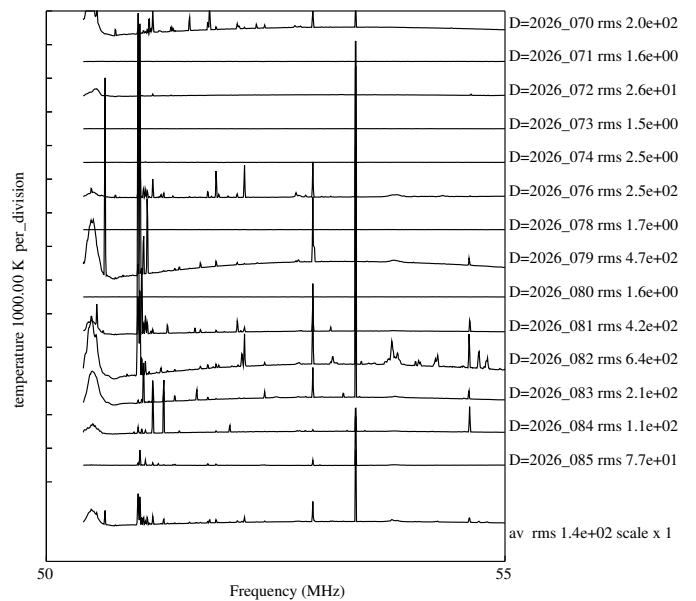
avrms 58.4155



avrms 179.1192

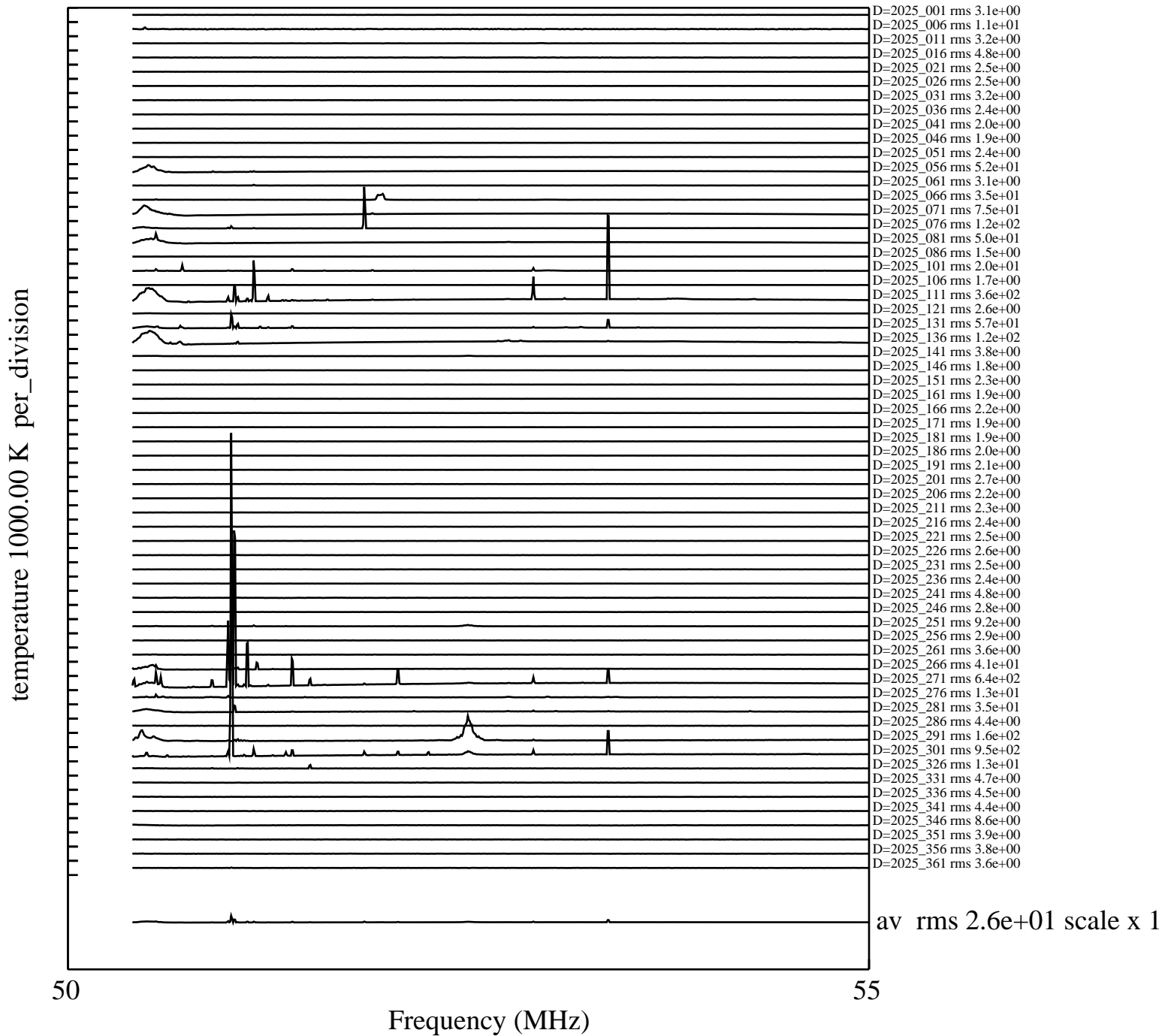


avrms 117.6544



avrms 173.5599

Figure 3. Search for timed radio beacons on days 70-85 04-08 UT of 2023, 2024, 2025 and 2026



avrms 47.1759

Figure 4. Search for timed radio beacons on days 1-365 every fifth day 04-08 UT of 2025