EDGES MEMO #509

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To: EDGES group

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Subject: Strong Thermal Emission Velocity Enhancement emissions seen in EDGES-3 data

EDGES-3 data from the WA shows occasional strong emissions which unlike the Electron Cyclotron maser emissions which has strong relatively narrow band emissions is relatively broadband. It is thought that these may be Strong Thermal Emission Velocity Enhancement emissions which are known as "STEVE" emissions. The latest example of this emission is from day 148 (28 May) 2026 and is shown in the waterfall plot as the "burst of emission" from about 03 to 06 UT and covers about 75 – 130 MHz.

This event was also reported as being seen by citizen scientists:
On May 28, 2026, skywatchers and citizen scientists across Western Australia captured rare and vivid sightings of STEVE (Strong Thermal Emission Velocity Enhancement) slicing through the night sky. This narrow, ribbon-like glow was reported following recent geomagnetic fluctuations that triggered widespread tracking of the Aurora Australis across southern Australia.

Figure 2 shows that the change in the spectra is a time scale of 1.2 minutes and is relatively smooth over the frequency range of 88 to 100 MHz.

Figure 1 also shows periodic signals at 133.8 MHz at the top of the waterfall plot. This signal is from the Mt Singleton Air Traffic Control (ATC) transmitter in Western Australia which operates on 133.8 MHz to provide high-altitude en-route communications for aircraft. The transmitter is situated on a summit with an elevation of 678 to 685 meters above sea level. The Effective Radiated Power (ERP) is generally in the 100 to 200 watt range which provides a solid line-of-sight communications footprint reaching out to a radial distance of roughly 150 to 200 nautical miles for aircraft cruising at high altitudes. The plots of the spectrum in Figure 3 show that the 133.8 MHz signals are always present and some times reaches a signal as high as a million K. This very high signal is probably from aircraft in communication with the ATC which are high enough to be in line-of-sight to EDGES. Aircraft are supposed to only transmit at 133.8 MHz when in communication with the ATC.

Impacts on Radio Astronomy:
The 133.8 MHz transmission is a known source of radio frequency interference (RFI) for sensitive scientific facilities located deeper in the Western Australian outback. Most notably, its high-power line-of-sight signal propagates far enough to introduce significant signal leakage into the core bands of the Murchison Radio-astronomy Observatory (MRO). This interferes with precise observations of the global 21 cm hydrogen line.

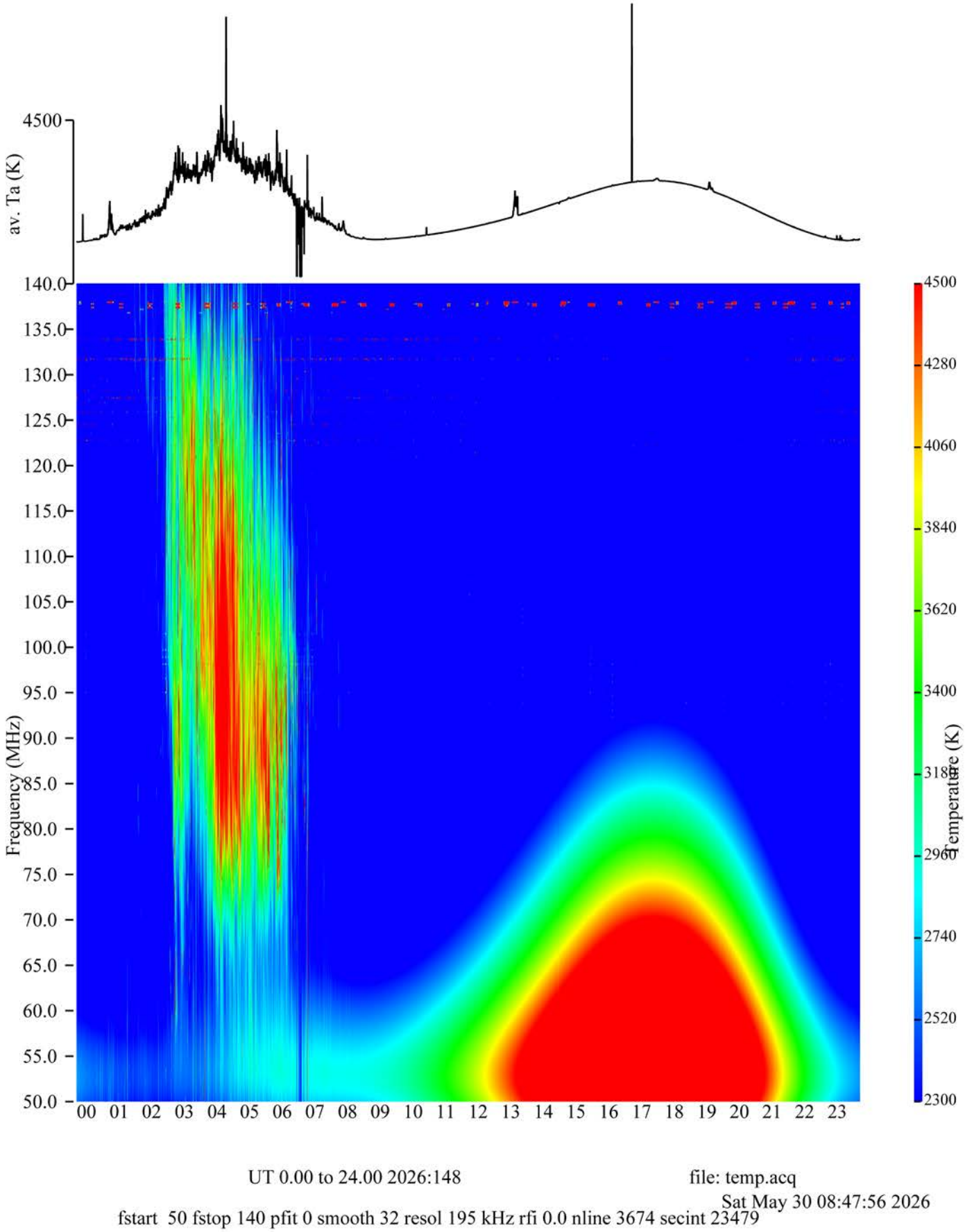

Figure 1. Waterfall plot of EDGES-3 in the WA data from 2026 day 148

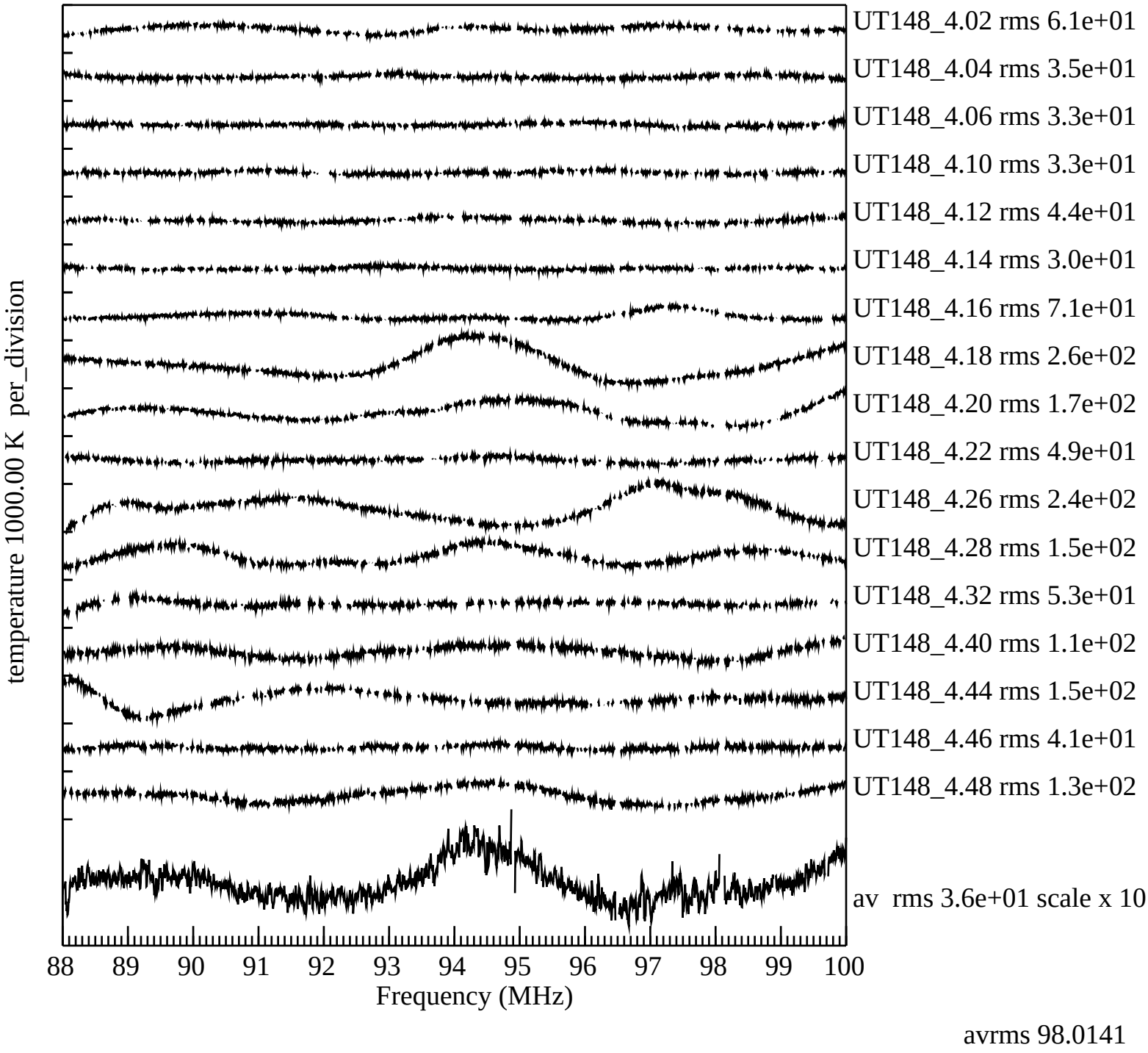

Figure 2. Calibrated spectral residuals with 4 terms removed vs UT time in hours

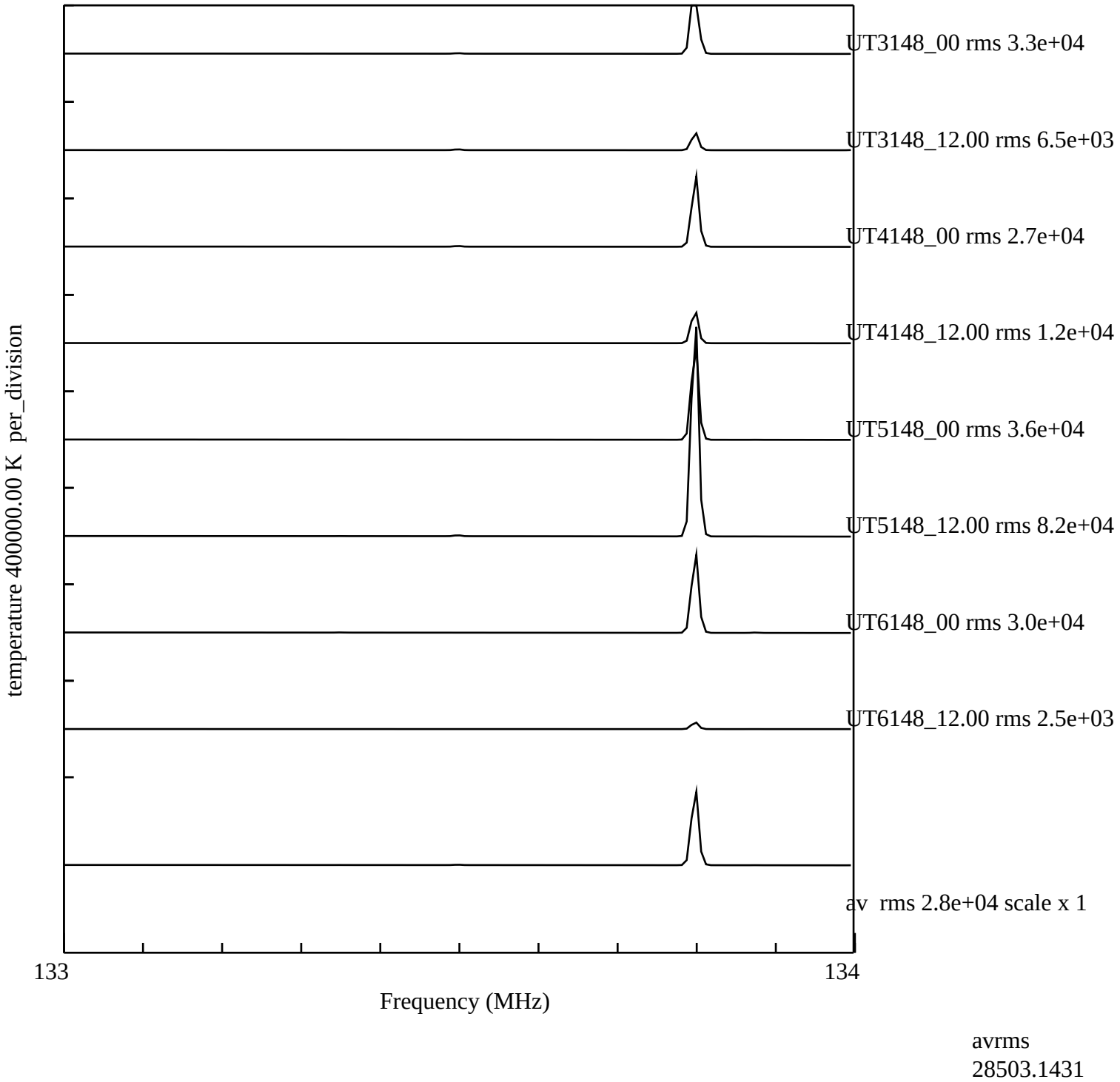

Figure 3. EDGES-3 133.8 MHz days 148 2023 2024 2025 2026 UT 0-12 and 12- 24