Unintentional Observations of a HAARP Experiment

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At least one of the experiments at the HAARP facility near Gakona, Alaska during the November 2023 research campaign coincided with the daily operating schedule of the Callisto solar radio spectrometers in Alaska. The spectrometers are located at the HAARP Radio Observatory, HRO, about 1 km from the HAARP Ionospheric Research Instrument (IRI), Anchorage Radio Observatory, ARO, 290 km southwest of HAARP and Cohoe Radio Observatory, CRO, 400 km southwest of HAARP. HRO and CRO each use an active LWA Antenna with circular polarizations and ARO uses a rotatable log periodic dipole array with horizontal polarization. The experiment itself is briefly described later.

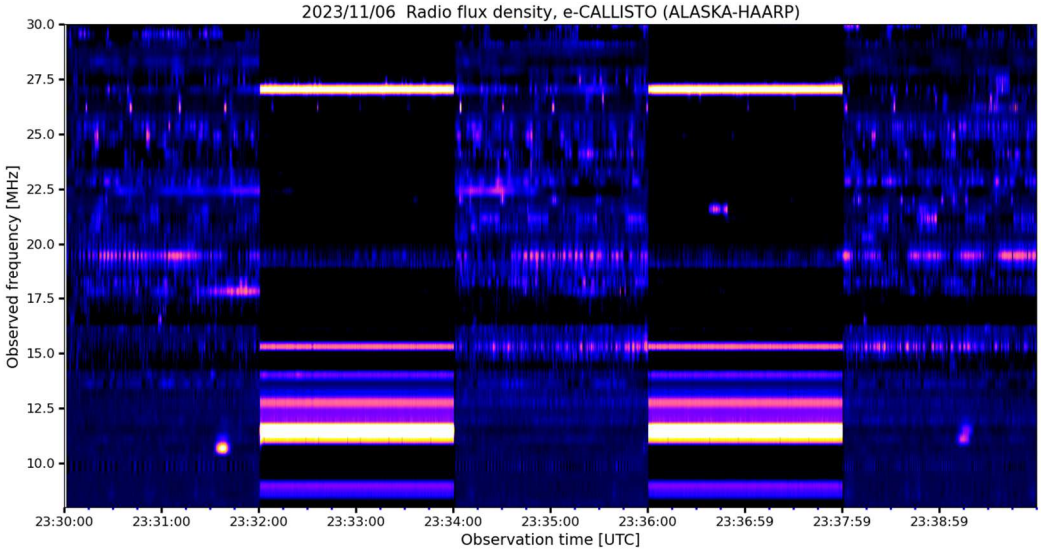

Figure 1 ~ The 2-minute On/2-minute Off cycle of the IRI is clearly seen in this 10 minute spectrogram. The responses of the Callisto spectrometer and antenna Front End Electronics were grossly nonlinear due to their close proximity to the powerful IRI. Image courtesy of Christian Monstein

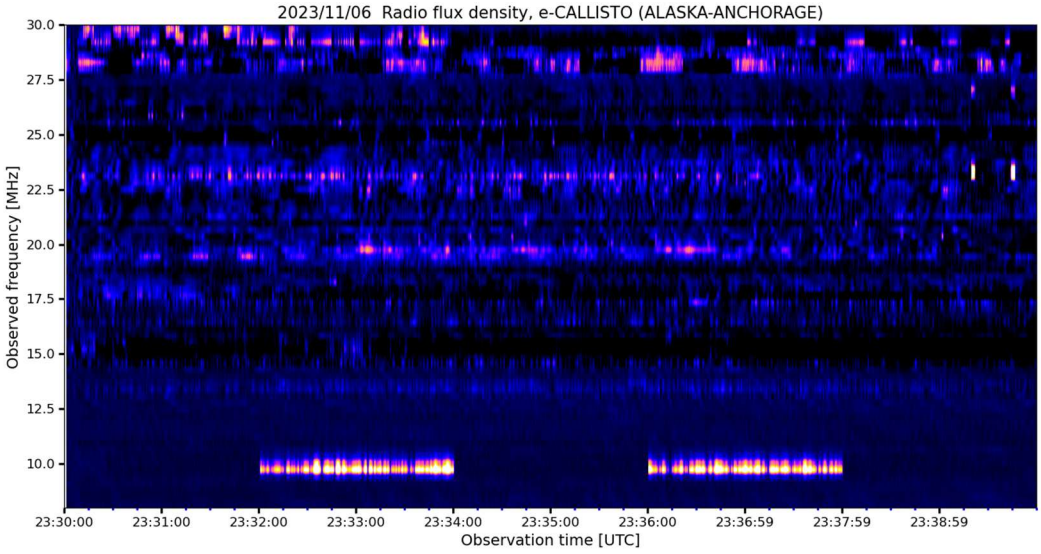

Figure 2 ~ The spectra at ARO (290 km distant) was relatively normal compared to HRO, showing only the 8.1 MHz fundamental (seen near 10 MHz due to a plotting limitation). The weak trace at 20 MHz in this and previous image may be the time-frequency station WWV or WWVH. Image courtesy of Christian Monstein

The IRI is an extremely powerful transmitter that operates from 2.7 to 10 MHz while the Callisto instruments with an up-converter operate from 5 to 85 MHz. The proximity of the HRO Callistos and associated active antenna led to severe overload and nonlinear operation that are evident in the spectra, which shows several

harmonics of the transmitted frequencies (figure 1). The ARO Callistos are farther away and apparently experienced no ill-effects (figure 2) but those located at CRO also showed nonlinear operation (figure 3), possibly due to overload of the Front End Electronics in the antenna. Note that the low end of the frequency scales in all plots is inaccurate due to a limitation in the Python plotter library used to produce these images.

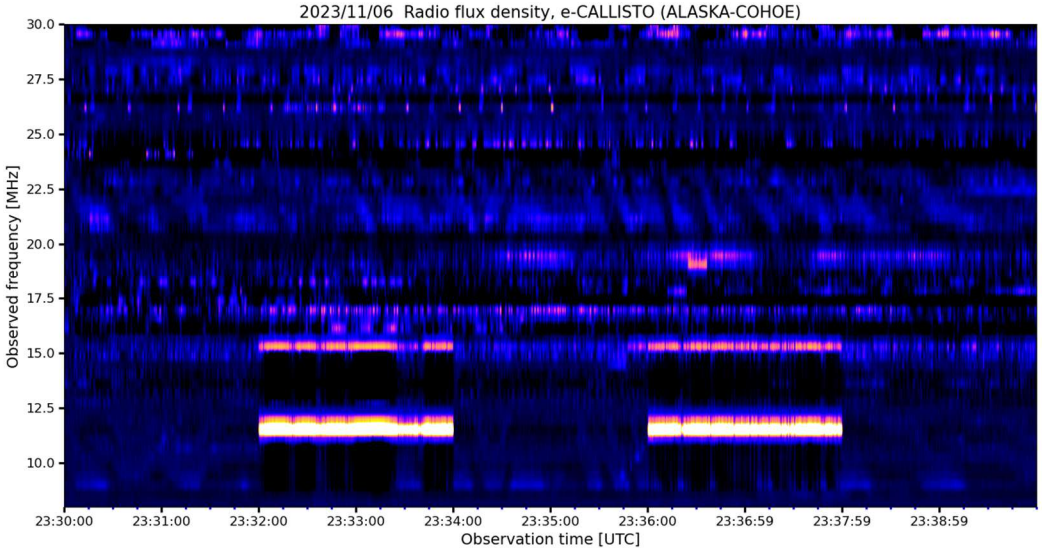

Figure 3 ~ The Callisto instrument at CRO (400 km distant) appears to show some overload that caused the bright traces between 10 and 12. 5 MHz and somewhat weaker traces slightly above 15 MHz. The fundamental at 8.1 MHz is not visible. Image courtesy of Christian Monstein

The HAARP experiment on 6 November 2023 that produced the above spectra consisted of splitting the IRI antenna array and transmitting 3.25 MHz on one half and 8.1 MHz on the other half. Both beams used circular polarization but with opposite rotations. The unmodulated 8.1 MHz pencil beam was pointed almost vertically along the local magnetic field lines (magnetic zenith, about 14°). It was designed to excite the E-region ionosphere above the HAARP facility to produce field-aligned highly conductive plasma that acts like a low frequency antenna. The 3.25 MHz carrier pencil beam was pointed vertically and was modulated with a low frequency linear ramp, snake-like ramp and amplitude shift keying (ASK) waveforms to induce low frequency emissions from the enhanced conductive region. The experiment produced the desired emissions as did an almost identical experiment the day before (figure 4).

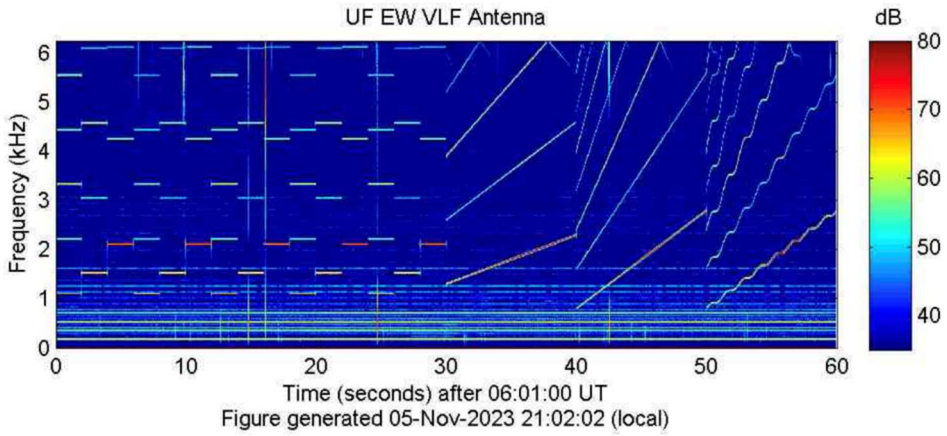

Figure 4 ~ HAARP induced ULF and VLF emissions received at Chistochina about 30 km northeast of HAARP on 5 November from a similar experiment.
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