HAARP Imaging Riometer Diagnostic

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Abstract: This report describes the prototype 16-beam, 38.6 MHz riometer system developed by APTI and the University of Maryland for the HAARP program. The prototype system is the forerunner for a full-scale imaging riometer diagnostic instrument for characterizing the ionospheric volume perturbed by controlled RF heating experiments. The prototype system, installed at the HAARP site near Gakona, AK, consists of a 1 x 16 antenna array phased in one dimension (beam width of 6.7 deg) and oriented approximately along the magnetic meridian. The system responds sensitively to natural variations or auroral absorption, such as those caused by magnetospheric substorms, and provides clear evidence of its capability to discern spatial structure and motion. A newly observed feature seen near dusk are intense, short-duration absorption spikes accompanied by only weak magnetic signatures. The proximity of the prototype system to the HAARP RF heater can result in significant interference to the riometer signal, making the data unusable at times. Detailed data comparisons have not yet been made with operations of the heater. However, the full scale imaging capability of the proposed instrument, and a remote location, may be required to detect small scale modifications of the ionosphere caused by the RF heater.

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