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Simultaneous Multi-angle Radar Observations of Langmuir Turbulence Excited by RF Ionospheric Interactions at HAARP J.P. SHEERIN, N. RAYYAN, Eastern Michigan Univ, N. WATANABE, UC-Denver, B.J. WATKINS, W.A. BRISTOW, U. Alaska-Fairbanks, P.A. BERNHARDT, NRL — The high power HAARP HF transmitter is employed to generate and study strong Langmuir turbulence (SLT) in the interaction region of overdense ionospheric plasma. Diagnostics included the Modular UHF Ionospheric Radar (MUIR) sited at HAARP, the SuperDARN-Kodiak HF radar, and HF receivers to record stimulated electromagnetic emissions (SEE). Dependence of diagnostic signals on HAARP HF parameters, including pulselength, duty-cycle, aspect angle, and frequency were recorded. Short pulse, low duty cycle experiments demonstrate control of artificial field-aligned irregularities (AFAI) and isolation of ponderomotive effects. Among the effects observed and studied are: SLT spectra including cascade, collapse, and coexistence spectra and an outshifted plasma line under certain ionospheric conditions. High time resolution studies of the temporal evolution of the plasma line reveal the appearance of an overshoot effect on ponderomotive timescales. Bursty turbulence is observed in the collapse and cascade lines. For the first time, simultaneous multi-angle radar measurements of plasma line spectra are recorded demonstrating marked dependence on aspect angle with the strongest interaction region observed displaced southward of the HF zenith pointing angle. Numerous measurements of the outshifted plasma line are observed. Experimental results are compared to previous high latitude experiments and predictions from recent modeling efforts.

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