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## Investigation of Ionospheric Disturbances and Associated Diagnostic Techniques

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**Abstract:** The objectives of this research and development program were to conduct simulation modeling of the generation and propagation of atmospheric acoustic signals associated with surface and subsurface ground disturbances; to construct an experimental measurement system for exploratory research studies of acoustic generated ionospheric disturbances; to model high power radio wave propagation through the ionosphere, including nonlinear wave plasma interaction effects; and to assist in the assessment of diagnostic systems for observation of ionospheric modification experiments using existing and planned high latitude high power rf transmitting facilities. A computer simulation of ionospheric response to ground launched acoustic pulses was constructed and results compared to observational data associated with HF and incoherent scatter radar measurements of ionospheric effects produced by earthquakes and ground level explosions. These results were then utilized to help define the design, construct and test for an HF Doppler radar system. In addition, an assessment was conducted of ionospheric diagnostic instruments proposed for the Air Force/ Navy High Frequency Active Auroral Research Program (HAARP).

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