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Project SESAMISEED. Experiments to Demonstrate the Practical Uses of Artificial Plasma Clouds in the Lower Ionosphere

Authors: [John R. Davis](#); [Derrill C. Rohlfis](#); [Frederick E. Wyman](#); [NAVAL RESEARCH LAB WASHINGTON DC](#)

Abstract: Cesium plasma **clouds** have been emplaced in the 90 to 103-km altitude region of the ionosphere by rockets and by a 7-in. gun. These **clouds** have been studied by coherent-pulse-doppler, high-frequency radar for three purposes: (a) to investigate neutral gas and magnetohydrodynamic motions in the **clouds**, (b) to investigate the role of such motions in forming the plasma **clouds** into persistent, artificial, sporadic-E patches, and (c) to investigate the potential of such **clouds** for illuminating the near-over-the-horizon region and detecting small targets in that region. Parts (a) and (b) of this study are continuing efforts in basic ionospheric research which will be reported elsewhere. This report concerns the third stated purpose, which may be of importance for over-the-horizon surveillance radar. Evidence has been acquired which demonstrates that the objective of achieving over-the-horizon illumination by this means is possible. Earth backscatter echoes have been found to display an adequately narrow spectral dispersion to permit velocity-discrimination of moving targets. Examples are given of earth backscatter and probable over-the-horizon aircraft echoes from cesium plasma **clouds**.

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