The Impulse Responses of Electronically Scanned and Dish based ISR
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Electronically steerable array (ESA) technology has recently been applied to incoherent scatter radar (ISR) systems. These arrays allow for pulse-to-pulse steering of the antenna beam to collect data in a three dimensional region. This is in direct contrast to dish based antennas, where ISR acquisition is limited at any one time to observations in a two dimensional slice. This new paradigm allows for more flexibility in the measurement of ionospheric plasma parameters.

Multiple ESA based ISR systems operate currently in the high latitude region where the ionosphere is highly variable in both space and time. Because of the highly dynamic nature of the ionosphere in this region, it is important to differentiate between measurement induced artifacts and the true behavior of the plasma.

Previously the idea of a full space-time ambiguity function was introduced. This frame work poses the estimate of the of the time domain lags of the intrinsic plasma autocorrelation function as a linear inverse problem with the space-time ambiguity function as a blurring kernel over space and time.

We will perform a simulation study to compare the different types of antenna and their impact on reconstructing parameters from an impulse like vertical enhancement that is moving toward the radar system. We will discuss the space-time sampling issues associated with both the electronically scanned and dish based systems. We will also show how this impacts reconstruction of the parameter field of a moving enhancement.