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Empirical Modeling of Plasma Clouds Produced by the Metal Oxide Space Clouds (MOSC) Experiment

Abstract:

The MOSC chemical release experiments employed the ALTAIR radar as a primary measurement of plasma density in the clouds. However, the radar provides only the local plasma density in the beam location, and the measurements are of limited value without context to determine the location of the radar beam relative to the larger plasma cloud. We have constructed an empirical model of the cloud locations, shapes, and sizes as a function of time for both MOSC launches using fits to all-sky images recorded from near the launch site. When combined with ALTAIR radar measurements of local plasma density at the sampled point and ionosonde measurements of the peak plasma density, a robust 4-D representation of the plasma density can be derived and used to study impacts on the background ionosphere and RF propagation.