

Application of Capon technique to mitigate bird contamination on a spaced antenna wind profiler

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Abstract

A novel technique is developed for profiling radars to measure atmospheric wind fields when signals are contaminated by migrating birds. It exploits the idea of adaptive beamforming to suppress the interference from birds to provide accurate three-dimensional wind measurements using a spaced antenna (SA) system. Numerical simulations based on the configuration of the UHF Multiple Antenna Profiler Radar (MAPR) of National Center for Atmospheric Research (NCAR) are implemented to investigate the performance and limitation of the proposed technique. The feasibility for atmospheric wind measurements is further demonstrated using experimental data. Wind measurements from the full correlation analysis (FCA) and post-set beam steering (PBS) are also provided for comparison. During the period when a single bird is present in the radar beam, the proposed technique produces wind estimates consistent with atmospheric wind filed prior to the entrance of the bird, while both FCA and PBS wind estimates are biased.