

FIRST LIGHT ON A 3-RECEIVER DISTRIBUTED PASSIVE
RADAR SYSTEM

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Distributed, passive radar is emerging as a powerful yet affordable technique in geophysical remote sensing. The Manastash Ridge Radar (MRR) is one such instrument, and until recently it consisted of two receive stations tuned to the FM radio band. In July 2005, we added a third receiver to the MRR network, making the radar multistatic. We will discuss some new scientific opportunities this multistatic architecture affords; particular challenges of deploying and maintaining the three-receiver network; and show some data collected simultaneously on the three receivers.

The MRR now routinely collects commercial FM broadcasts from two to three stations in both Seattle and Spokane, Washington. Scattered signals from plasma density irregularities are received atop Manastash Ridge in central Washington State. The three-receiver system allows us to simultaneously monitor slightly different fields of view in the sub-auroral latitudes of southwestern Canada. With this information we can study the meso-scale properties of phenomena that cause the irregularities, such as the SAPS. Also, we can perform experiments on flow angle and aspect angle sensitivity, and more precisely estimate velocity vectors, within scattering volumes by taking advantage of illumination from multiple angles and frequencies (different FM stations).

Challenges associated with these experiments include proving that the scattering volume detected on each "radar station" is the same. Interferometry proves useful here, and the multiple frequency signals can help to reduce ambiguity in azimuth bearing estimates.

We were fortunate to have the three-receiver MRR system running for the mid-September 2005 solar flare activity and related geomagnetic storms. We will present some of the data we obtained during these events, and show preliminary results from the newly enabled analysis techniques mentioned above.

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