

11.6 EXTENDING DOPPLER VELOCITY COVERAGE FOR DATA ASSIMILATION

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One way to improve radar data assimilation is to increase the coverage of radar data, primarily by trying to detect weaker echoes. This can be achieved by more aggressive processing and better thresholding of good data, as well as taking advantage of the expected properties of weak targets.

Improved signal processing did not yield noteworthy results: So far, the best way to detect weak echoes we have found is to use Doppler spectra and compute power only on spectral components that are expected to have echoes. The challenge then becomes determining the spectral components of interest. At high resolution, some small gains can be made by replacing the traditional NCP or SQI thresholding by a more holistic test combining NCP/SQI with copolar correlation and expected differential phase.

A more promising has been to compute Doppler velocities over large areas. The basis for that approach is that weak signals generally occur in benign weather where winds are not expected to be very variable in space as a result of which echoes would be concentrated in a few spectral components. That process worked, but it also enhanced contamination by clutter and second-trip echoes, as well as promoted the spreading of point contamination. Using dual-polarization data in the process, we are able to better detect spectral components containing weather echoes as they also show higher correlation and expected values of differential phase. Finally, using continuity in range, we have been able to extend low-resolution Doppler coverage by close to 10 dB while filtering out most sources of contamination.