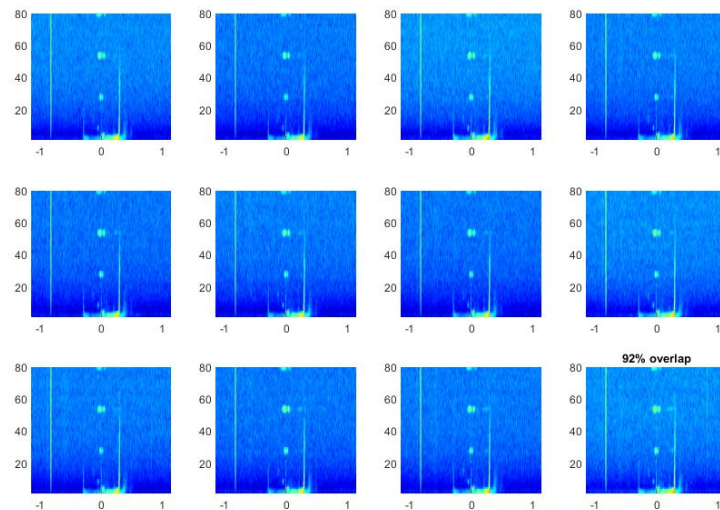


In output results, the degrees from boresight are given in mathematical angles, degrees CCW from east!

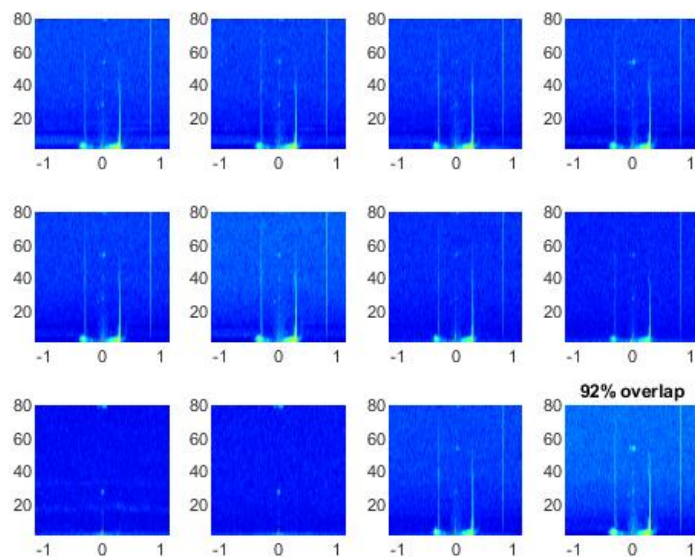
To run beamforming, beamscan and/or MUSIC, you need the .SORT files and the antenna positions from your radar system.

Included in this package are two example data sets, one from the radar site GTN and one from CSW, along with their respective antenna locations.

The GTN data set has all 12 antennas well maintained and there is good signal in all antennas as shown below.

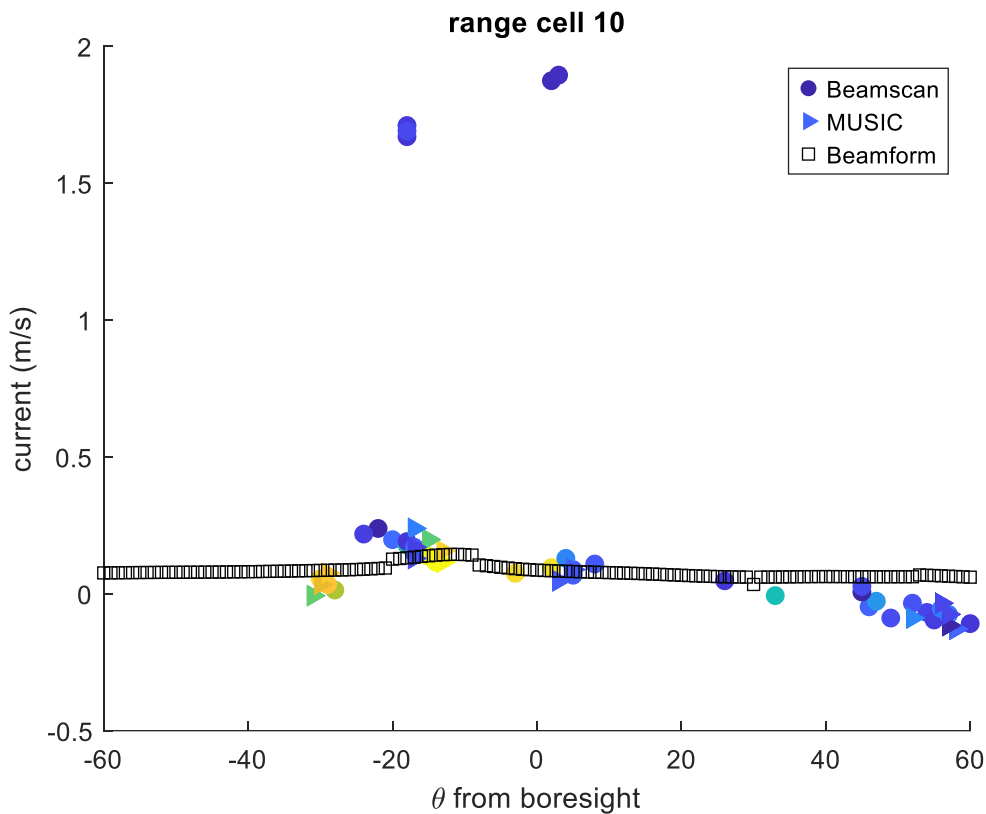


The CSW data set has some broken or malfunctioning antennas (see image below), which will degrade performance of beamforming, beamscan and MUSIC, but not all identically.



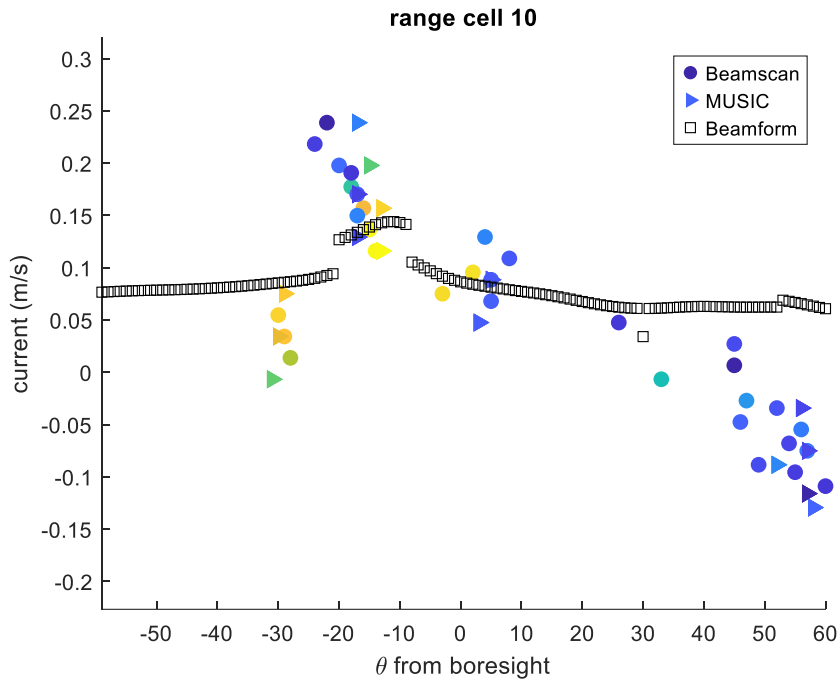
The default settings for Beamscan and MUSIC will process frequency bins in the Bragg peaks that have an SNR of 5dB above noise for DOA analysis. This is a low threshold and wildpoint editing or post processing will be necessary. This threshold can be increased in main HFcur\_BBM.m in lines 131 and 156. More accurate DOAs are calculated for higher SNR thresholds, but less solutions are found. Additionally, for the DOA methods, some interpolation should be performed across the radar coverage area to fill in missing current measurements as the DOA methods do not provide solutions at all beam angles for every range bin but instead much fewer DOA solutions.

An example of the solutions for range cell 10 from CSW:



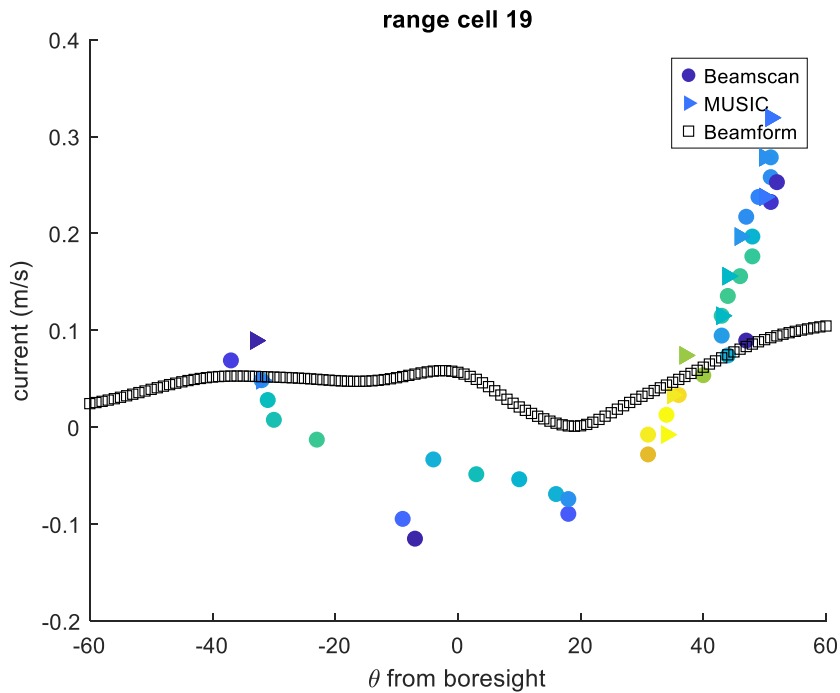
The SNR of each DOA is colormapped and we see some of the very low SNR DOA solutions from beamscan are clearly erroneous.

Zooming in,

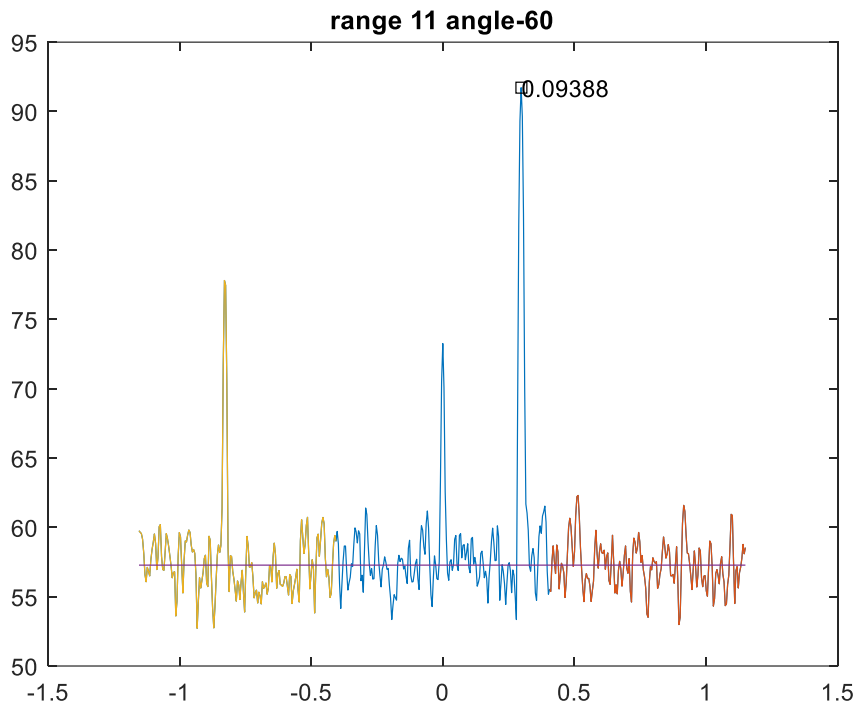


We see much more variation in the current from the DOA methods as compared to beamforming. The jet like feature at rough -10 degrees from the boresight is apparent in the beamforming analysis, but it is much sharper in the DOA methods. Note: Degrees from boresight are given in mathematical angles, degrees CCW from east!

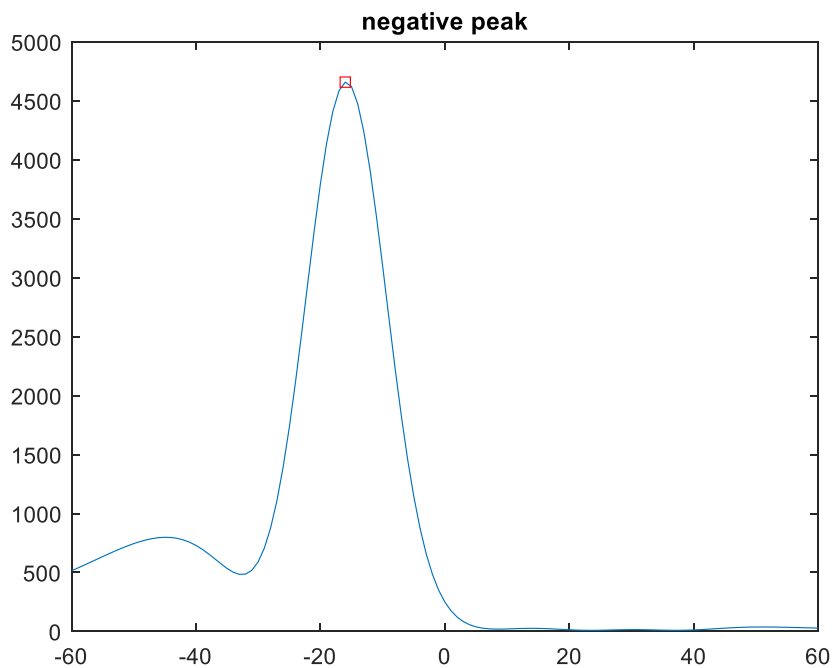
We see similar results from CSW:



To see how the beamforming analysis is at each range cell /beam angle, you can enable more debug plots, see line 112 in HFcur\_BBM. We suggest pausing the script and analyzing the specific range/angles you are interested in here as there can be over 10,000 plots for each .SORT file.



Similar debug plots are available for Beamscan in line 137 in HFcur\_BBM



And MUSIC pseudo spectrum and DOA analysis can be enabled in line 167 in HFcur\_BBM and detailed more in peak\_thresh\_optimizing.pdf

