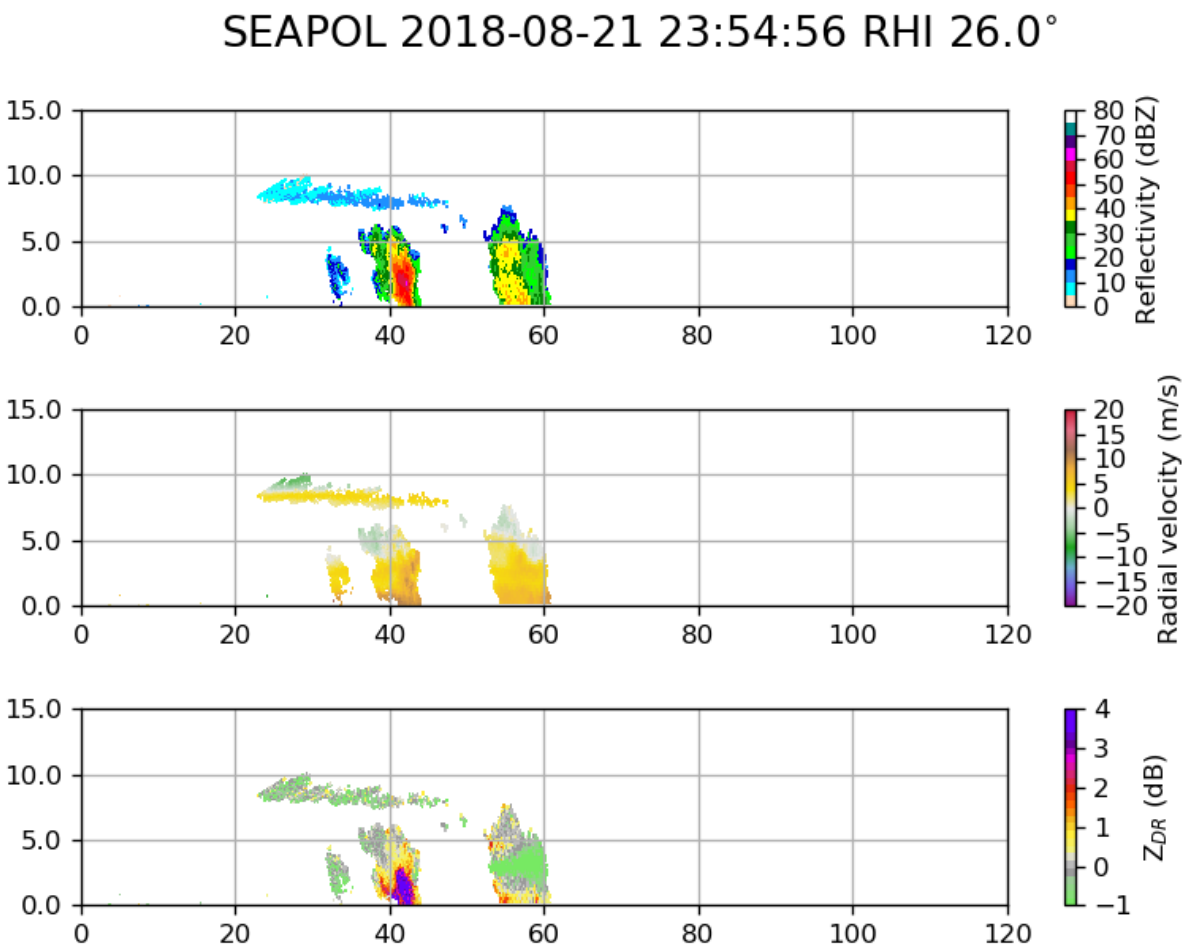
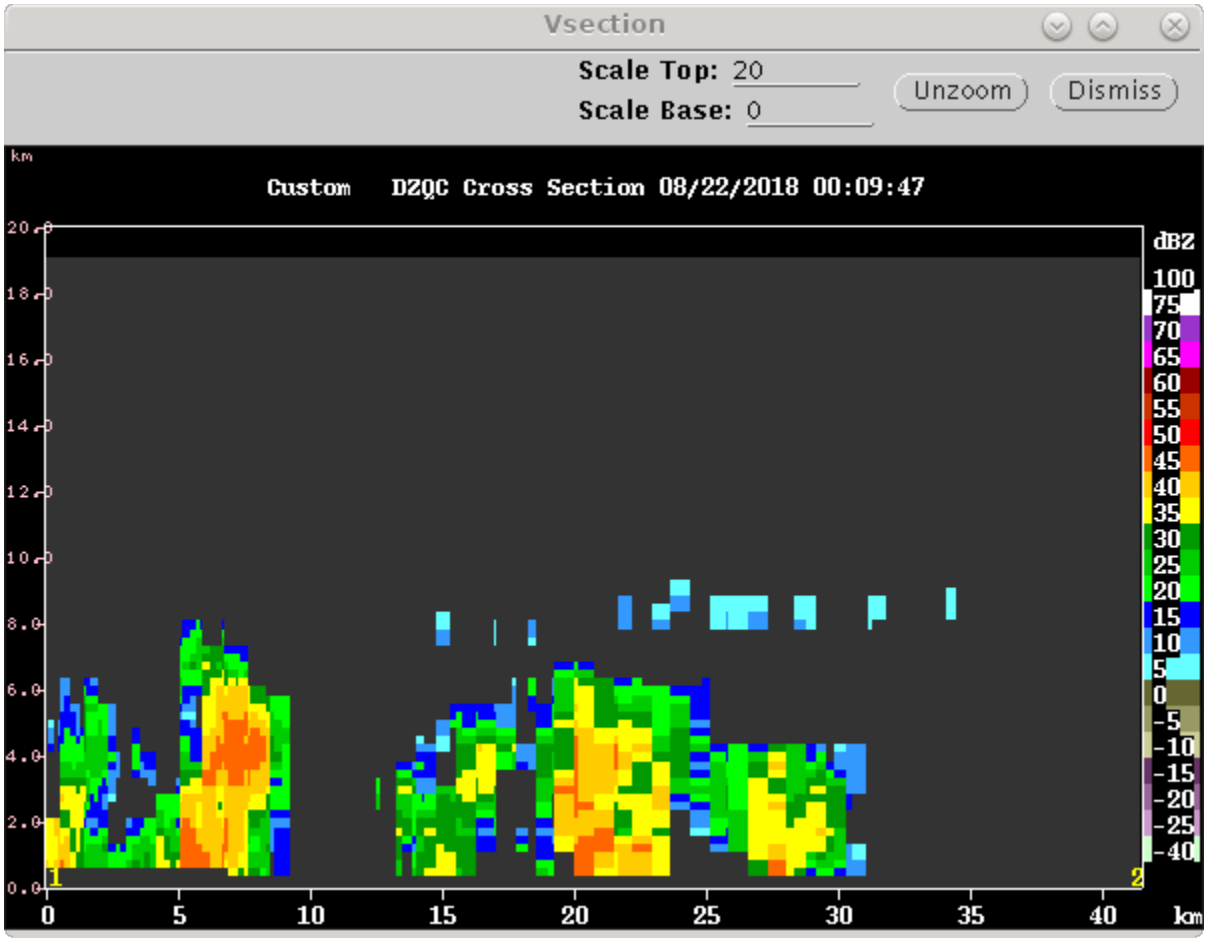
20180822
Day Shift (4a-4p L)
Timothy Lang

0001 – Adding two additional RHI sweeps. 20 deg is sufficient to top everything and we have at least a min to spare. Convection to NE threatening to develop into a WNW-ESE line. Strong ZDRs seen in at least one of the cells (the one with close to 60 dBZ). Evidence for differential attenuation behind core as well, especially aloft.



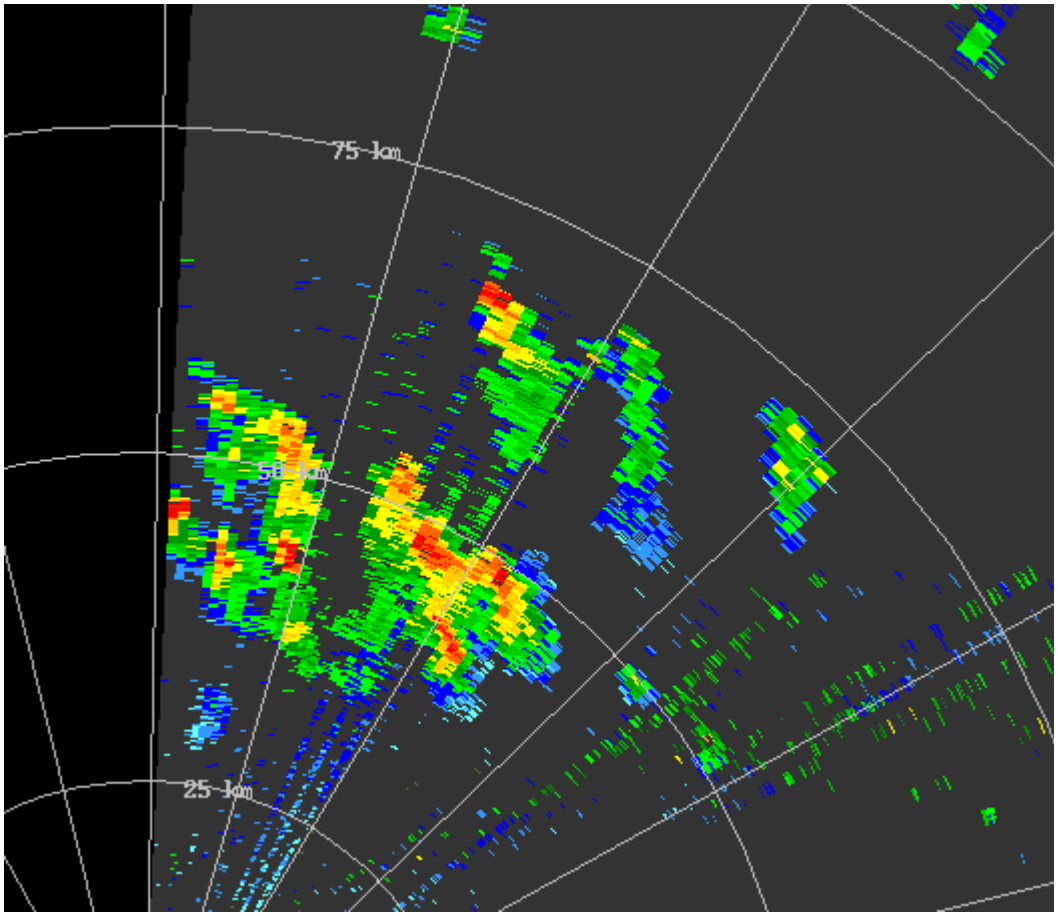
0014 – Vertical cross-section thru line o' convection, about 40 km to NE:



0015 – Additional cells popping up to S and SW. Overall trend toward increasing coverage, while NE trend is toward increasing organization.

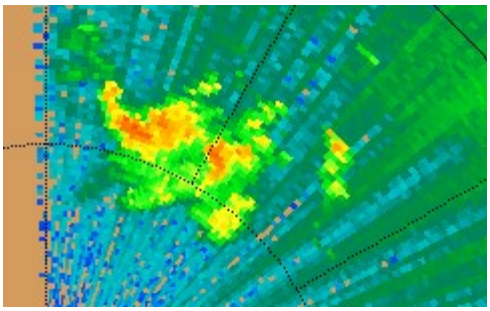
0025 – Some of the strongest NE cells reaching at least 10 km. Consistent with improved organization enabling stronger and more sustained updrafts. At least one cell (strongest from before) reaching 14 km, however.

0029 – State of NE organization:



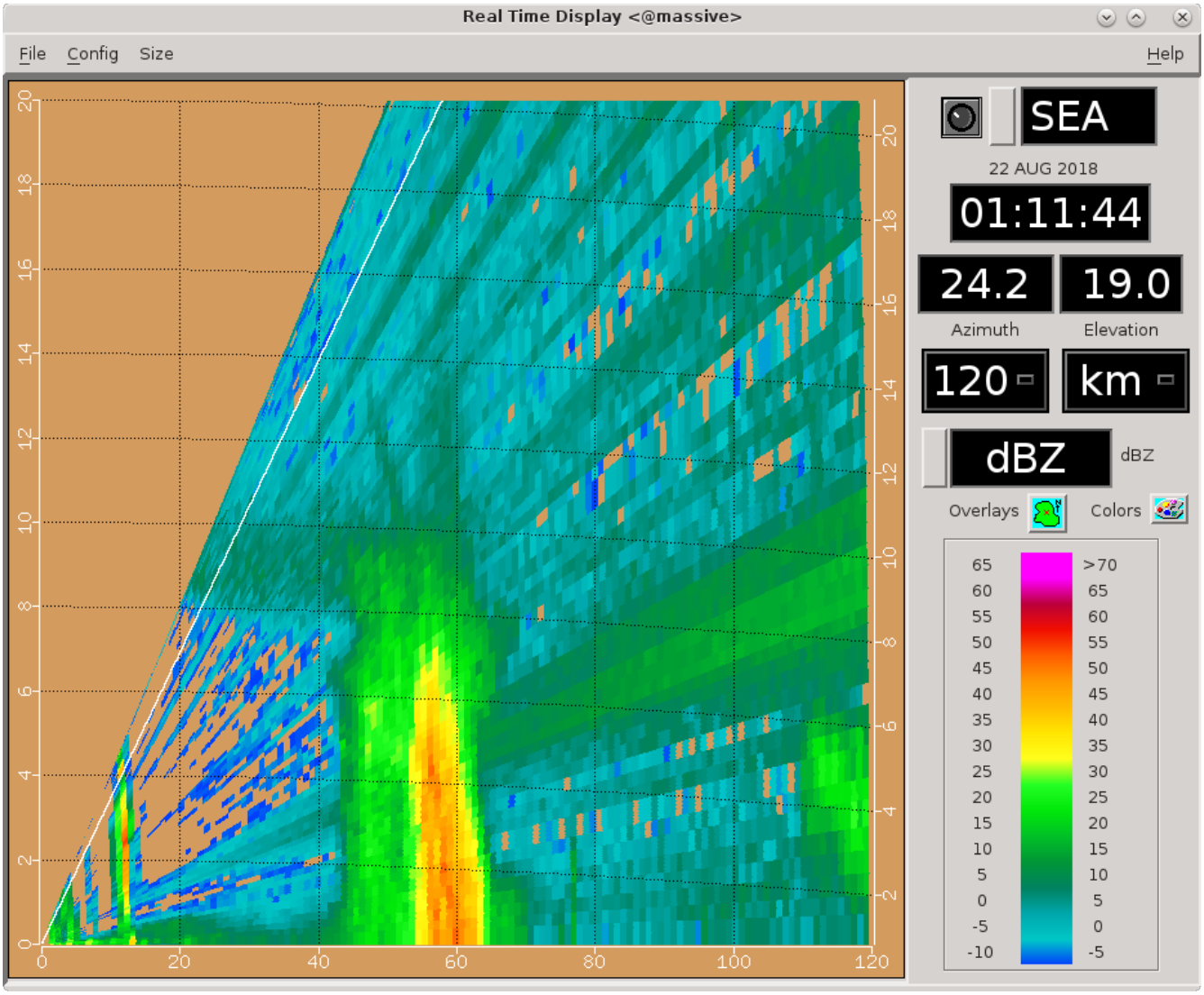
0038 – Switching to PISTON_NEAR next volume due to proximity of SW cells. Will keep RHIs on the NE organized convection, however.

0101 – NE convection agglomerating into a single contiguous mass. Maintaining RHIs on it, 12-44 az. Overall convective envelope moving NE away from ship, following monsoon winds. Ship's motion toward SE helping slow down the radar-relative propagation. Same process that helped keep the large out-of-range MCS off our port side for so long.

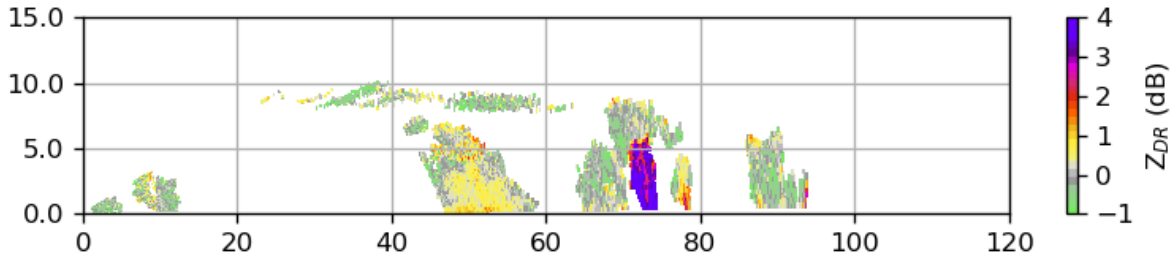


0108 – NEAR scan still having difficult time topping nearby convection due to proximity.

0113 – Cores to NE getting larger overall. Tops at least 10 km, some reaching 14+.



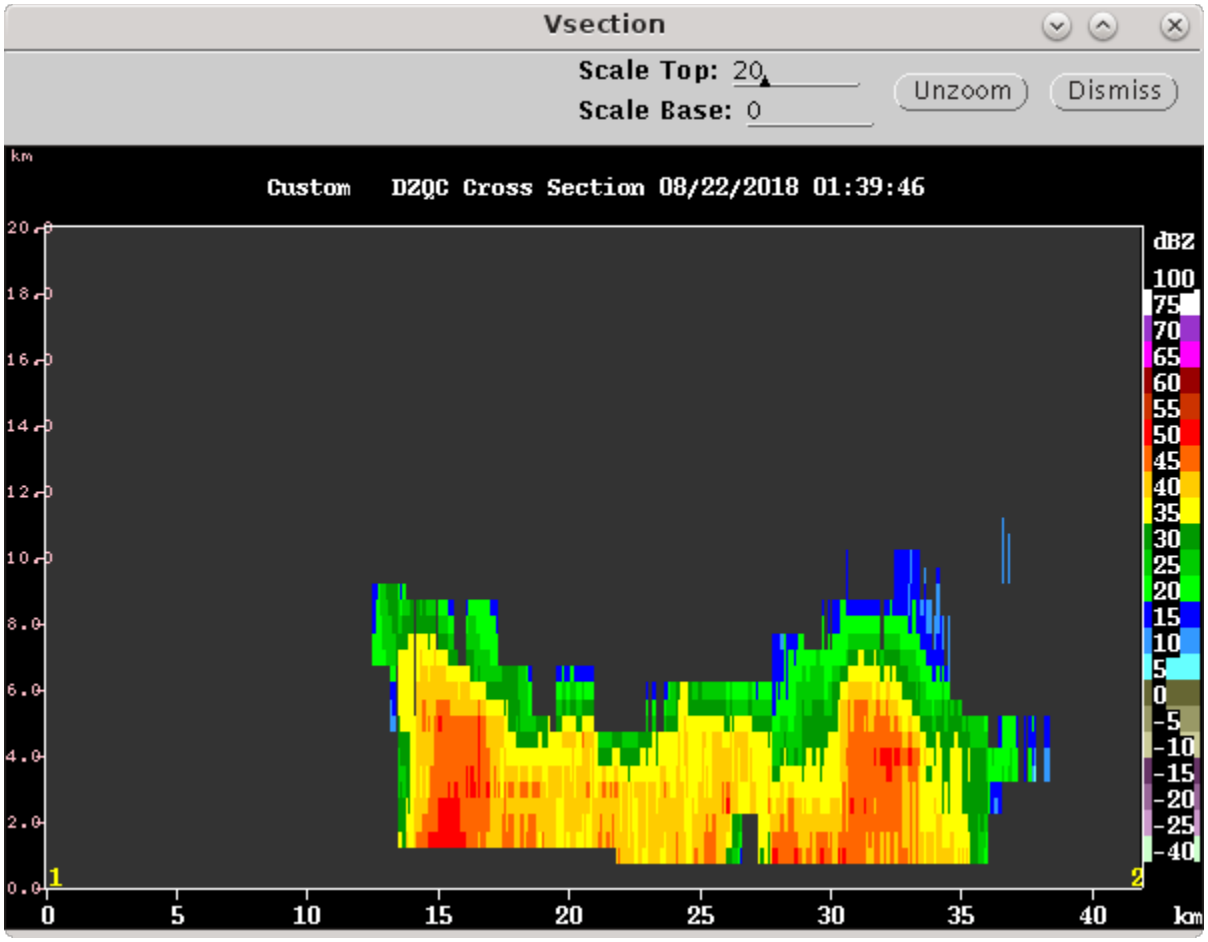
0119 – Not sure what is going on here … resonance? 010954, 42 az. Reflectivities are really strong, along with the ZDR below



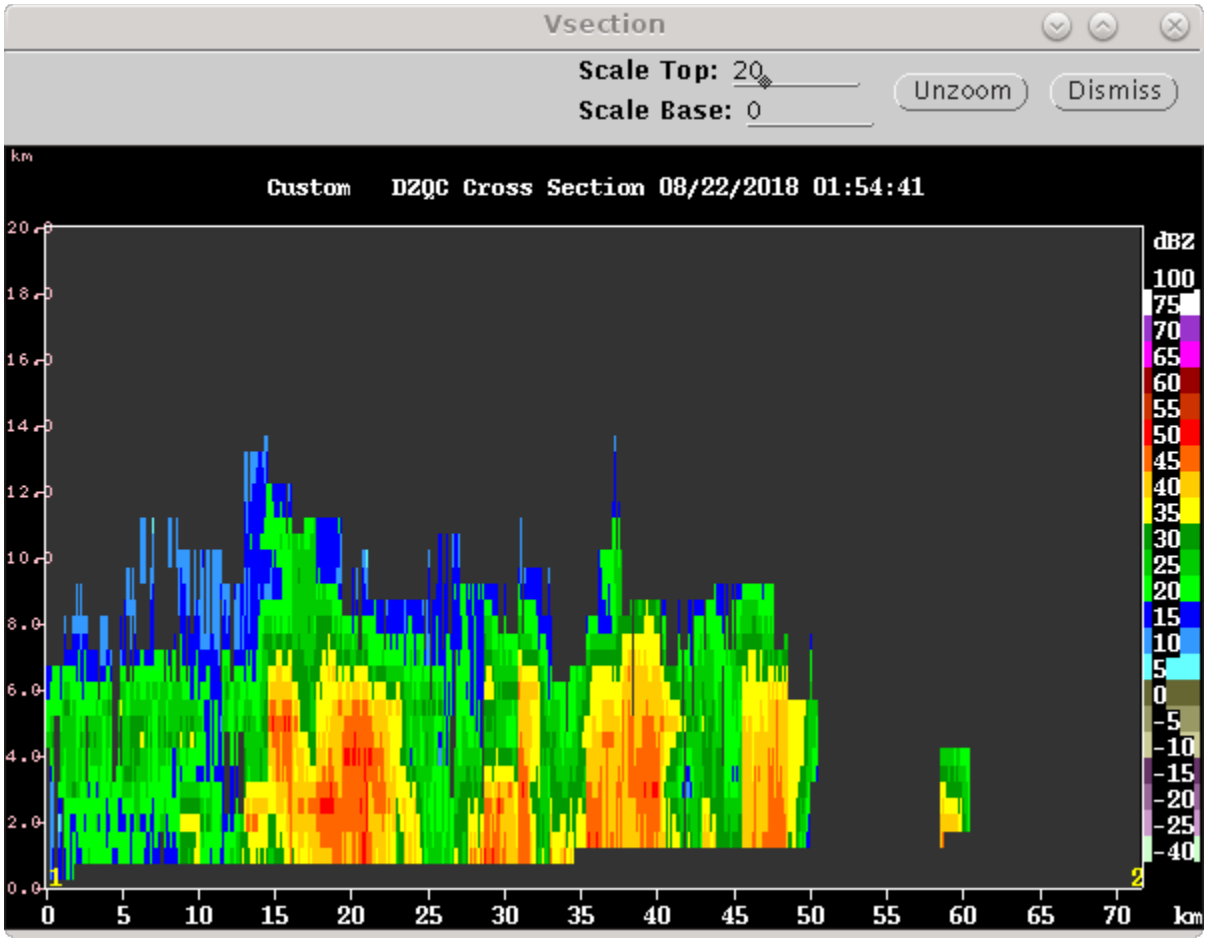
0133 – RHIs to 18-50. Apparently boat will be slowing down soon, not sure if it will rotate into wind.

0149 – So far no ship rotation, just slow. Rotating RHIs to east to include cell about 25 km out, along with eastern flank of NE multicell system.

0155 – Here is east flank of multicell:

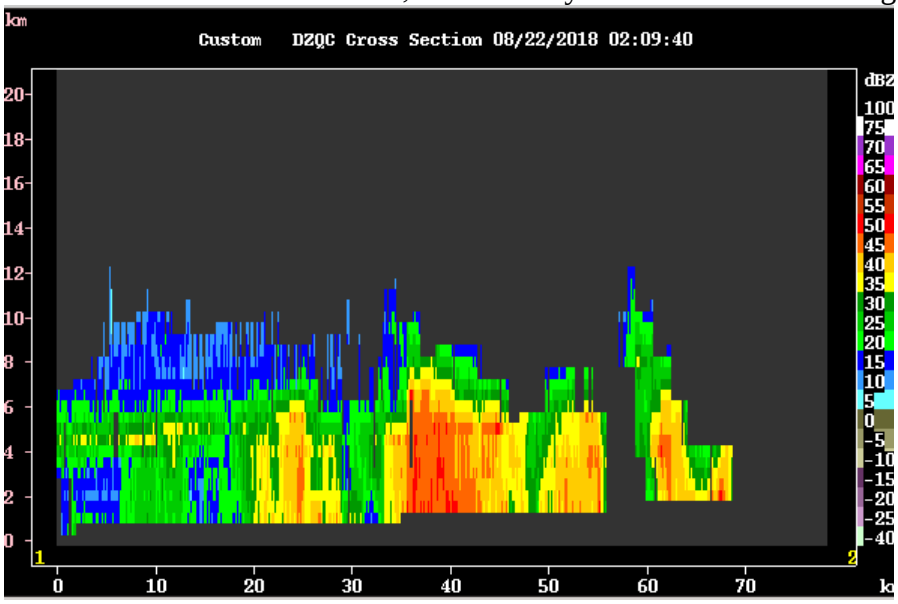


0204 – Some cores up to 14 km to the NE:



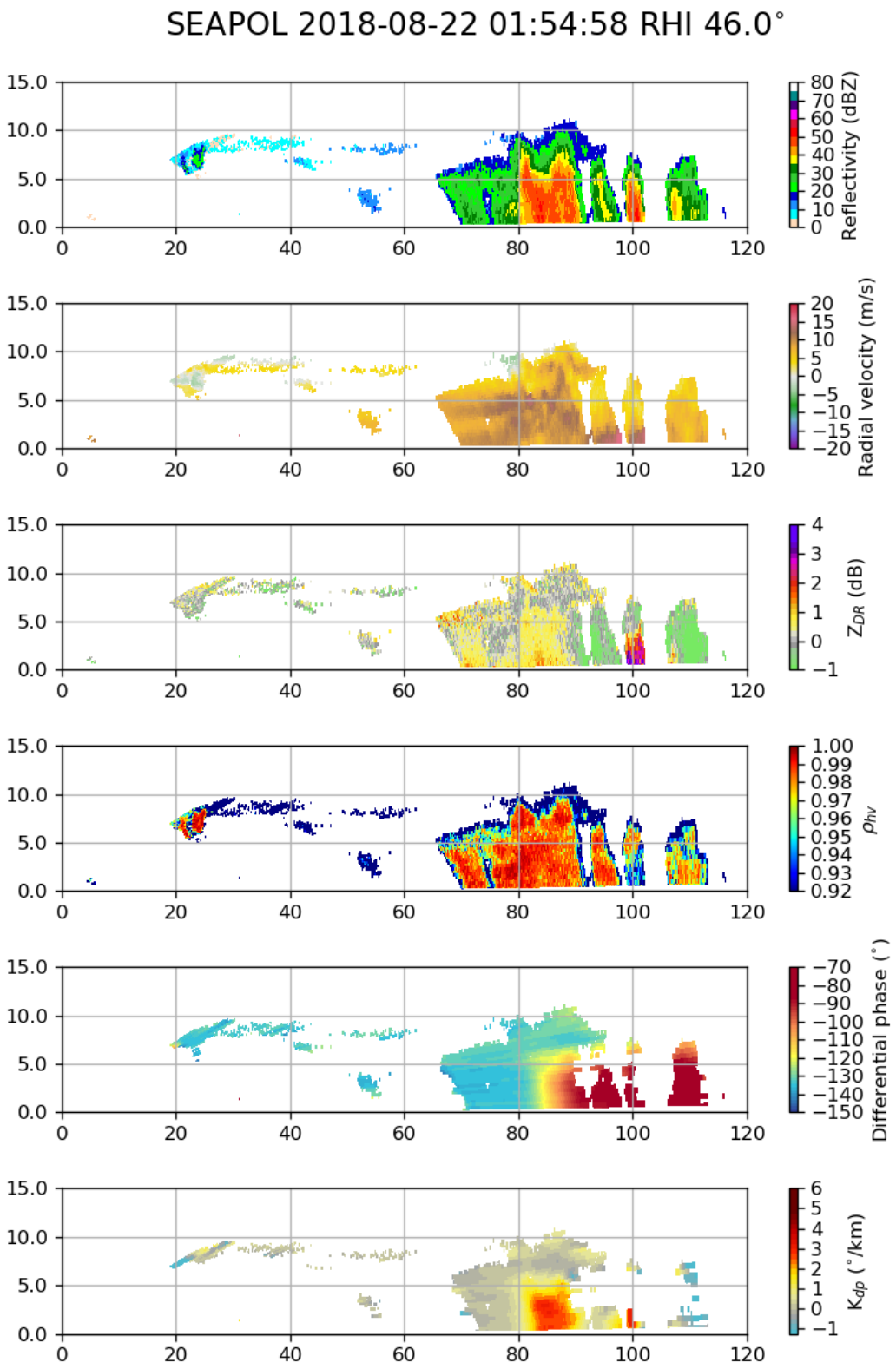
0205 – Switching to FAR next round due to no intense nearby convection.

0213 – Bright band toward west of NE multicell, due to decayed convection in that region.



0216 – Look at the KDP in some of the largest cells! A lot of interesting microphysics in this RHI. Note

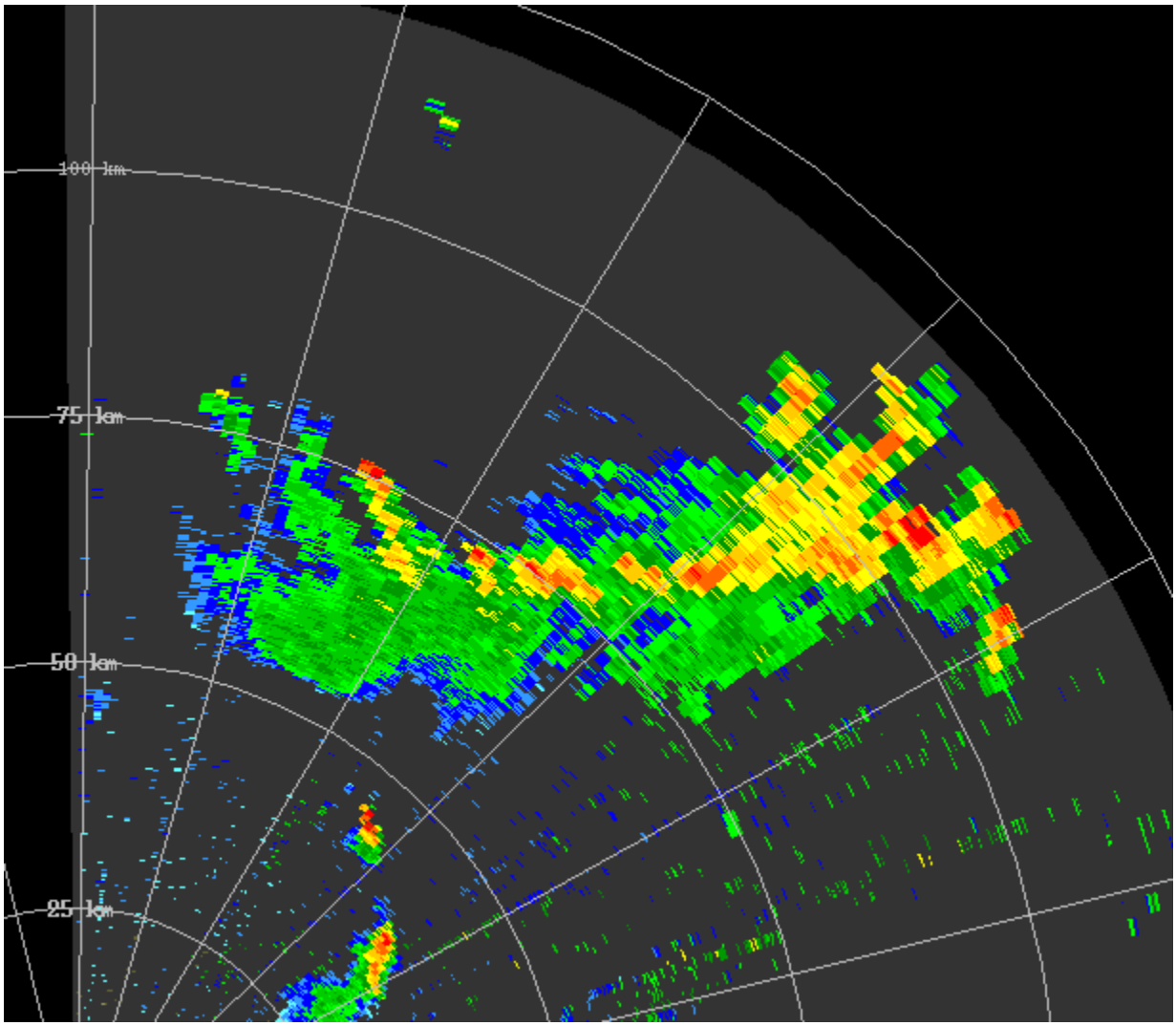
the difference in ZDR in the large mature cell near 85 km vs. the younger cell at 100 km.



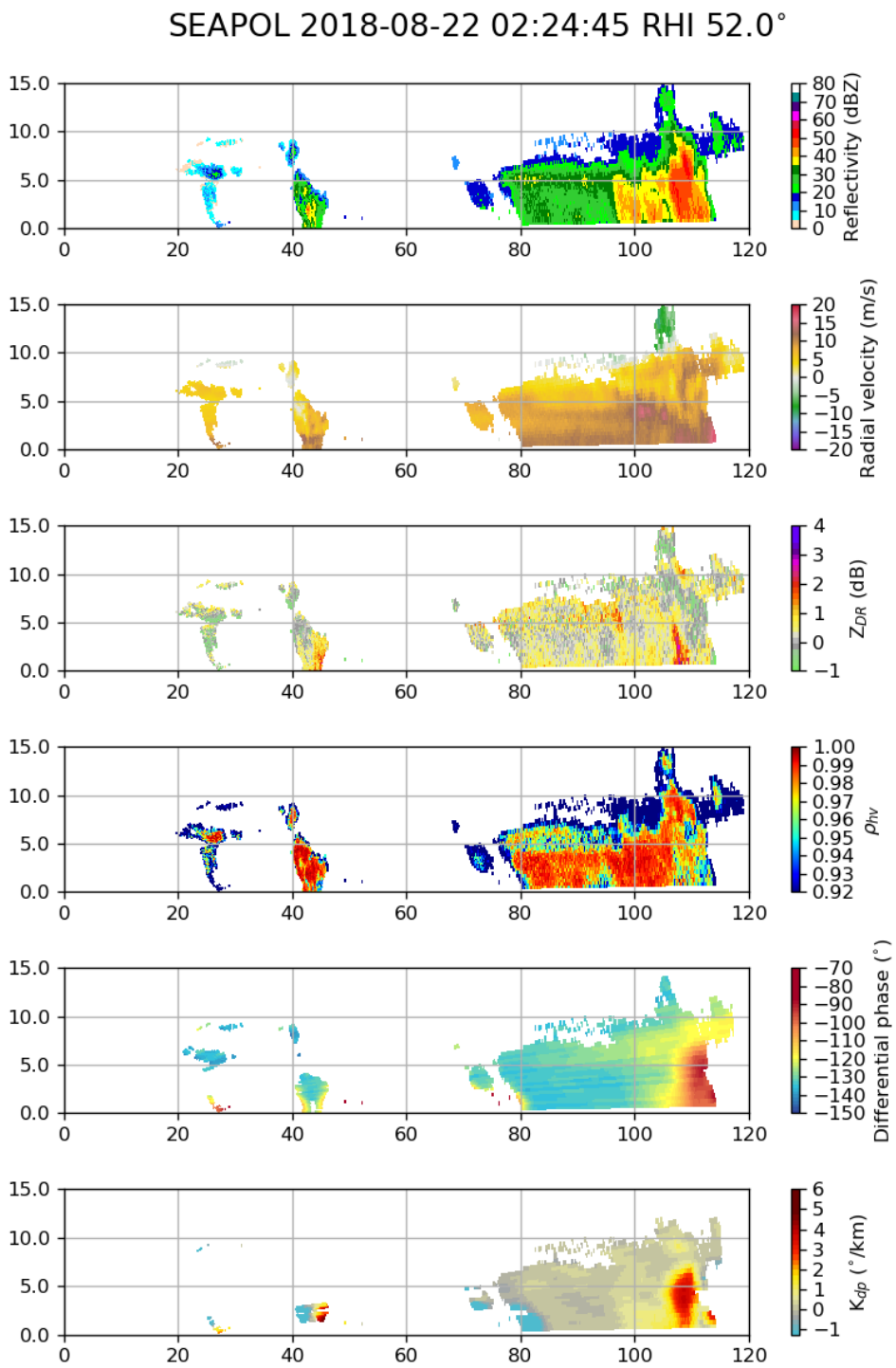
0220 – RHIs 34-66 az.

0228 – Finally turning into a line! QLCS, baby! Most of the new growth is on the eastern flank, starting

to get out of range. Meanwhile the western flank is decaying and turning into stratiform.

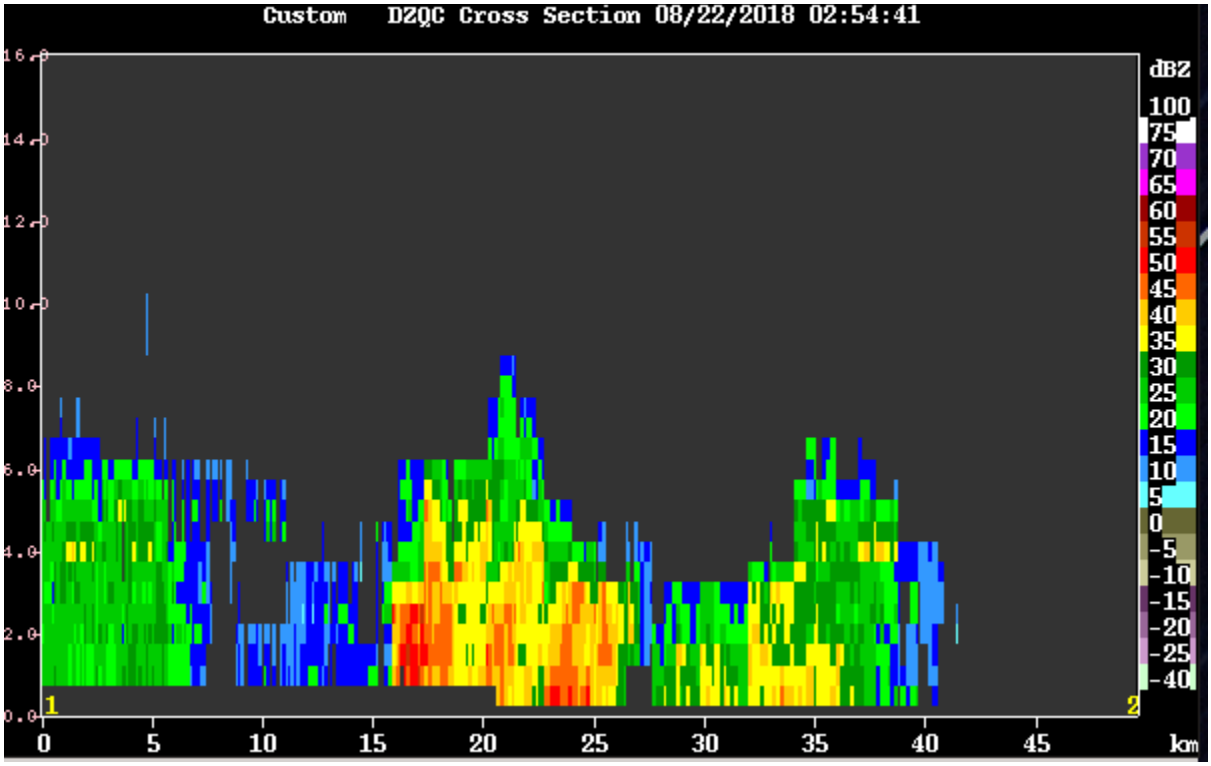


0234 Interesting decreased correlation signature down-ray of the main core in this RHI. Great bright band signature between 80 and 95 km as well.



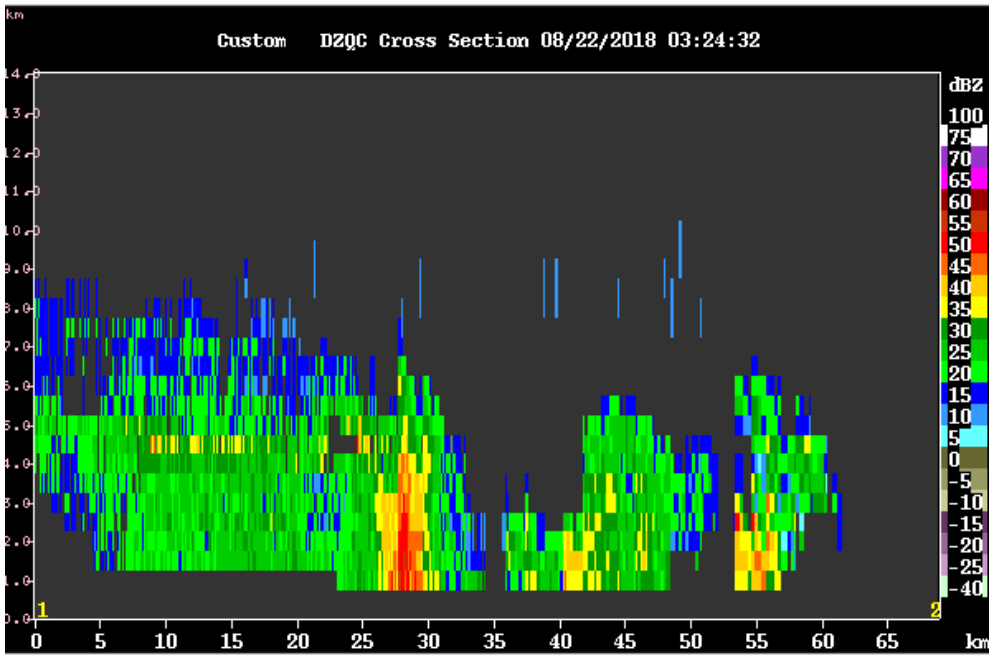
0250 – Switching to LOW next round as everything is too shallow/distant. RHIs unchanged.

0307 – RHIs to 40-70 az. Main line getting pretty distant, but this will provide good coverage of at least one short N-S line that is closer to radar. Here is the line in question:



0316 – No need to change RHIs. The W-E line is moving out of range, but still has a lot of stratiform near the ship due to it reaching its mature-to-decaying phase. The RHIs will capture this plus the westernmost N-S line, at a minimum.

0328 N-S line looking pretty ragged. Doesn't have the size of the main W-E line to have the same lifetime, methinks. Although the W-E line continues to stratiform out.



0331 No changes to RHIs. No great targets. Most cores are pretty narrow. The current RHI sector (40-

70) will still capture a few of these, plus the stratiform echo.

0346 – Rotating RHIs to 46-76 to capture more of remnants of easternmost N-S line. Will still get a lot of strat echo too.

0402 – RHIs to 44-74 az. Gonna ride this storm out. The NE quadrant is nearly filled with stratiform, and most cores are near 100 km range or further. Been a good dataset so far.

0417 – Most cores beyond 100 km so trying some RHIs through stratiform, hoping for good BB signature. 5-35 az.

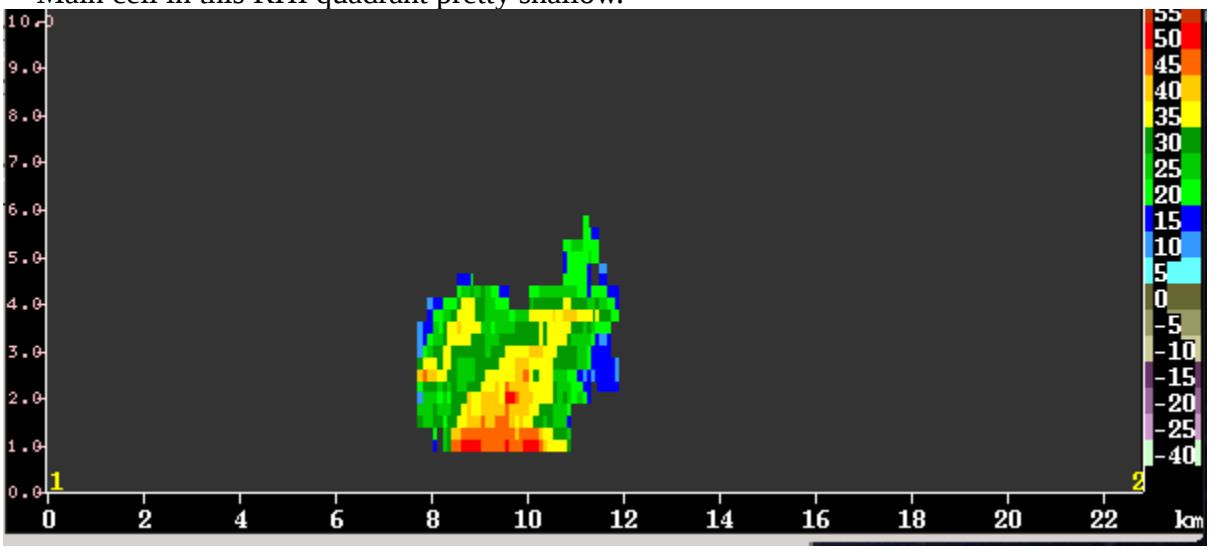
0436 – Ship has stopped and rotated into wind (~213 az). Stopping RHIs since it's not clear we can see anything to NE anymore.

0439 – In a good position for a CYGNSS overpass, but that won't be for another ~6 h.

0442 – Running a couple long-range surveillance scans to get the lay of the land and understand what targets they may be here to SW.

0447 – Back in PISTON_LOW. RHIs to 240-270. Some cells in this quadrant, but small. Will maybe narrow RHI sector and increase its resolution next round.

0457 – Main cell in this RHI quadrant pretty shallow.



0501 – Trying two sets of RHIs this round, one to SE near 150, the other clustered on the previous western cell. Both narrower (8 sweeps each, spaced 1 deg apart).

0514 – Western RHI hit its storm. SE RHI didn't capture much. Looks like cell moved too much.

0519 – Minor adjustments to western RHI. Rotated the other RHI set counter-clockwise to capture eastward translation of SE cell.

0527 – 06 UTC sounding is away.

0530 – West RHI hit OK (very marginal cell at this time), but SE storm dissipated before it was scanned.

0532 – Full 16-sweep RHI to 251-266. Storm is beyond 100 km, but it's the only thing I trust to survive the next 10 min.

0540 – Forgot to start RHIs, now started 30-40s late.

0543 – Pretty typical oceanic cell, about 8 km high with 50+ dBZ. Core was around 260 az.

0546 – Only minor adjustments to the RHI sector.

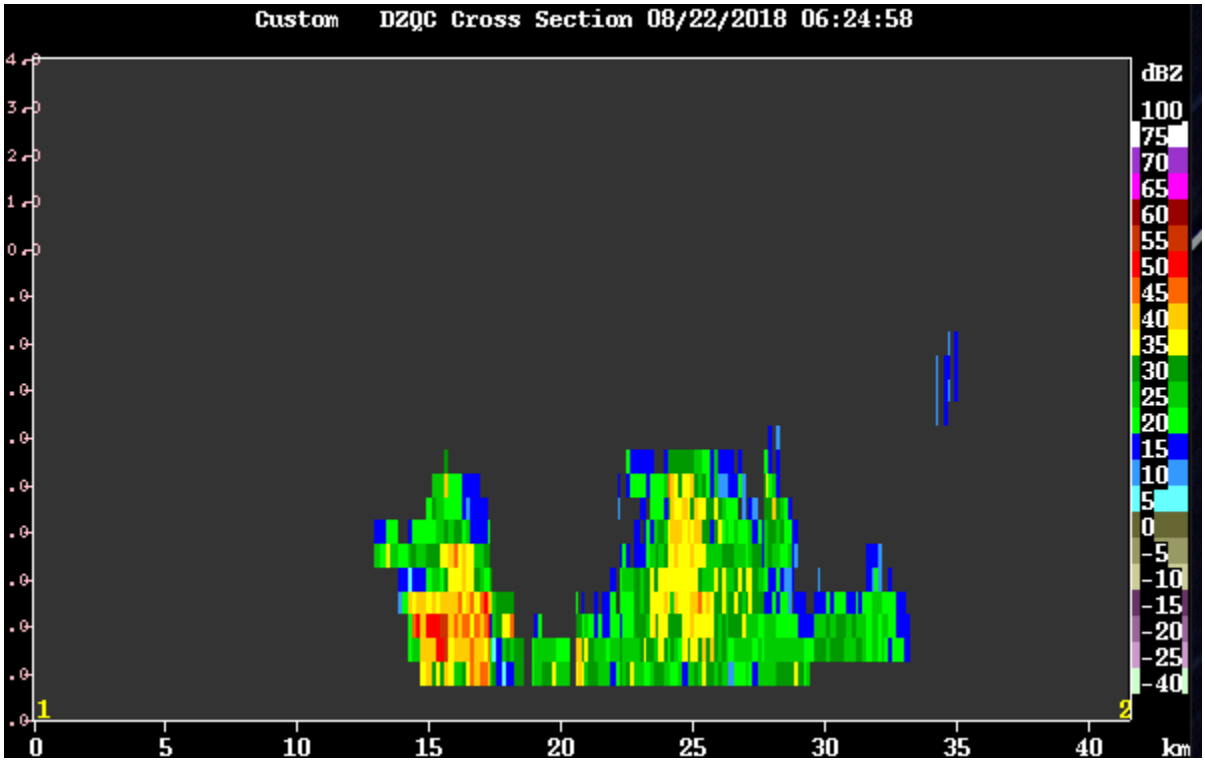
0548 – New plan, will start a time series scan once the PPI volume tops the echo.

0609 – Back on normal scanning with PISTON_LOW. Will try RHIs 252-267; still enough echo there to bother with.

0611 – LOW was started late, delaying RHIs to next round. Boat still stationary.

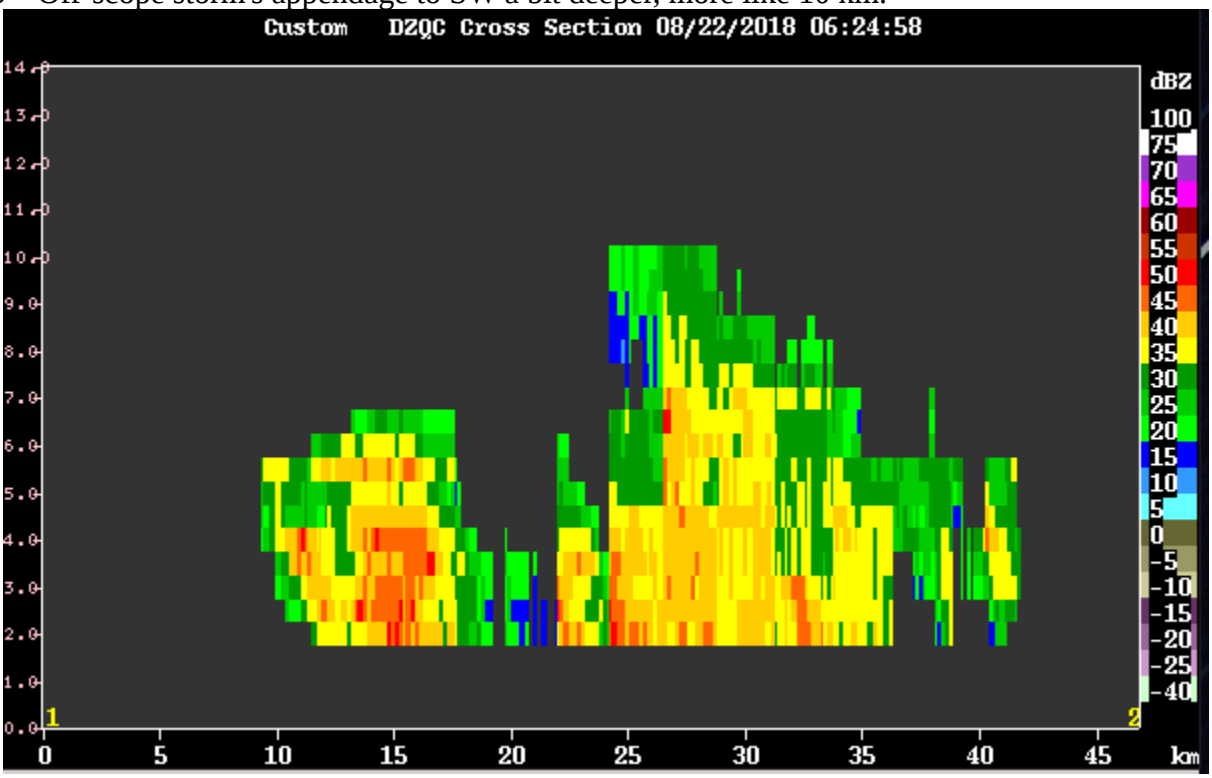
0617 – Restarted LOW a bit late, but shouldn't seriously impact the RHIs. Going with 252-267 (16 sweeps) as originally planned. There is also an appendage on scope from some mesoscale storm to the distant SW. That likely will not be covered by the RHIs, but there is some second trip from the rest of that storm.

0627 – Western cell not much, about 6 km in height.



0632 – Minor mods to RHI sector only, to account for northward movement of cell.

0633 – Off-scope storm's appendage to SW a bit deeper, more like 10 km.



0635 – Jim George analysis of velocity data suggests Bragg scatter layer near 10 km altitude. Not visible in reflectivity (too much RFI). Sounding doesn't indicate much notable there, and lidar does not see that high.

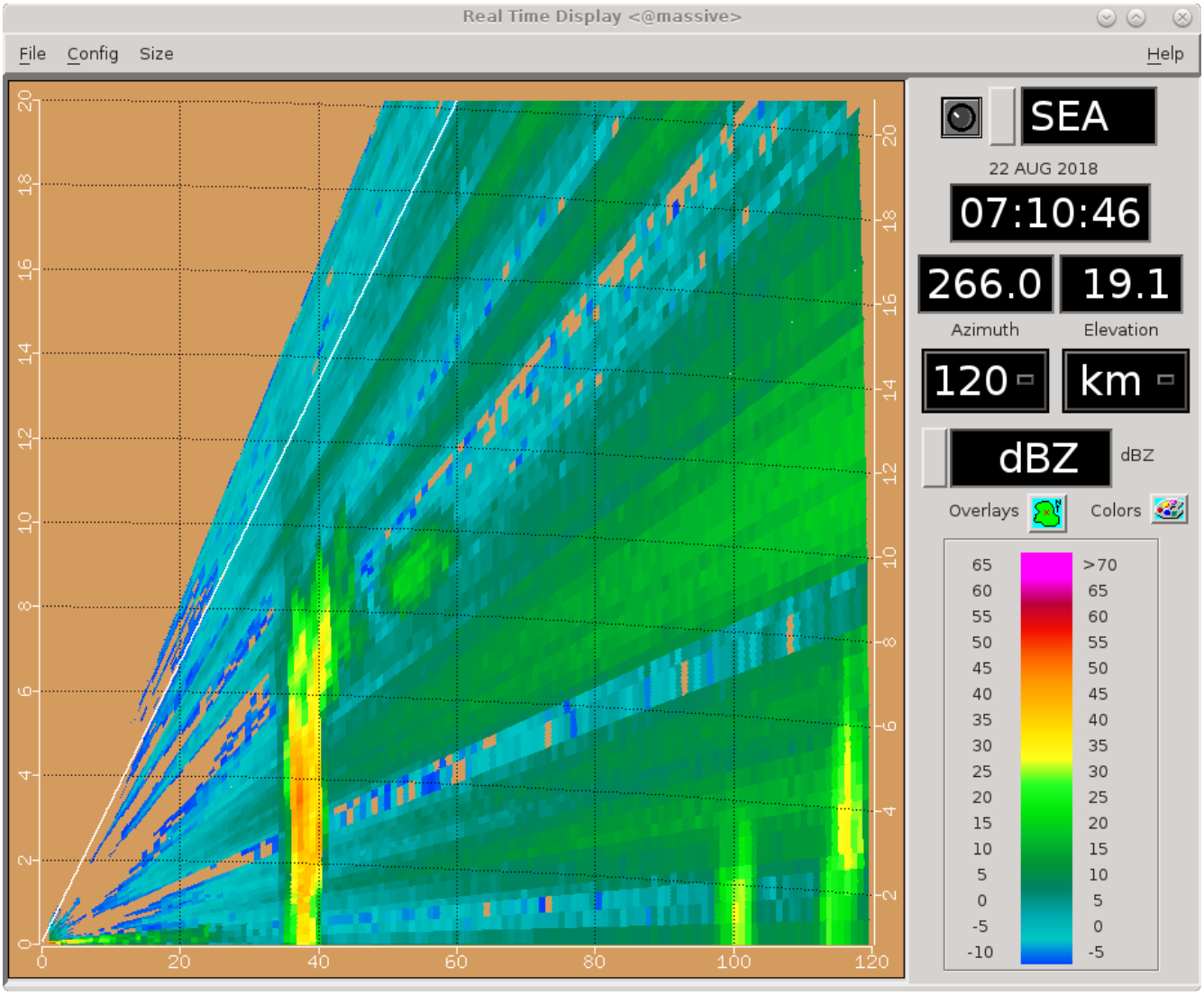
0641 – RHI shows tops to 10 km in western cell.

0646 - RHIs to 256-271. Closest game in town. Two other storms in SW quadrant, but both are more distant. These RHIs will cover one of the other two storms as well, however.

0657 – Tops in western storm closer to 8 km this round.

0701 – RHIs to 262-277, due to northward drift of storm.

0710 – Core getting a bit bigger. This western storm has held together better than hoped. Now about 40 km out.

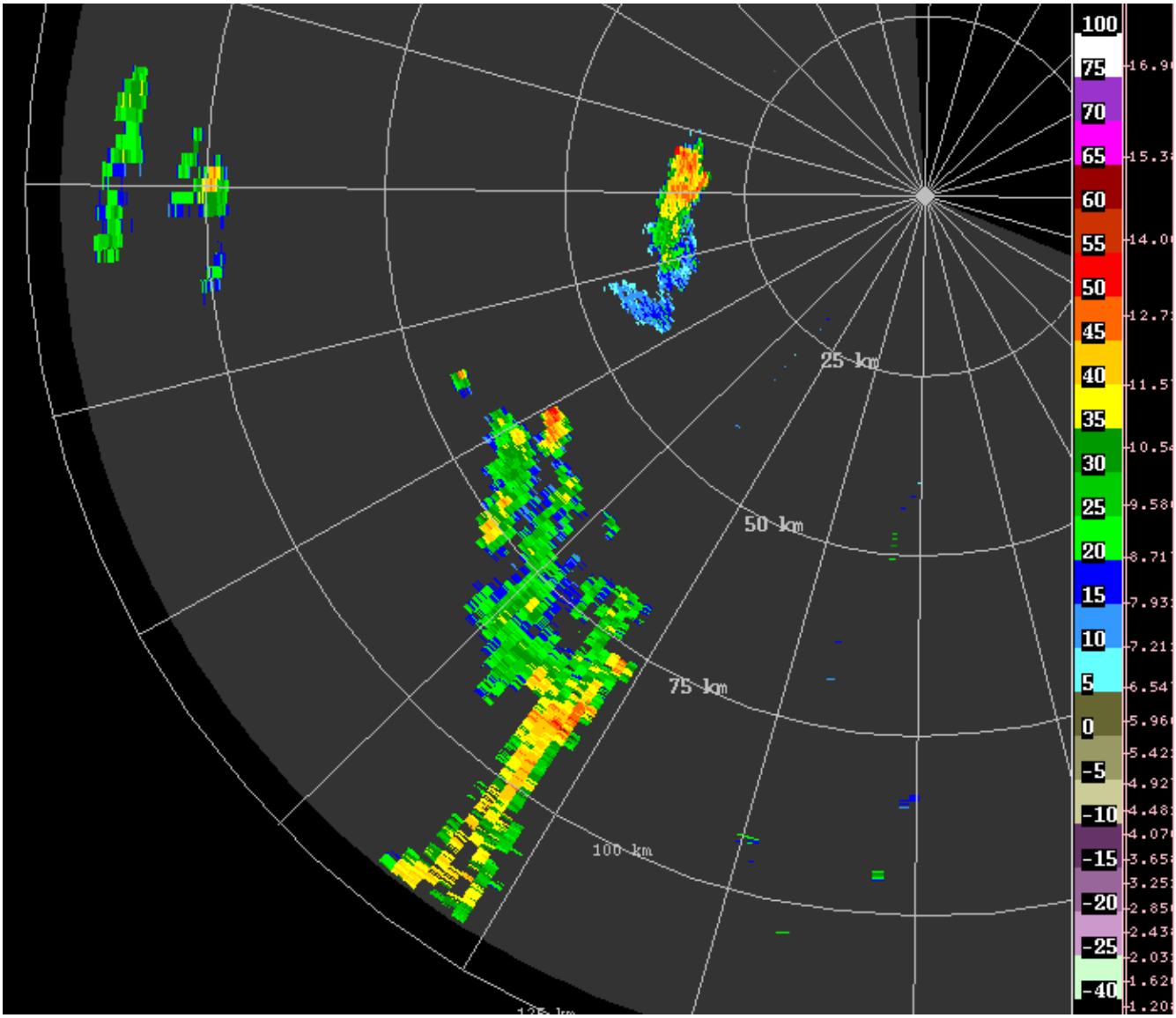


0720 – No changes to RHIs.

0726 – Switching to PISTON_FAR next round, to try to stay above incoming western cell.

0732 – Keeping 16 tilts centered on 270 az, but spacing 2 deg apart to account for broader angular swath now that storm is within 30 km.

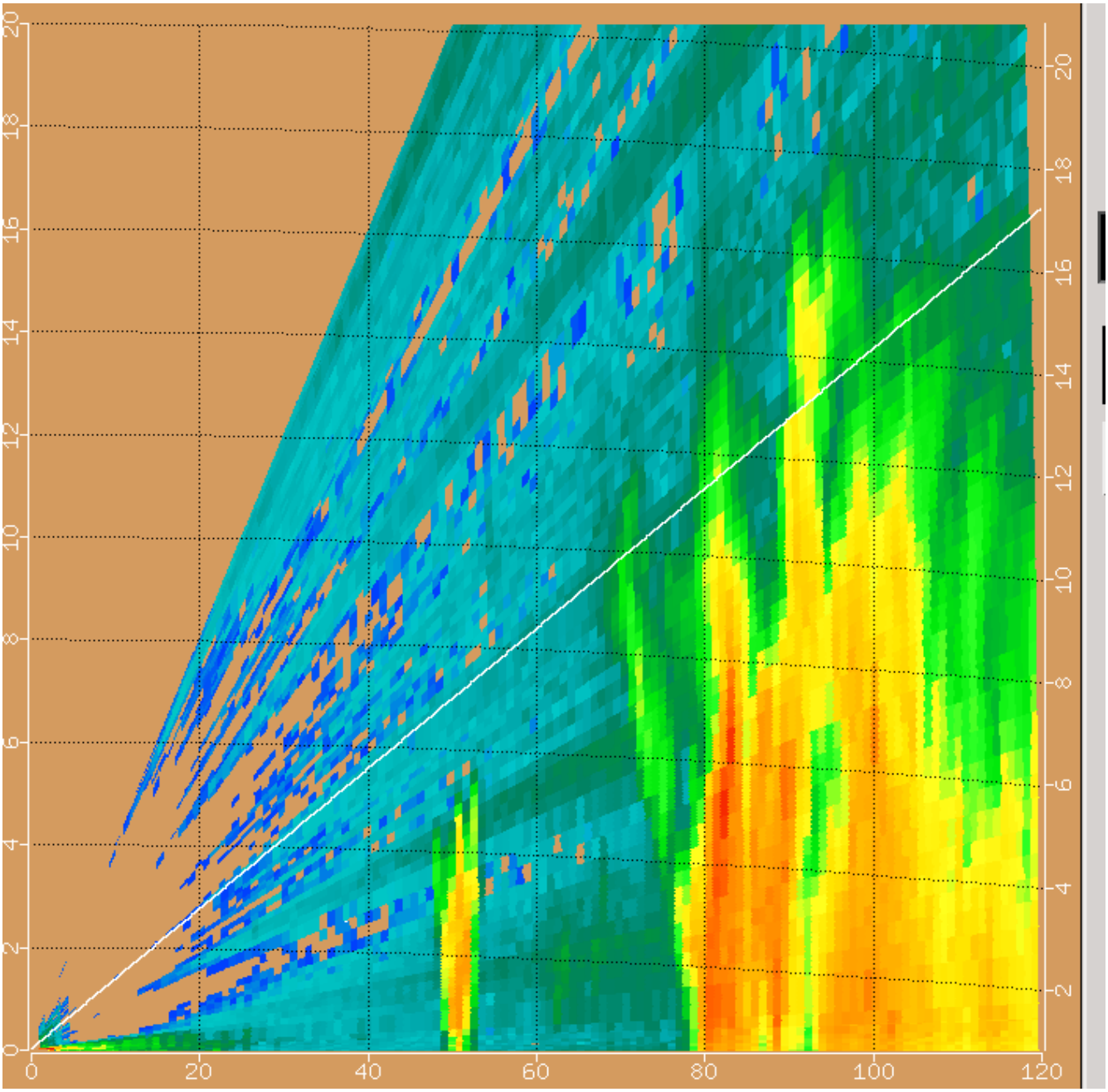
0734 – CIDD's take on current situation. Still three main storms. The southernmost one has a line along a radial, making it an attractive RHI target. However, it is pretty far away.



0738 – Finally underway to SE. Disregarding previous RHI set. Switching to 11 tilts 210-230 az to try to get the SW storm.

0743 - Scan failed, trying 210 az, 3 tilts centered there. Nice looking storm!

0745: Ship was turning while scan was underway.



0748 – Now doing 16 sweeps spaced 2 deg apart, centered on 210 az.

Shift Summary

At the beginning there was a large MCS off scope to NE, causing significant second trip. There was minor downtime due to a lidar INU replacement, then when we came back up we captured a very nice example of upscale growth that lasted multiple hours. The storm progressed from an individual cell to a small QLCS-type system, which then stratified out. At that time the boat stopped for oceanographic work and we started pointing SW. Some long-lived cells in the SW quadrant enabled a number of RHI sets on average tropical convection. Toward the end of shift the boat resumed heading SE, and the shift ended with RHIs on a radially aligned line far to our SW.

Night Shift (4p-4a L)
Scott Powell

0800: Continuing scan strategy. RHI sector shifting slowly east to track convective line.

0842: See daily science summary for lidar data and cold pool passage over ship.

0850: Took some photos of convective line to the south of ship.

0854 - Noting some negative phase shift aloft during scanning on 8/22, 0854 UTC, 184 az. (TJL)

1011: Weird fork in stratiform anvil in RHI.

1100: Switching to two RHIs: One to northeast to sample isolated convection and maintaining a smaller RHI sector to decaying stratiform to south.

1115: Switched to LOW scan for volumes.

1149: Still using two RHI sectors to scan isolated convective echoes to NE and S of ship. Trying out 1 deg azimuthal resolution for narrow sectors. Looks useful (i.e. 184 deg looks quite different from 185).

1152: Seems like isolated cells are pretty short-lived. An hour or two tops.

1230: Nothing but a few isolated cells remain. Stopping RHI scans but continuing low-level scan at 15 minute intervals. A long-range surveillance scan will run after each volume scan.

1348: Created a scan called PISTON_FAR_S in PISTON2 scheduler. In this, I used the FAR scan but cut off all angles above 10.8 deg. Going to start this at 1400 since only echoes observed are remnant stratiform anvils scattered throughout the radar domain. This will save scan time at a point in time when we don't need high vertical resolution. The scan has 13 tilts. Altering the LOW scan to stop above 10.8 deg would have included 19 tilts. The new scans will repeat every 15 minutes. Surveillance will continue every 10 minutes.

1452: Went outside and noticed some wave-like features in altostratus (?) cloud base overhead and just north of the ship. Interesting considering some of the wavy features seen in lidar data.

1530: Switched to NEAR scan for decaying stratiform close to ship. Conducting RHI from 6 to 20 deg on this area of precipitation. Also sampling edge of stratiform region to the N near 100+ km range. Not much of interest yet.

1630: Stratiform near radar is pretty much dissipated. Switching to FAR scan. Some small cells starting to appear in eastern part of domain.

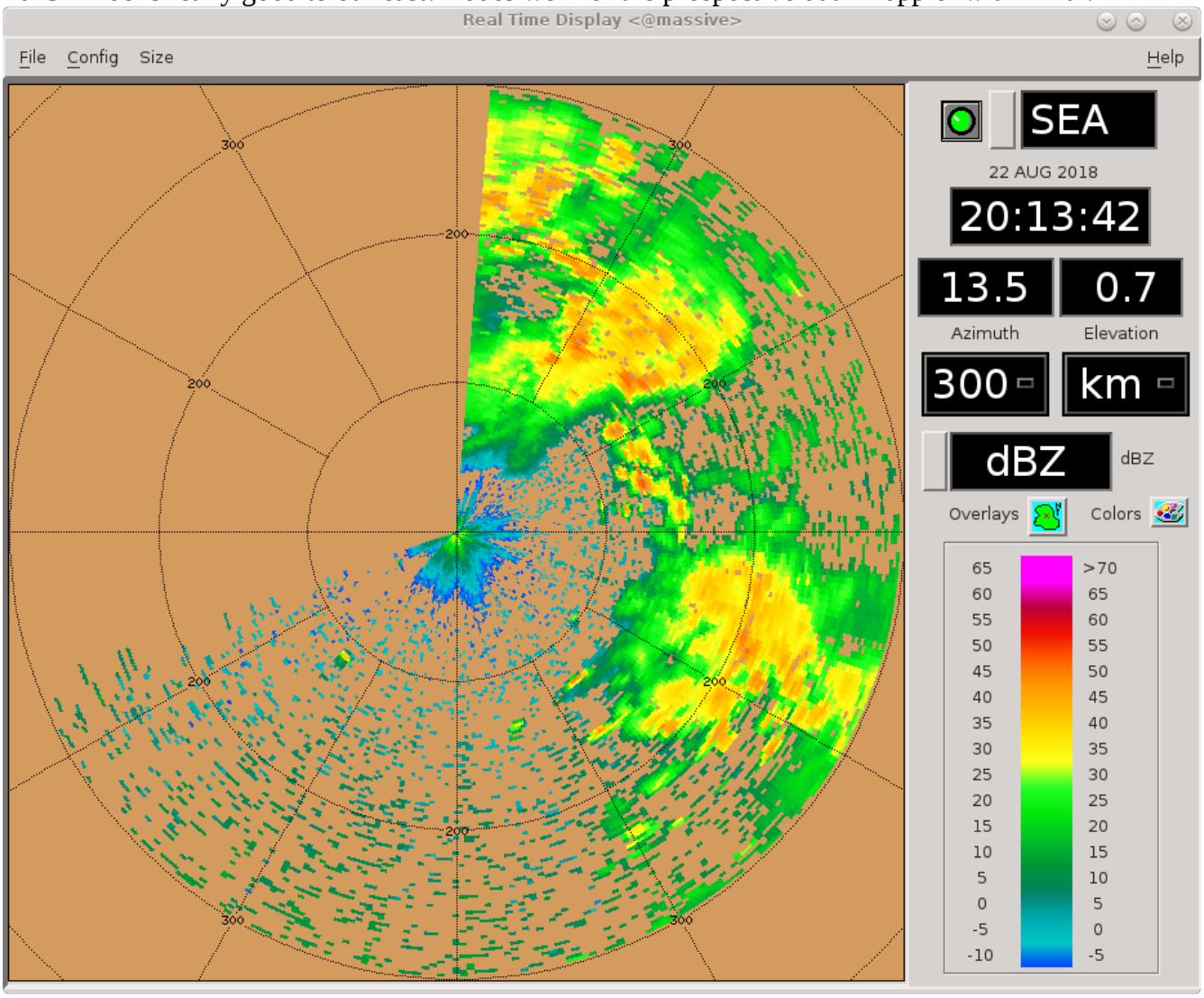
1648: Switching RHI to 60-80 deg to capture some isolated convection.

Day Shift (4a-4p L)
Timothy Lang

2005 – Been running similar scanning for the last few hours. Stratiform from distant eastern convection

in our NE quadrant. RHIs thru stratiform centered on 30 az, with a 300-km surveillance thrown in. Switching to LOW next round.

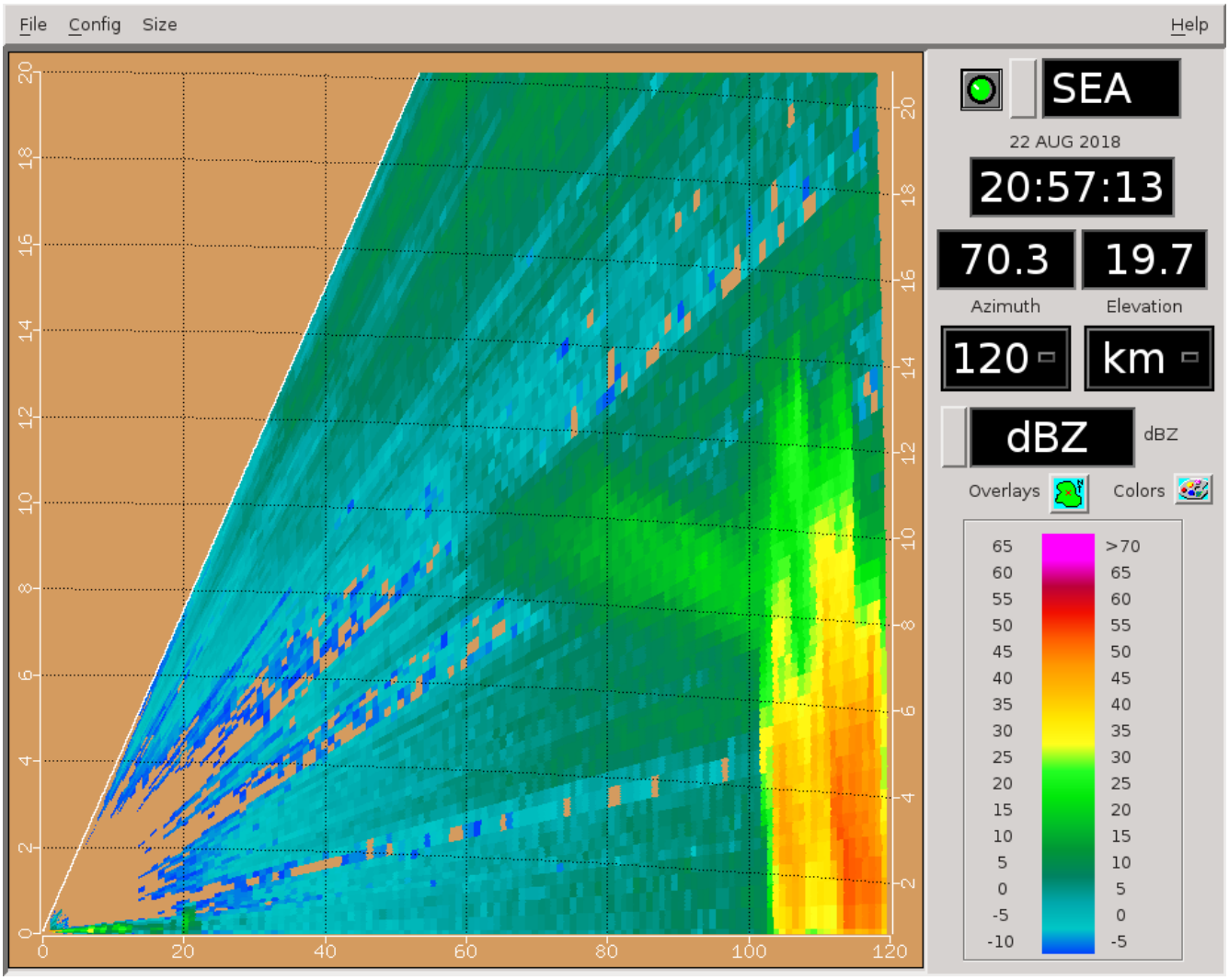
2013 – Looks really good to our east! Bodes well for the prospective dual-Doppler with Mirai:



2031 – Starting to get a few cells to our E and SW. Letting the RHIs go on the stratiform to our NE one last round then will likely switch to one of these cells.

2047 – Moving RHIs to 62-84 az to cover long-range cell. Swath is probably overkill, but we shouldn't miss the cell.

2057 – Storm looks pretty good, up to 14 km tall. Some anvil out in front.



2101 – RHIs to 65-76 az, spaced 1 deg. Trying to narrow focus on storm and have fewer empty sweeps.

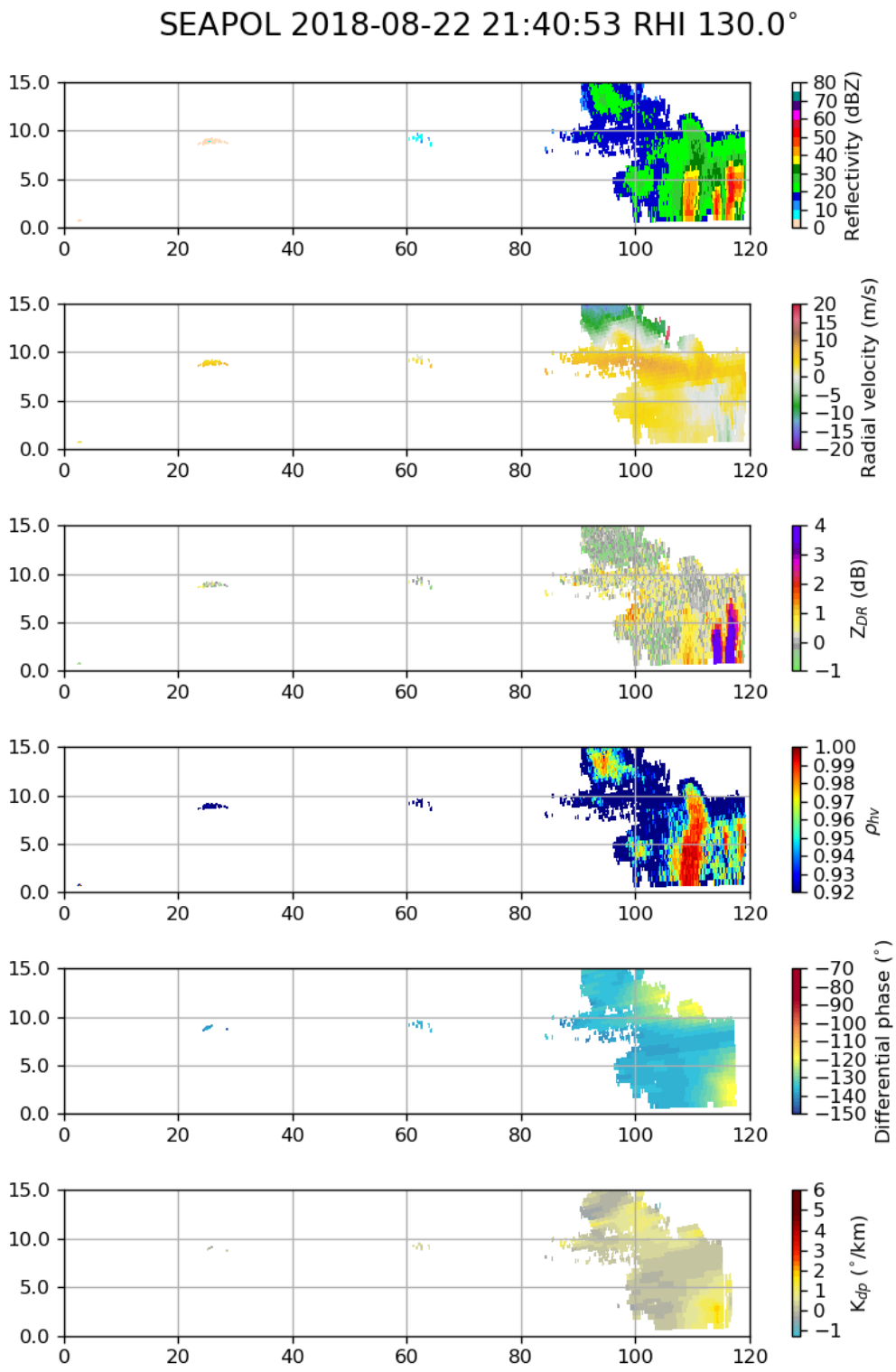
2113 – Think I missed a bit, should have been more counter-clockwise on the RHIs.

2116 – RHIs to 48-70 az, 2-deg spacing. Not going to miss this time!

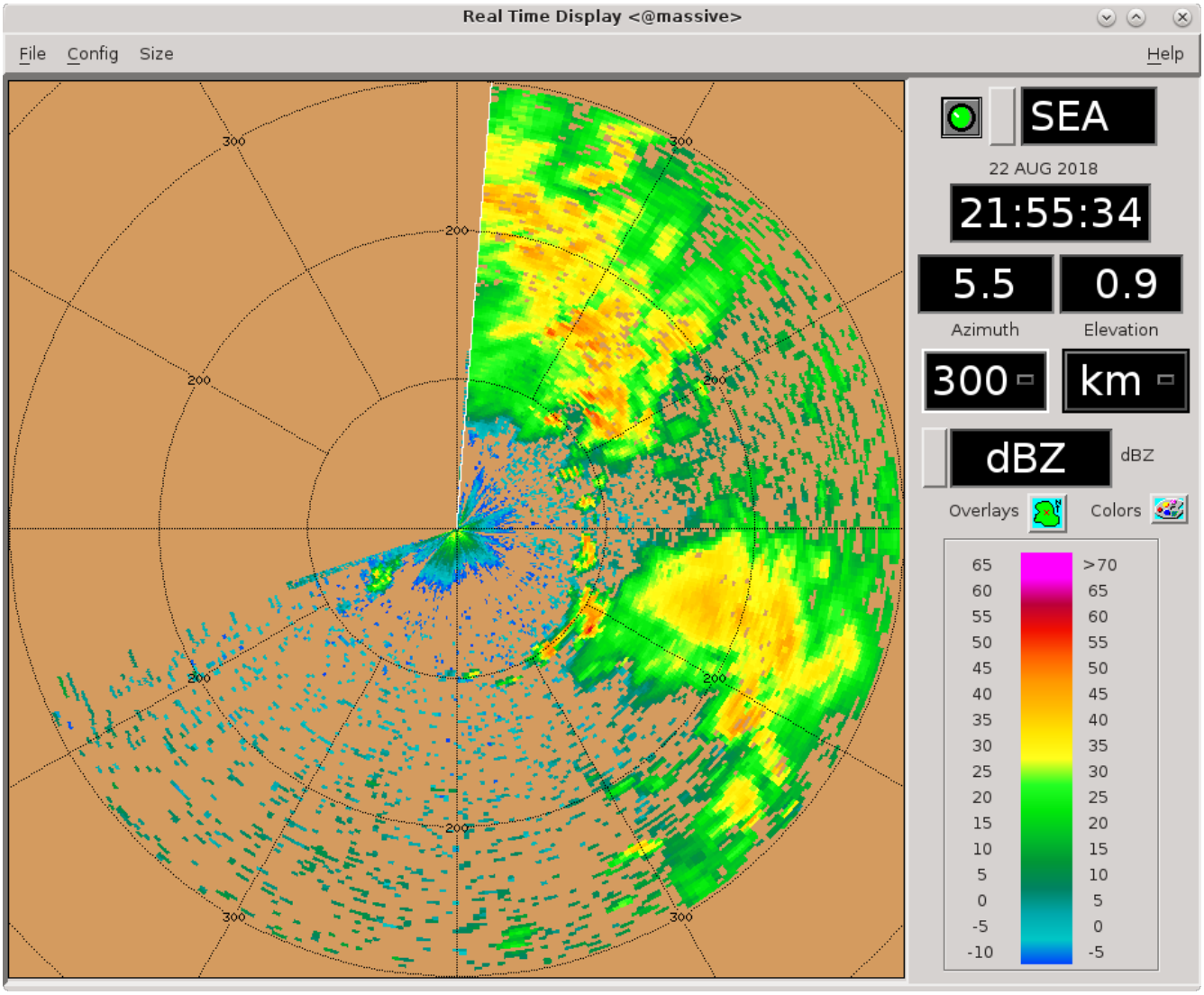
2132 – Switching RHIs to convection to SE, between 120-150 deg.

2148 – RHIs to 116-140.

2151 – Interesting ZDR/KDP differences in the furthest cells here. ZDR suggests at least a few really large drops, but KDP suggests that's all there really is. But very distant so not making too many inferences here.

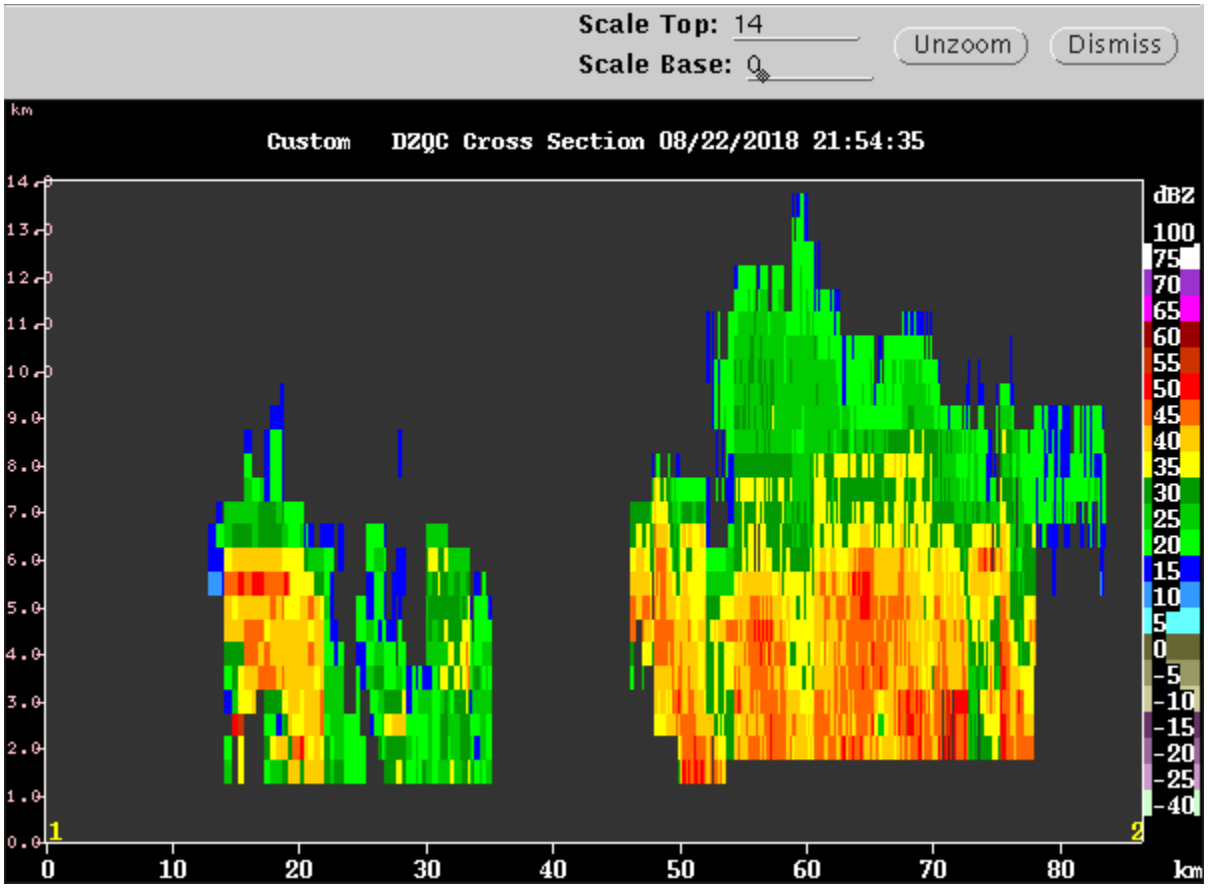


2156 – Current long-range situation. Large regions of mixed convection and stratiform, still mostly beyond reach of our main scanning.



2201 – No changes to RHIs. The SE convection is slowly aggregating and there are multiple possible RHI sweeps. This RHI volume can't capture it all, but gets the bulk. Storm is slowly approaching TGT, but likely is moving east with the monsoon winds.

2203 – Health N-S vertical cross-section thru portions of storms to SE:



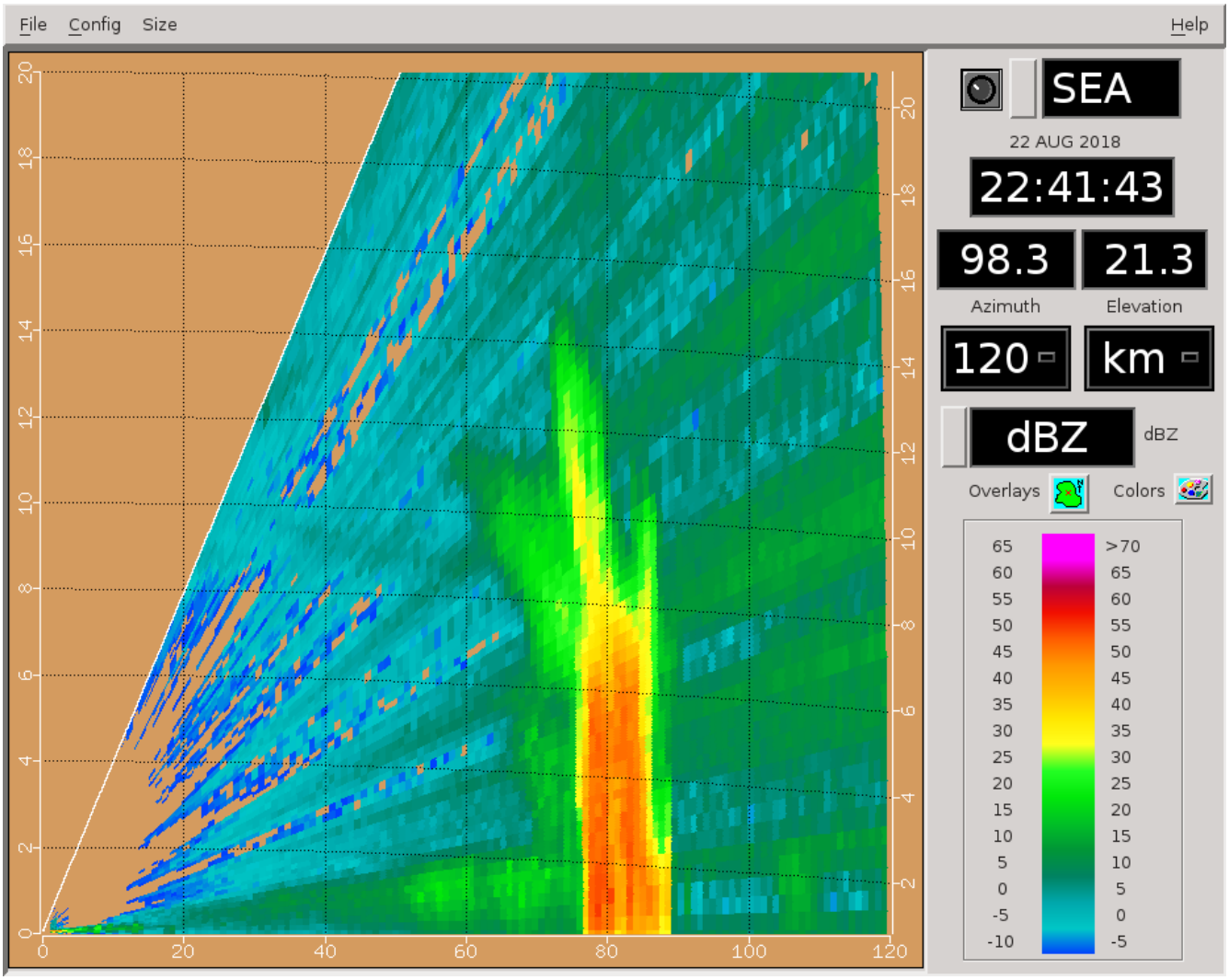
2216 – RHIs to 90-112. Lots of options to the SE as storms are forming a ring in that quadrant.

2229 – Switching to PISTON_FAR, as I am concerned about keeping above some of the incoming cells over the next hour or so.

2231 – RHIs to 94-118, will capture a nice chunk of the SE convection. But there is plenty else in that quadrant.

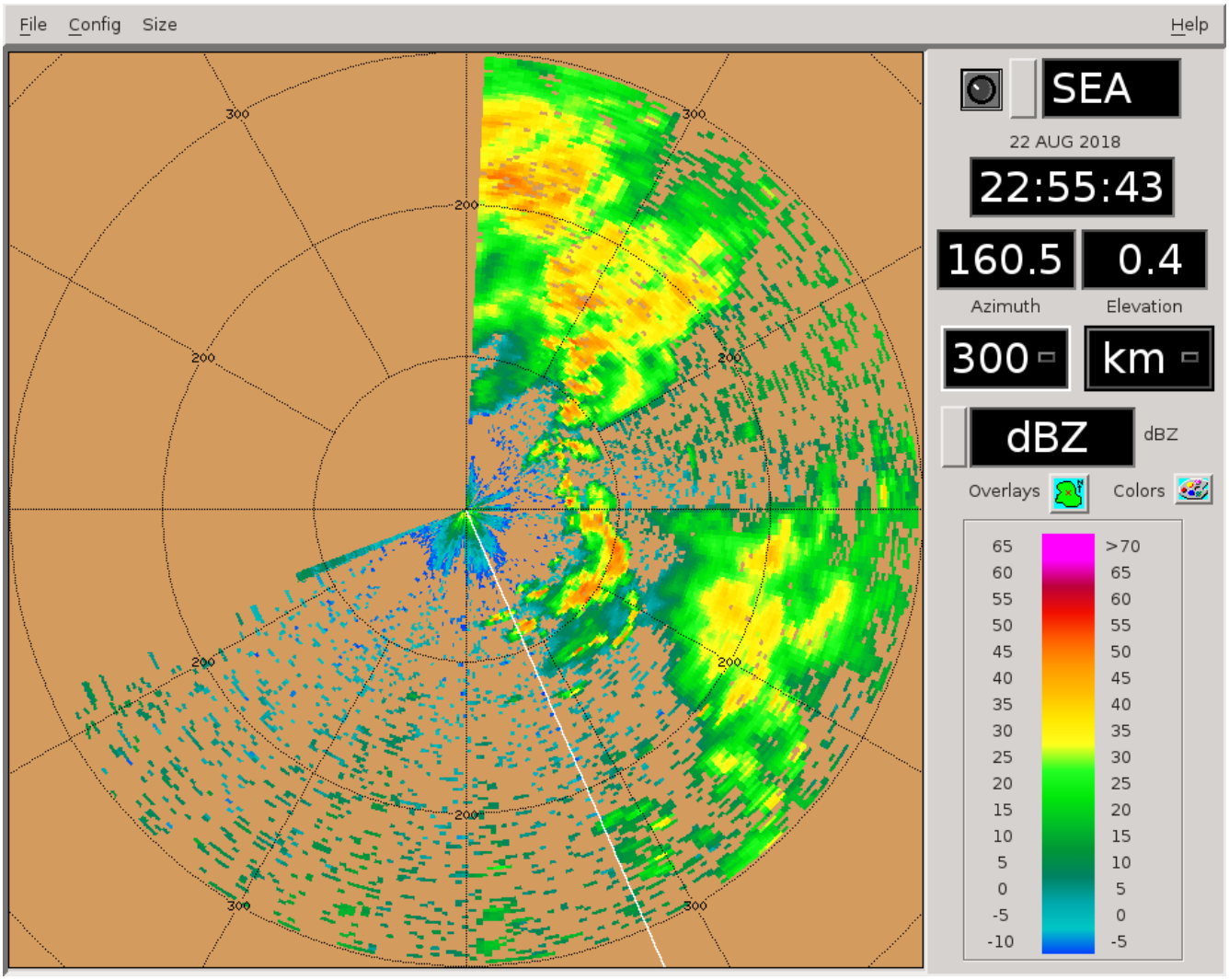
2239 – Overall northward movement trend with convection, likely due to ship's SE movement.

2241- SE convection still appears healthy.



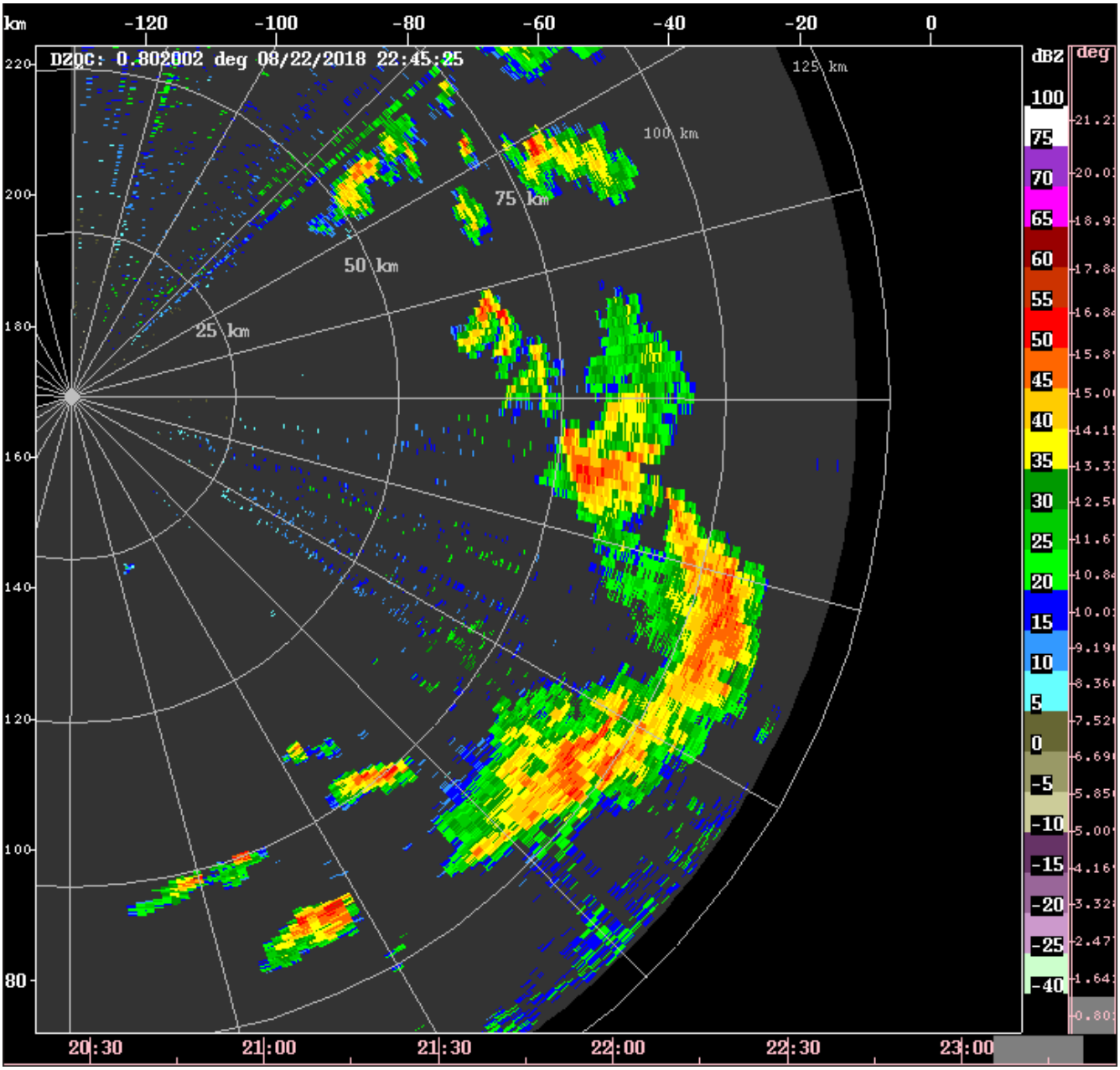
2245 – No RHI changes. Convection throughout eastern half of domain.

2255 – Eastern convection has merged with the NE stratiform. The SE distant stratiform also is close to the SE convection. Thus, there is a large mesoscale pattern encompassing much of the eastern half of the scope, out to 300 km and possibly beyond.



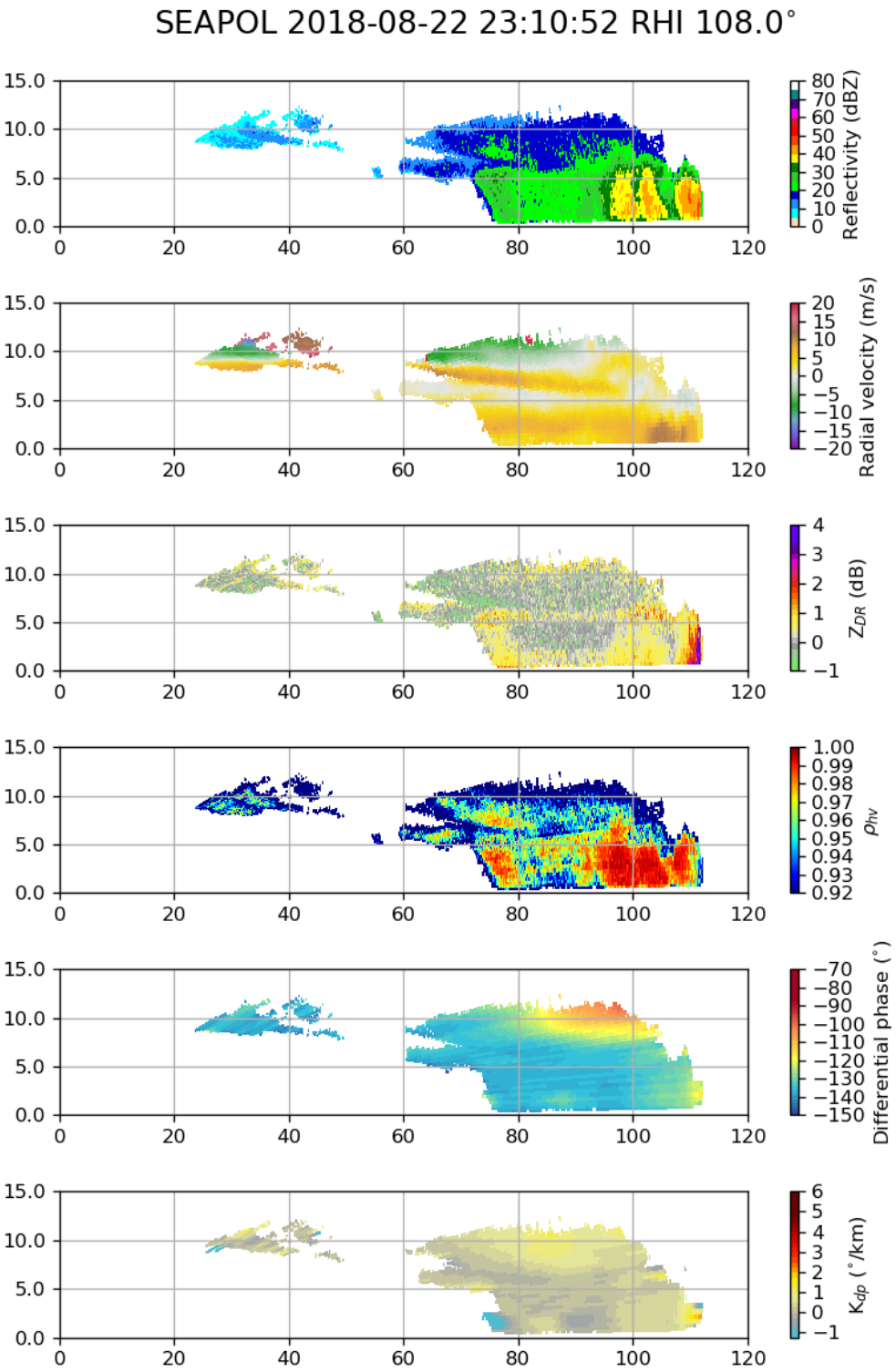
2300 – Moving RHIs to 90-112 az as the convection is a bit closer that direction.

2306 – Interesting curvature to SE convection:



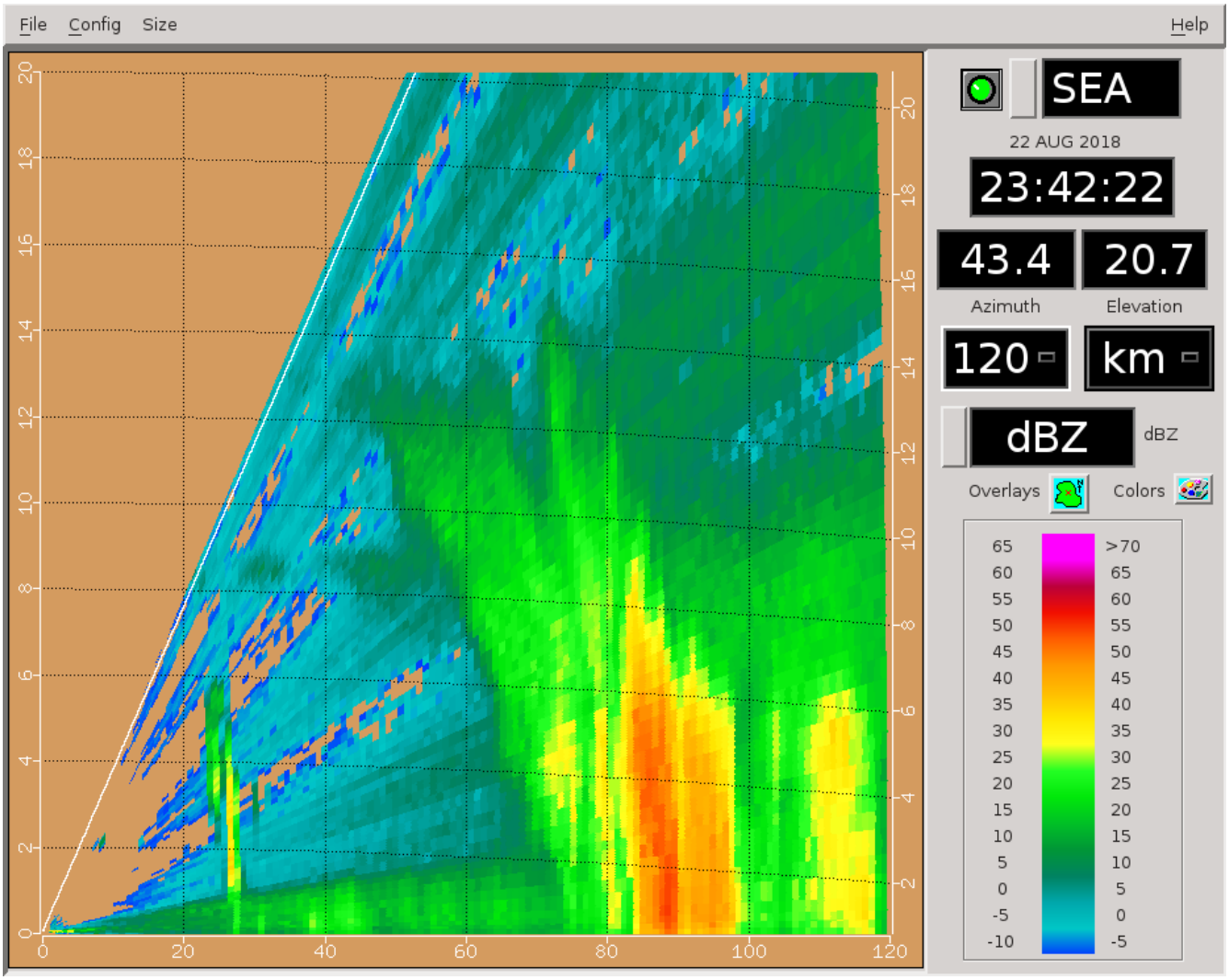
2316 – RHIs to 86-108.

2319 – A lot of positive phase shift aloft. Dendrites? Some folded velocities as well.



2332 – RHIs to 34-56, as the storm up there is stronger and closer.

2342 – Healthy, mature convection to the NE



2346 – Minor adjustments to RHI sector only.