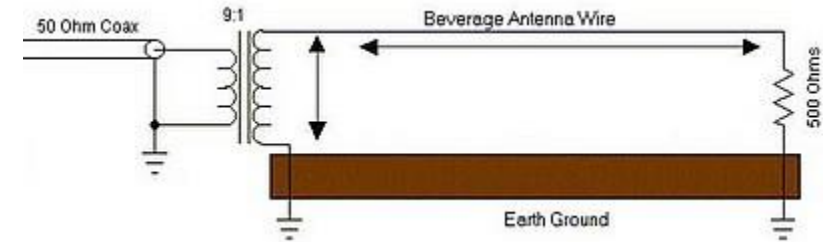


Real-Life RX antenna directional performance validation

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¹ ARAT Tunisia

- The Fascination of RX Antennas; hearing the impossible, pulling weak DX Signals out of the noise floor on the low (noisy) bands.
- Beverage Antennas:
 - Functions as a traveling-wave antenna
 - Typically 0.5 to 2 wavelengths long
 - Radio waves arriving from the forward direction induce signals that add in phase as they travel down the wire toward the receiver
 - Waves from the reverse direction are absorbed by a terminating resistor at the far end, preventing reflected signals and creating a deep unidirectional pattern with excellent rejection of noise and interference from the rear.
- Beverage-On-the-Ground
- Phased Beverages



- **Objective:** To conduct a quantitative, real-world assessment of the directional performance of a number of antennas during 48hours of the 2026 CQ WW 160m CW Contest.
- **Antenna Deployment:**
 - A broadside-phased pair of two 220m Beverages, spaced 120m apart, beamed at 320° (North America).
 - A 200m (VL) Beverage, 10cm high, targeted at 44° (Japan).
 - A 60m Beverage on Ground (BoG) targeted at 91° (Southeast Asia).
- **Receiving Hardware:** 2 Redpitaya Receivers running Skimmer Server and 1 SDR-IQ running CW Skimmer.
- **Data Aggregation & Filtering:** The streams of CW Skimmed spots from all receivers were fed into SkimCon software. This software was configured to filter the aggregate data, removing duplicate spots to ensure a clean feed for the RBN node (3V/KF5EYY).
- **Data Logging for Analysis:** SkimCon was configured to preserve a raw data log. This log retained the skimmer number associated with every spot, which is the key identifier linking each detection back to the specific physical antenna that received it.

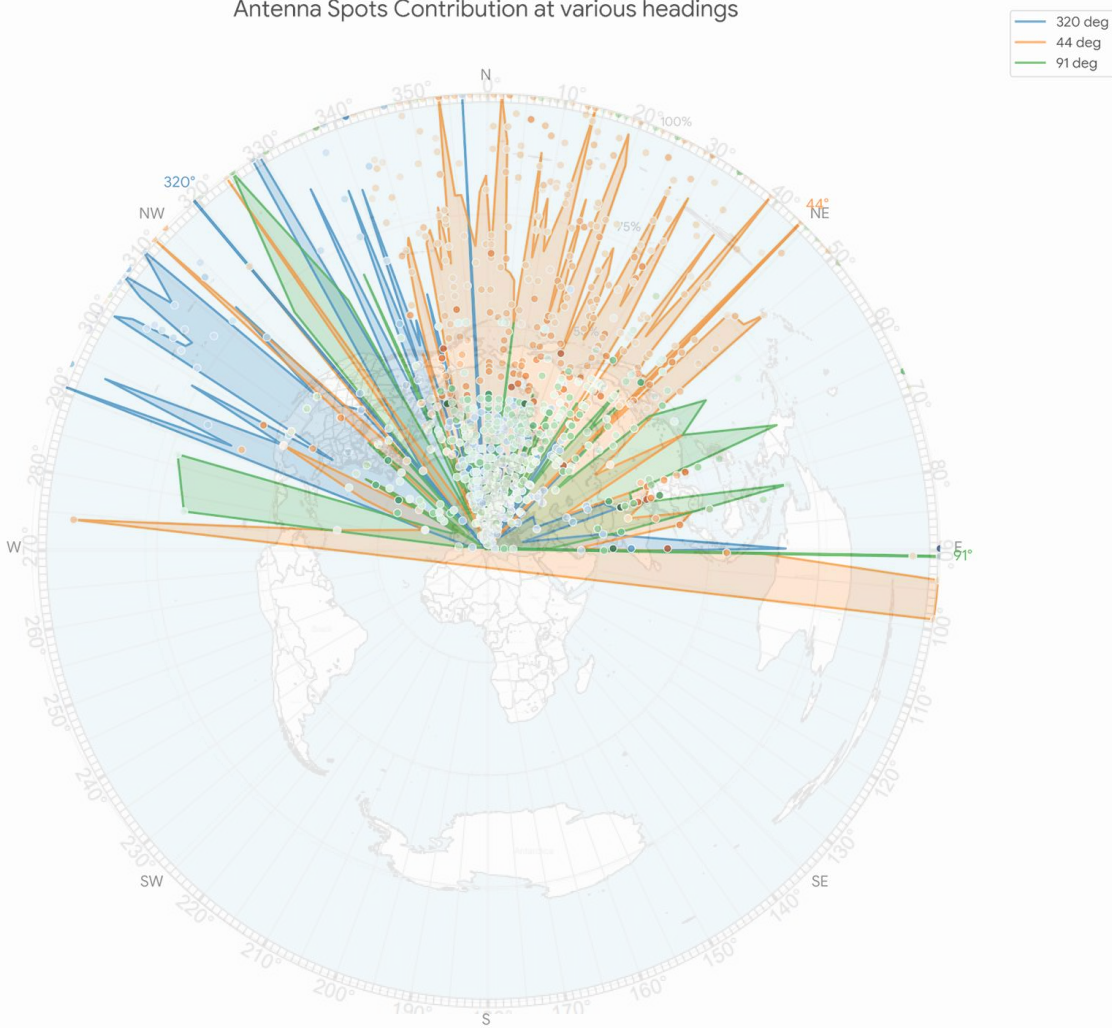
- **Data Processing:**

- The raw log file was post-processed using Excel and VBA.
- The data was sorted and analyzed based on the skimmer number to isolate the reception reports for each antenna.
- For each spot, geographical coordinates and beaming information were added
- For each beam heading, the contribution of each antenna in the total number of spots is calculated

- **Visualization:**

- The processed data was used to generate a radar plot of antenna 'contribution' percentage at each heading.
- Dots are colored for each spot according to antenna. Color gradient according to signal strength.

Antenna Spots Contribution at various headings

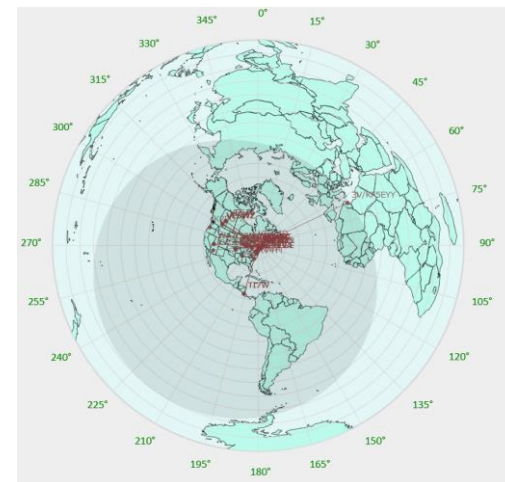
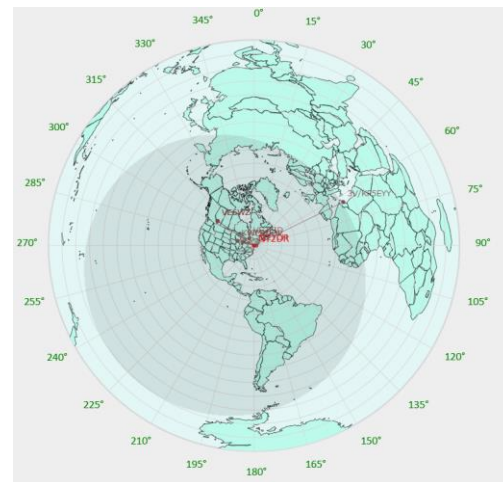
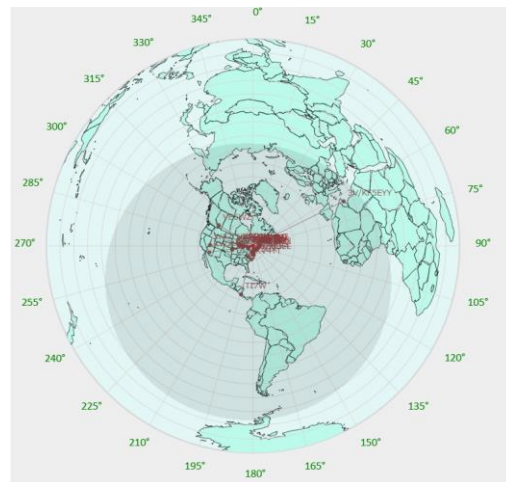
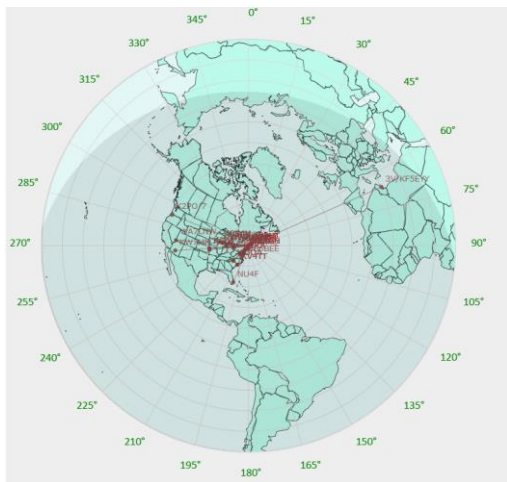


This visual representation shows:

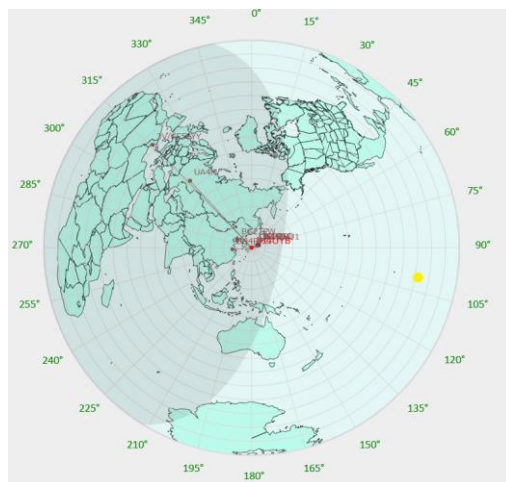
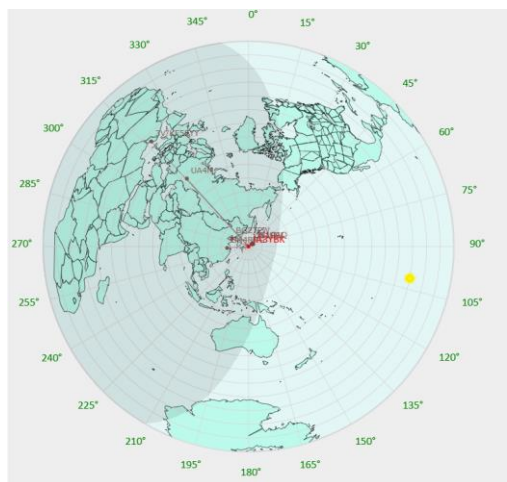
- The dominant concentration of spots from each antenna along its intended beam heading, while also revealing identifiable contributions from its side and rear lobes.
- Despite the proximity to Europe, the phased array showed a magnificent rejection of side/rear interfering signals.
- The JA VLB showed wider front lobe and more pronounced side lobes
- Although the BoG was a great performer to its heading (E2X), it has clear side lobes though

Results

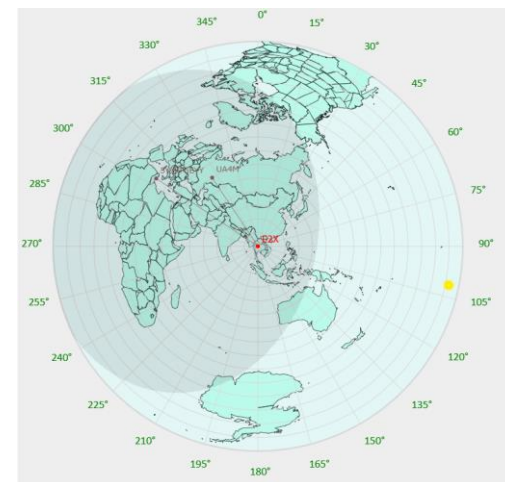
Phased
Beverages
NA



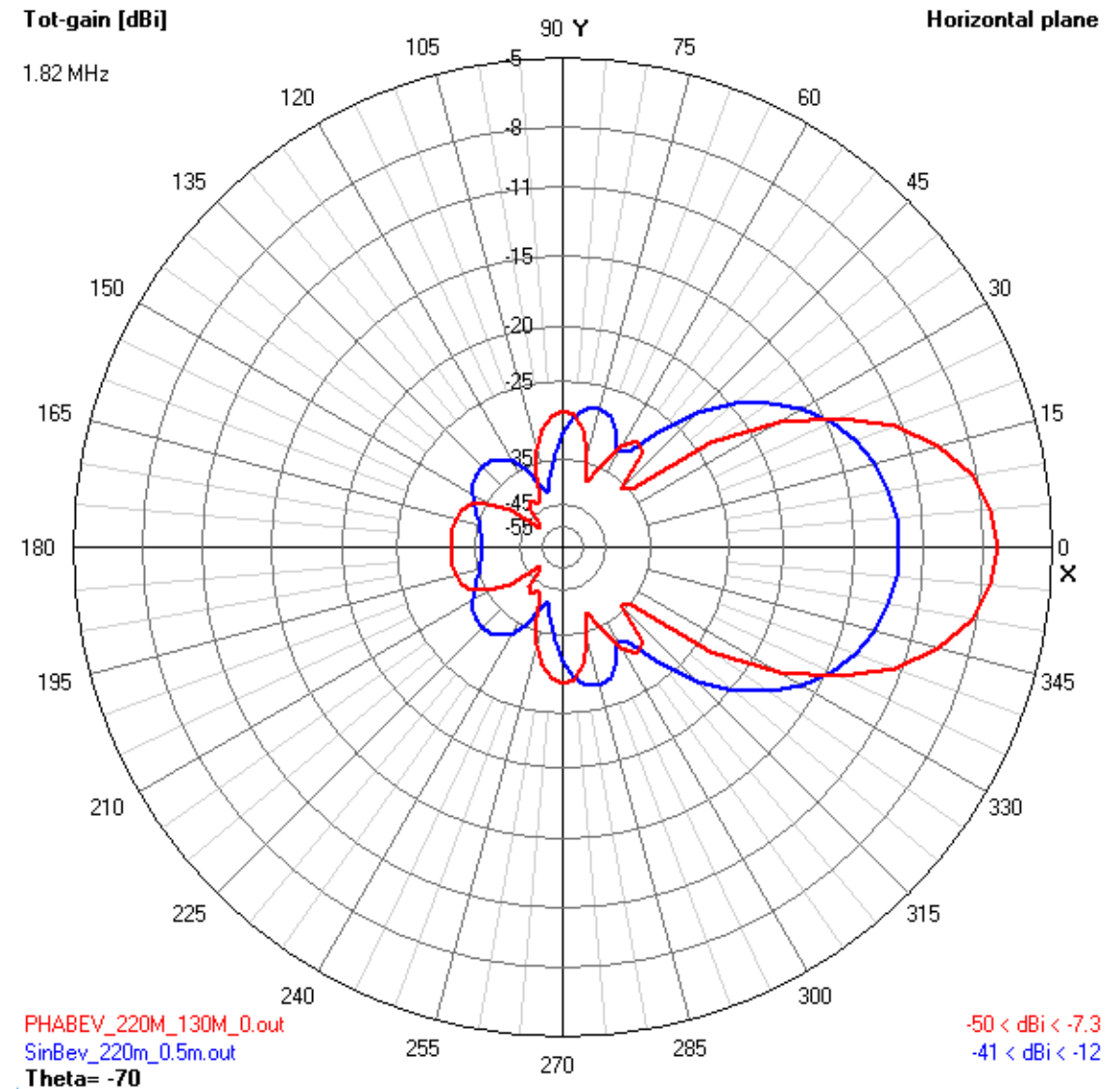
JA VLB



BoG



- The Beverage on the Ground (BoG) has not been modeled on 4nec2. Given the close proximity to ground, results are widely known to be inaccurate.
- The beverages were not properly tuned (termination resistance, flat SWR, equal distance from ground, etc.) which might have impaired the results
- Loud signals from close by Europe would have impacted the weak signals from other directions
- The receiving patterns plotted by 4nec2 are in line with the experimental results.
- Due to the lack of activity in the African continent, the assessment of rear lobes cannot be performed
- Propagation and skewed paths adds to results inaccuracies



- The use of a Signal Source presents a good method to confirm receiving pattern.
- Some experiments used a drone-flying signal source to plot patterns at certain 'take-off' angles
- This experiment covers a wide variety of take off angles which are very difficult to determine on 160m.
- This experiment can be further improved by using perfectly tuned antennas, identical antennas, more beaming, etc.

Thank you!
