

Comparing Accuracy of Household Lightning Detectors against the Houston Mapping Array Network



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Background

As part of the Student Operated ADRAD Project (SOAP), the accuracy and overall effectiveness of several household lightning detectors was evaluated. This was accomplished by comparing the detection rates and ranges of each detector to data from the Houston Lightning Mapping Array Network (HLMA), an established and reliable lightning detection system.

Data and Methods

- Develop template for each of the four lightning detectors to record the number of strikes detected
- The templates include:
 - Time range – when the data recording began and ended
 - Current date
 - Distance Ranges – The set of ranges preset ranges found on the detector
 - Tallies – where a strike occurred at each distance
 - Total – the total amount of strikes that occurred at each distance range
 - Notes – if anything notable occurred (e.g. battery replacement, detector malfunction)
- Compare detector data with the HLMA data.
- HLMA data binned by the same range of detection as the lightning detectors.

Conclusions

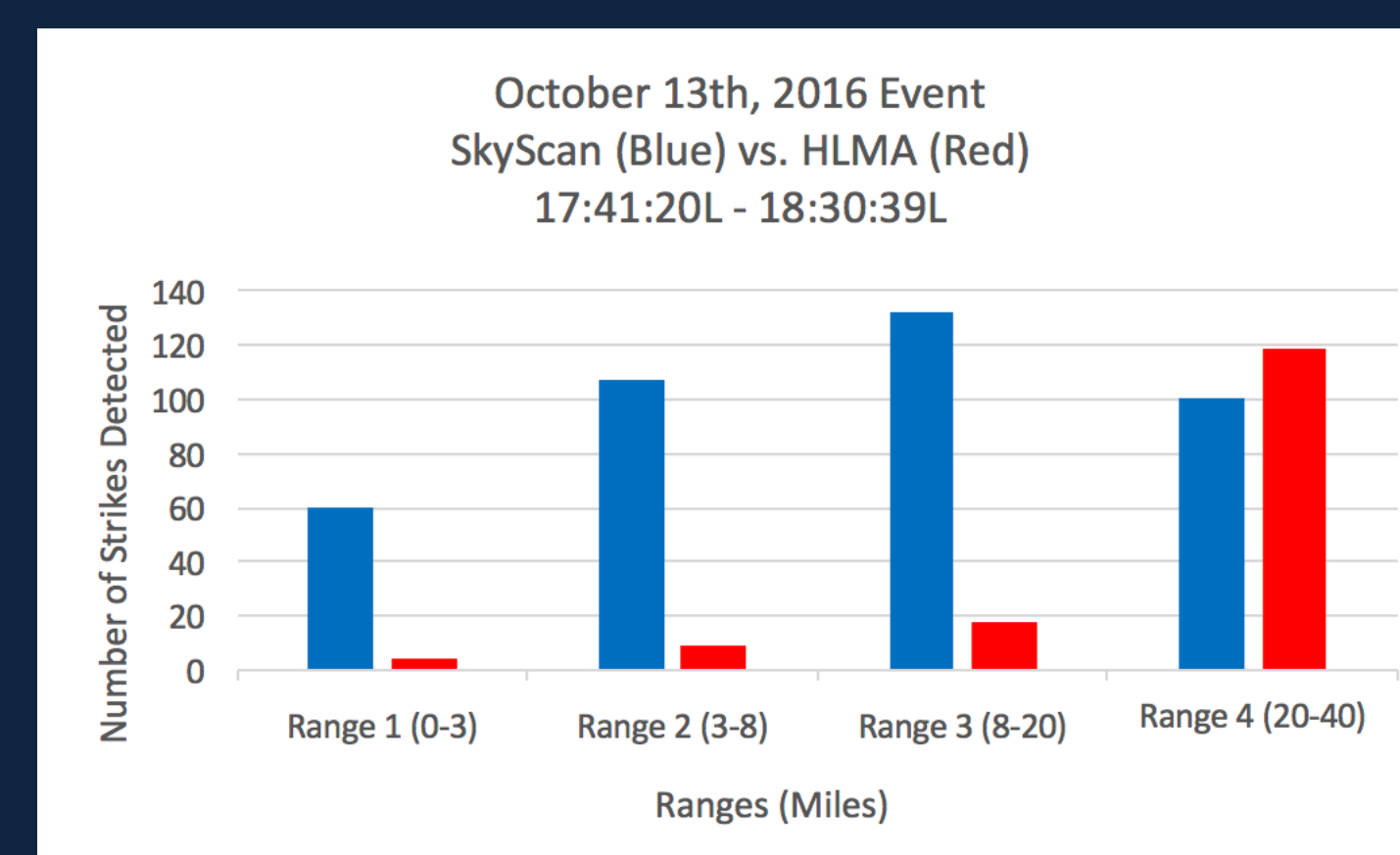
- Difficult to determine the accuracy of the lightning detectors.
- When compared to HLMA data:
 - StrikeAlert HD performance for Event One was better than for Event Two.
 - SkyScan detector (the most well-known) performed quite poorly. Mismatches in detector data versus HLMA data could be caused by multiple issues - human error, or possibly the detectors not being calibrated properly (too sensitive and picking up outside influences, or not sensitive enough and missing strikes).
- The detectors were also difficult to decipher, which may have contributed to the human error.
- Cannot rule out the uncertainty of the HLMA data.
- Detectors do not appear to be useful as scientific instruments, but all are adequate in alerting its owner of nearby lightning and possible danger.

Lightning Detectors & Results

SkyScan



The SkyScan Lightning/Storm Detector (\$292) is the largest of our handheld detectors with LED light display, severe thunderstorm detection, and a battery life of 50+ hours.

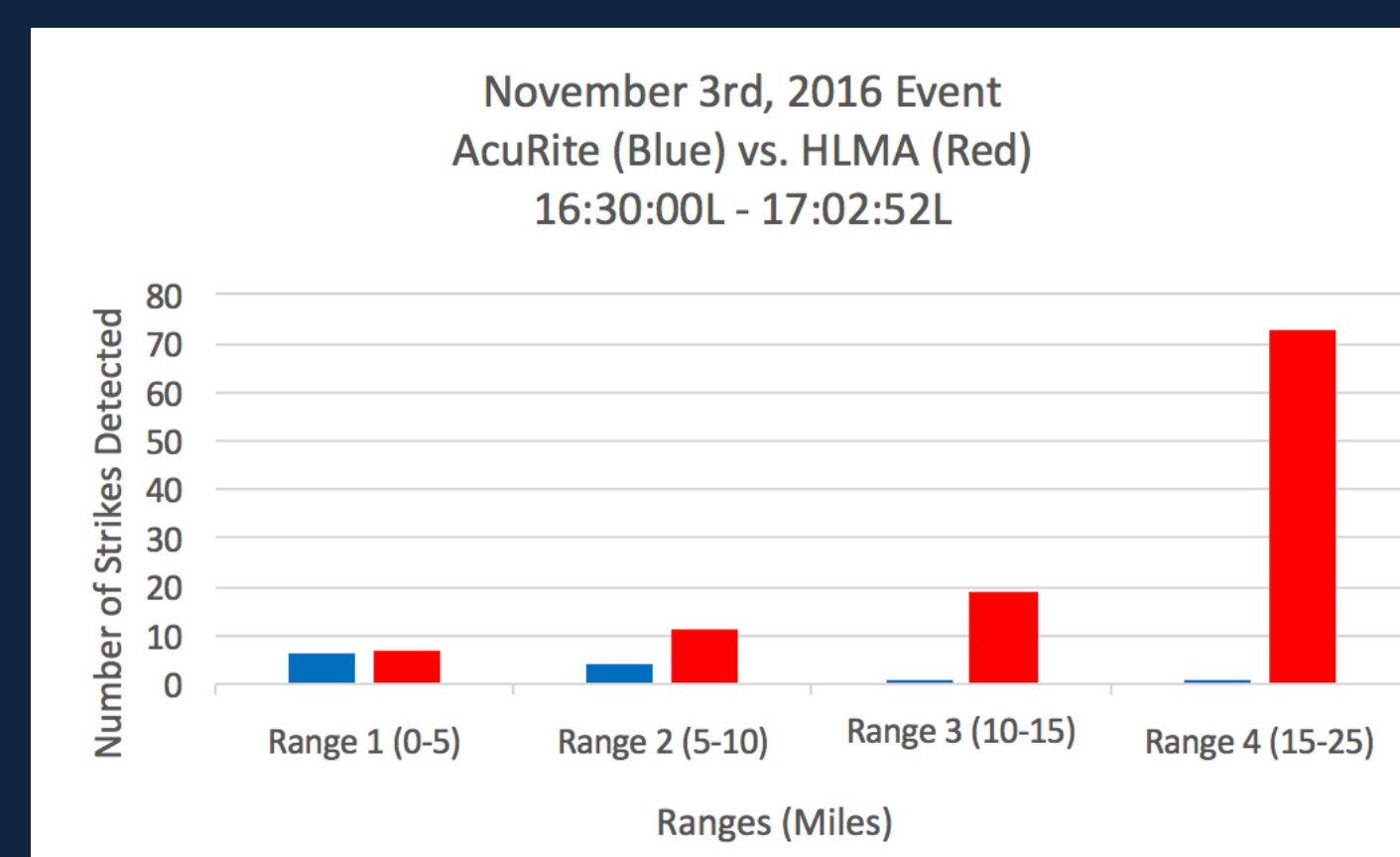
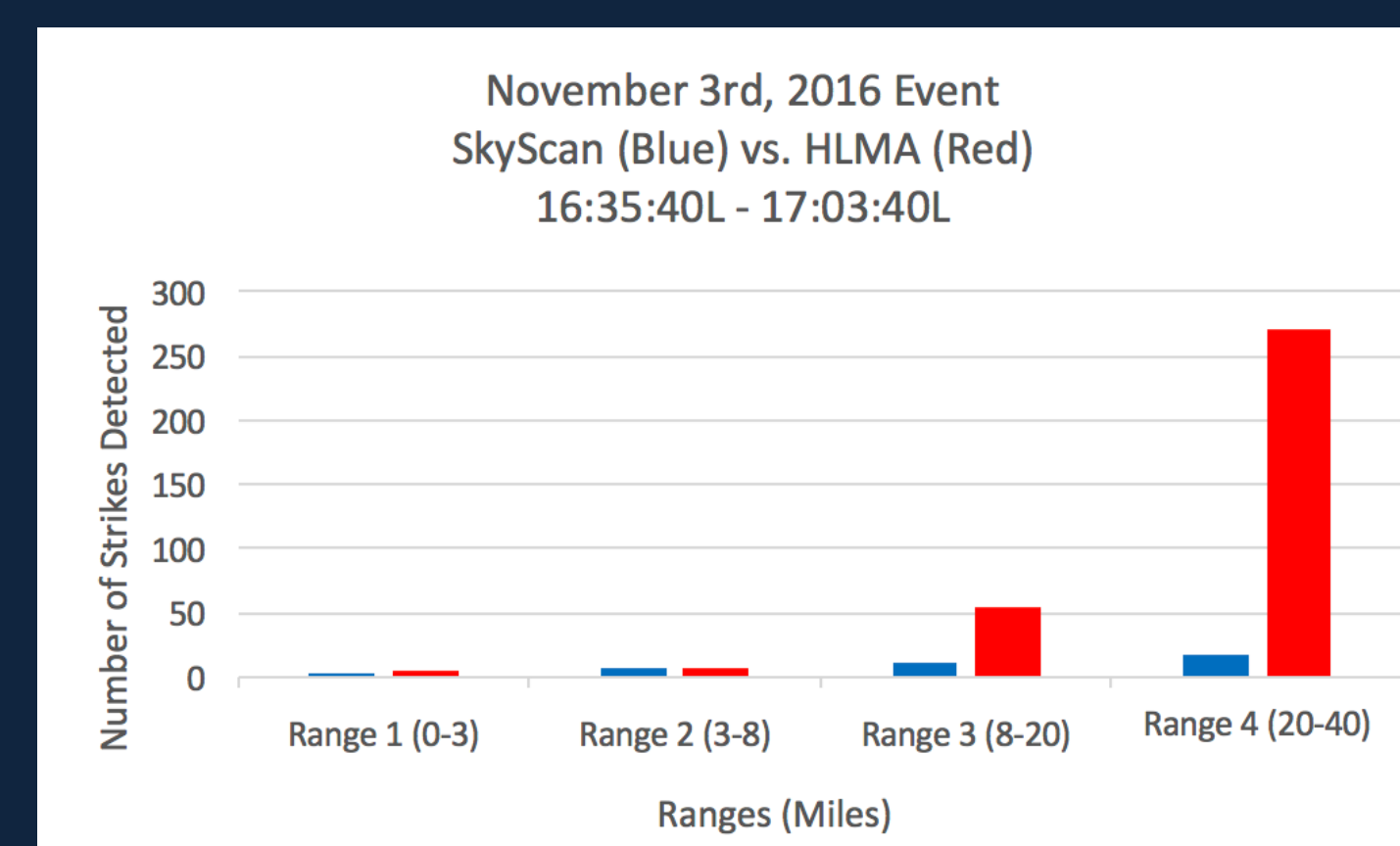


AcuRite Model 02020



The AcuRite Model 02020 (\$29) is a handheld lightning detector with a monochromatic display of strike count, both cloud-to-cloud and cloud-to-ground lightning detection, and an 8-10 month battery life.

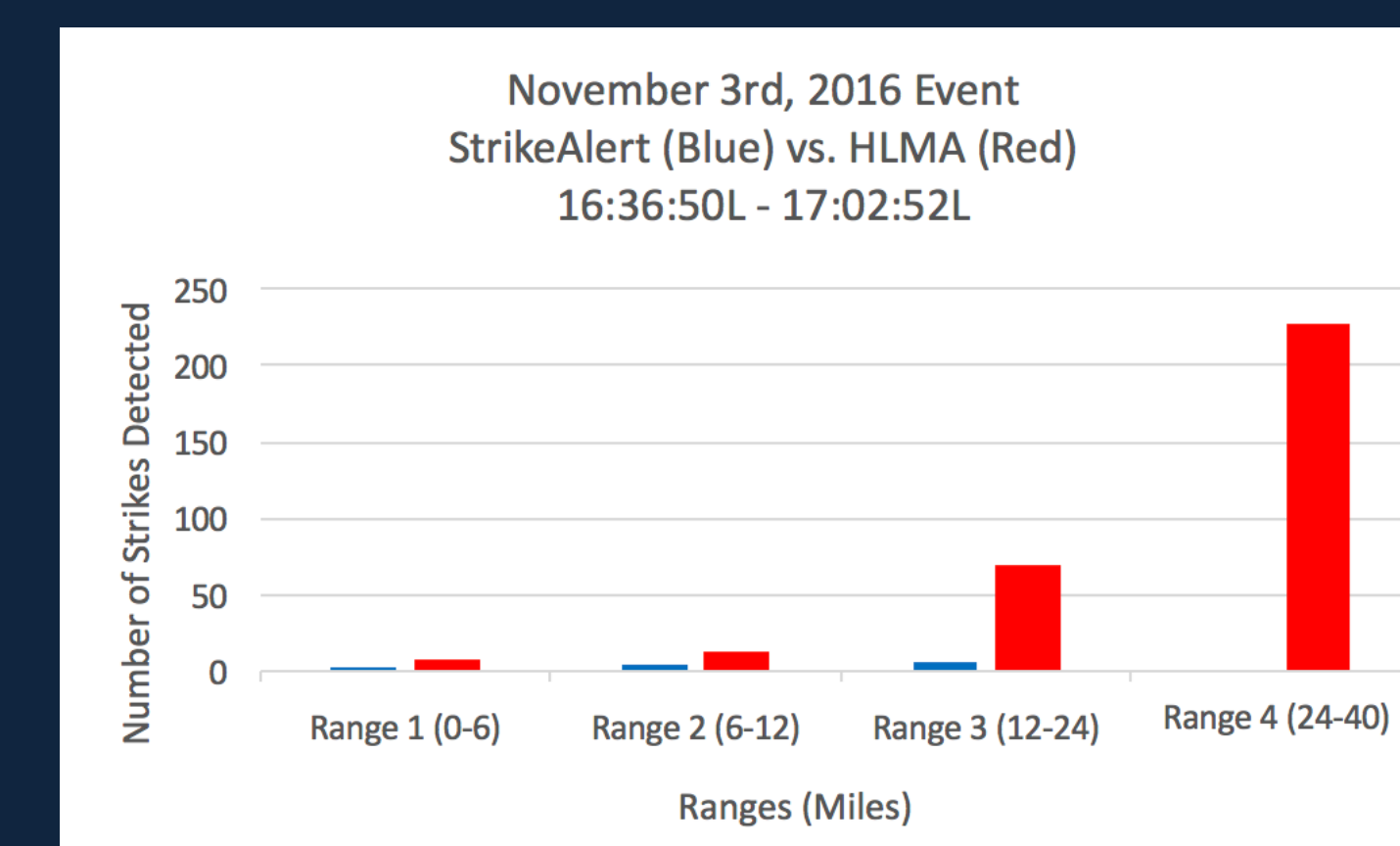
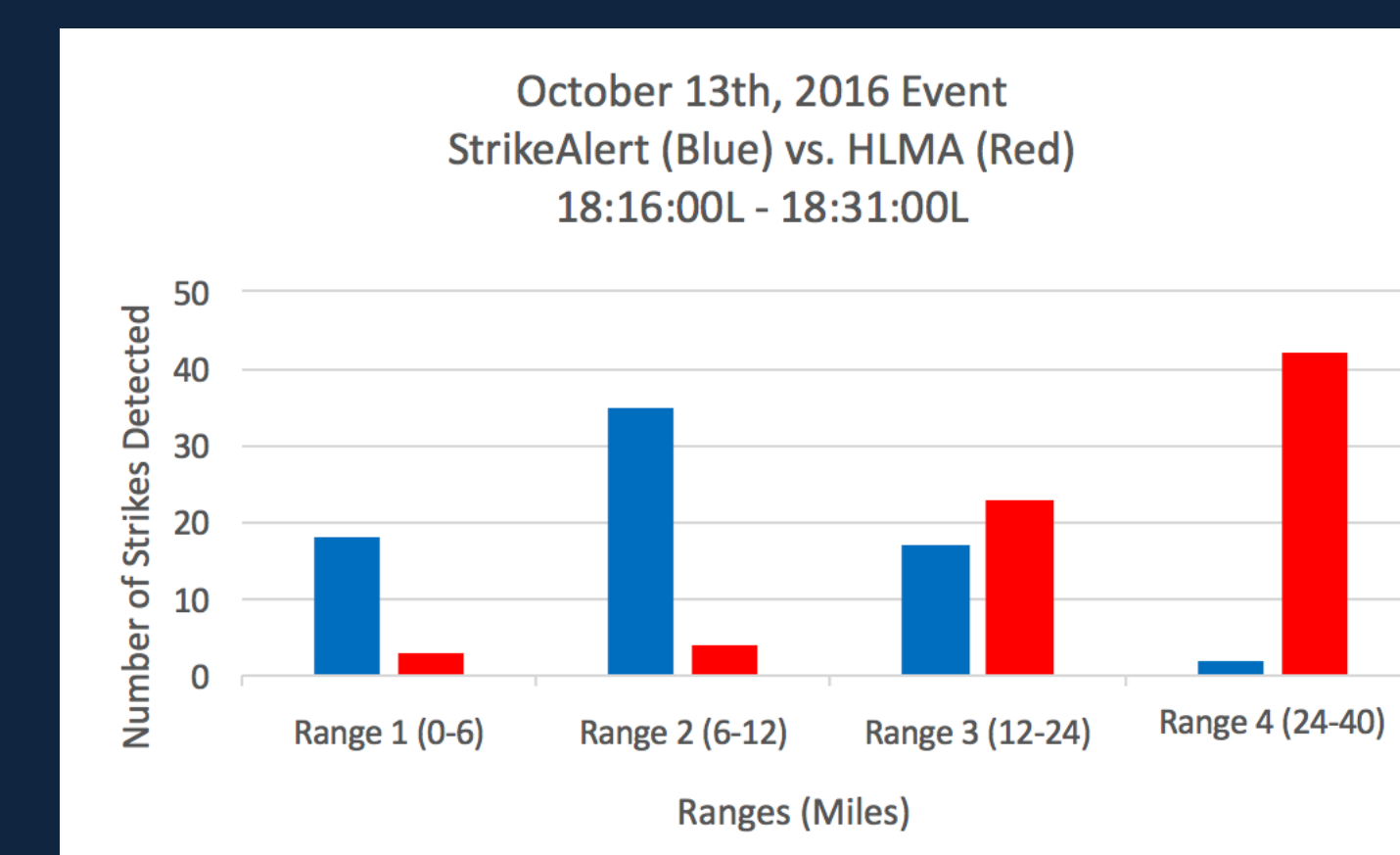
No data was recorded for this detector during this event.



Strike Alert LD 1000



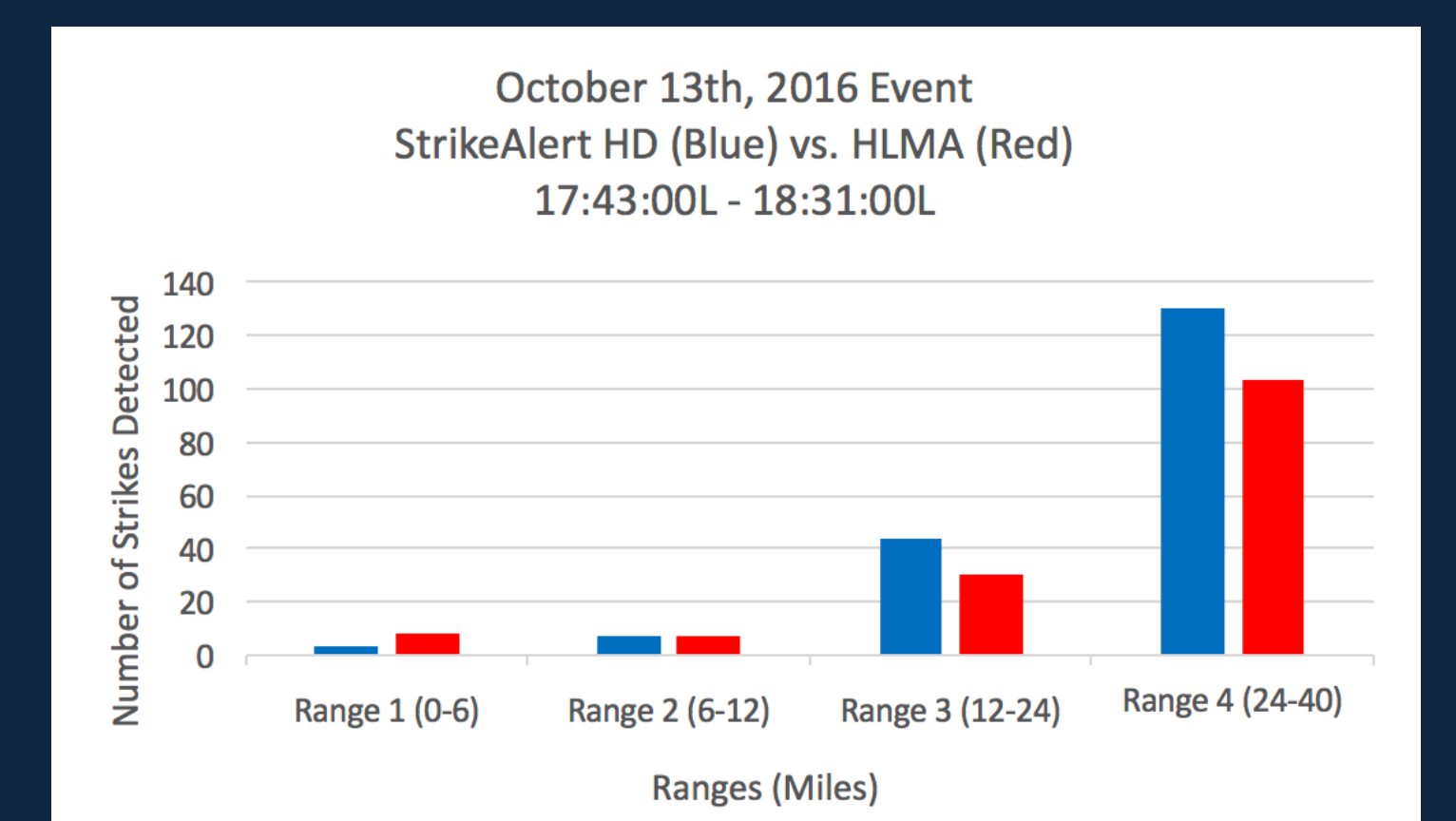
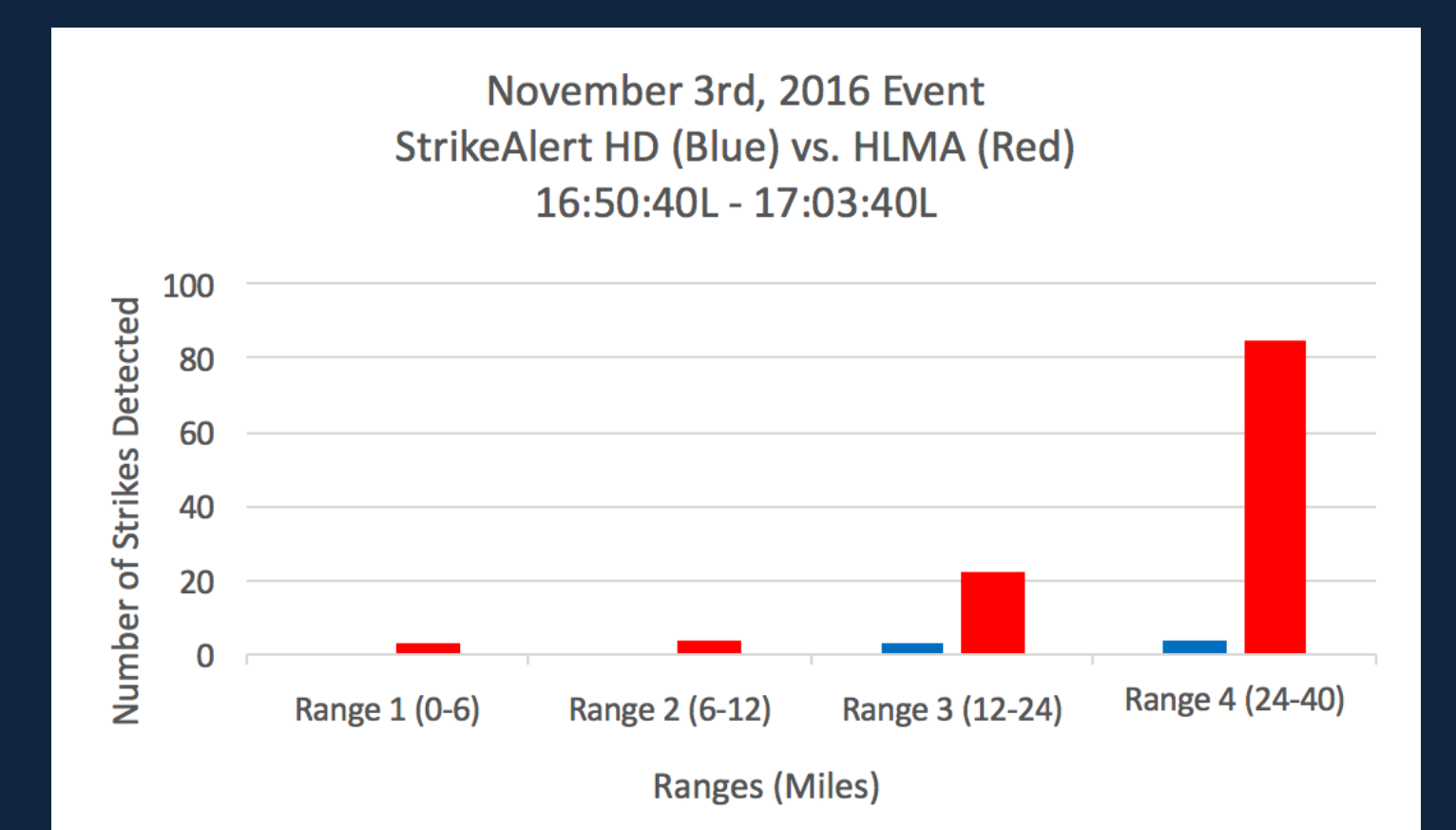
The StrikeAlert LD1000 (\$90) is a handheld lightning detector with LED light detection display, up to 100 hours of battery life, and can only detect lightning in the upright direction.



Strike Alert HD LD 3000



The StrikeAlert HD LD3000 (\$200) is a handheld lightning detector with an LED color screen, graphic strike counting, and a battery life of 80 hours.



Future Work & Analysis

Include more events so that more comparisons can be made between the detectors and the HLMA. Propose and implement methods to reduce or even remove human error. Develop objective methods to record data as opposed to recording data by hand. Explore adding more lightning detectors to this study, and also look at how certain brands compare against others. Explore designing and creating our own "homemade" lightning detectors, using tools such as Arduino and Raspberry Pi. We could then compare this design to that of the other lightning detectors and determine their accuracies as compared to the HLMA.

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