

# Reflection Coefficient Measurements of the EDGES Low-Band BLADE Antenna Starting on 2015/12/08

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# Description

The reflection coefficient of the low-band BLADE EDGES antenna was measured between UTC 2015/12/08-03:14:01 and 2015/12/09-04:30:17 (~ 25 hours). The environmental conditions were stable throughout this period. The highest humidity was ~ 23% during night time. The dew point temperature at the same time reached ~ 5°C, about 23°C below ambient temperature. The ambient temperature range throughout the measurement was ~ 28°C - 30.5°C. The temperature of the S11 switch, with the receiver at 25°C, ranged between 31.4°C and 32.4°C except at the very beginning of the measurement since it takes about 30 minutes for stabilization. For this reason, the data used for analysis start 1:15 hours after the actual beginning of measurements. With this, the data presented here amount to ~ 24 hours.

The time resolution of the S11 measurements is 34 seconds. In other words, within 34 seconds the automated system measures the reflection standards (open, short, match) and the antenna. At this rate, 2550 calibrated antenna reflection traces were produced in ~ 24 hours (after discarding the first 1:15 hours). The first-level calibration references the antenna measurement to the 4-position switch (where the standards are connected), and the final calibration yields the antenna reflection referenced to the 50-Ω impedance at the input of the receiver.

One representative trace is produced from the average of night time data between times 9.1 and 16.3 hours into the measurement. There are jump-like changes at about 8.4 and 23.5 hours into the measurement, which don't seem to be related to weather conditions (maybe wind, but we don't have data to check). These jumps are presented in figure 5. Obviously, these jumps are not considered in the representative average S11. Apart from these jumps, there are no other obvious anomalies in the data.

# Results

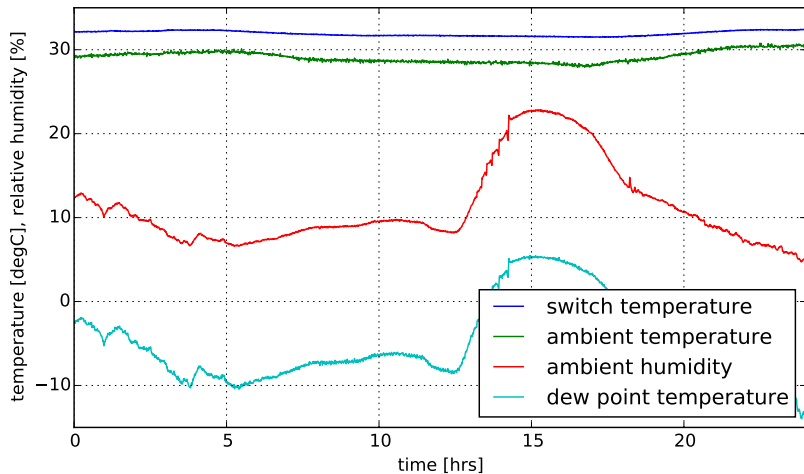


Figure : (1): Temperature of the 4-position switch, along with ambient temperature, humidity, and dew point temperature.

# Results

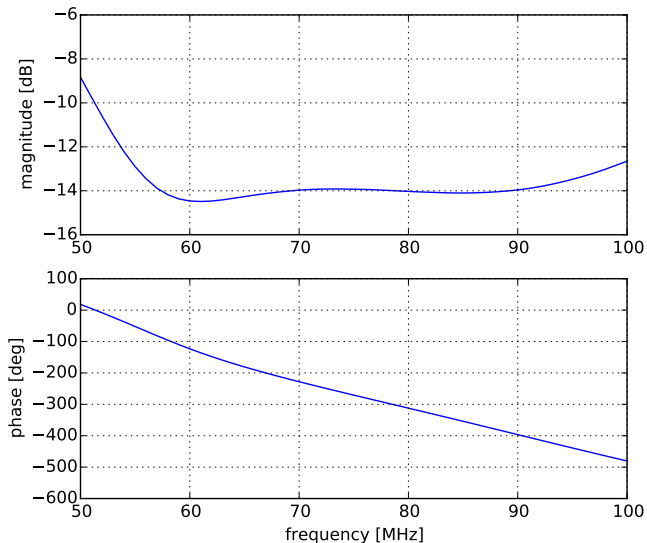
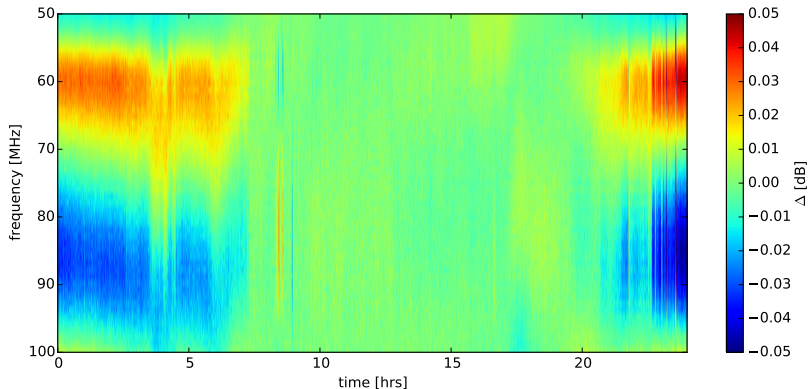


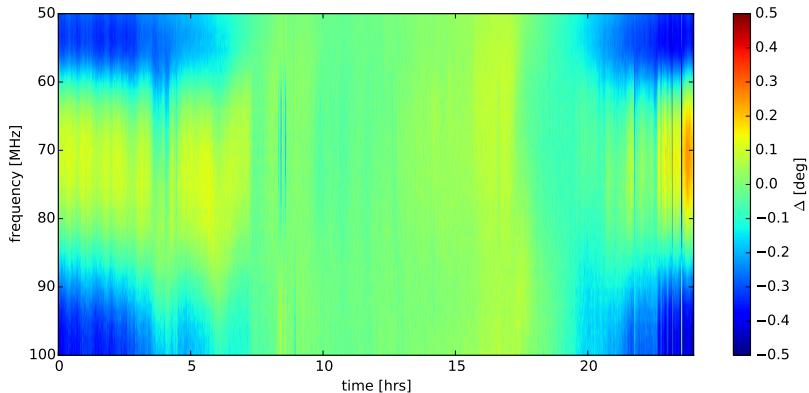
Figure : (2): Average of night time measurements, between 9.1 and 16.3 hours into the measurement.

# Results



**Figure : (3):** Variations of the reflection magnitude, relative to the average of Figure 2. There are a few jump-like changes at about 8.4 and 23.5 hours into the measurement, which don't seem to be related to weather conditions.

# Results



**Figure : (4):** Variations of the reflection phase, relative to the average of Figure 2. There are a few jump-like changes at about 8.4 and 23.5 hours into the measurement, which don't seem to be related to weather conditions.

# Results

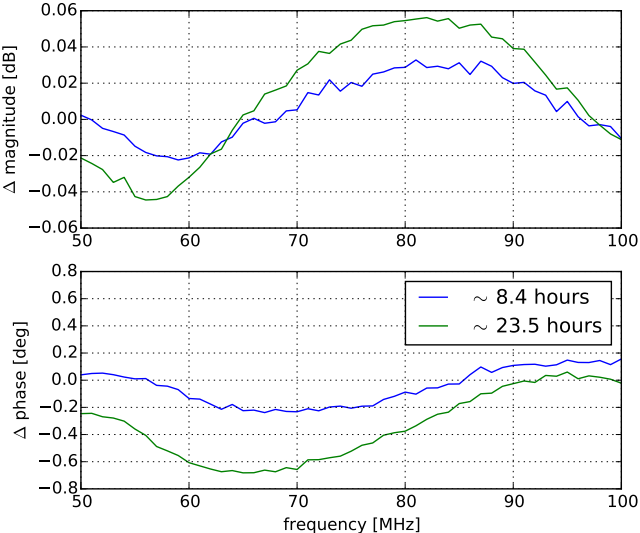


Figure : (5): Jump-like change of reflection coefficient, in magnitude and phase, at times  $\sim 8.4$  and  $\sim 23.5$  hours, relative to the average measurement of Figure 2.

# Results

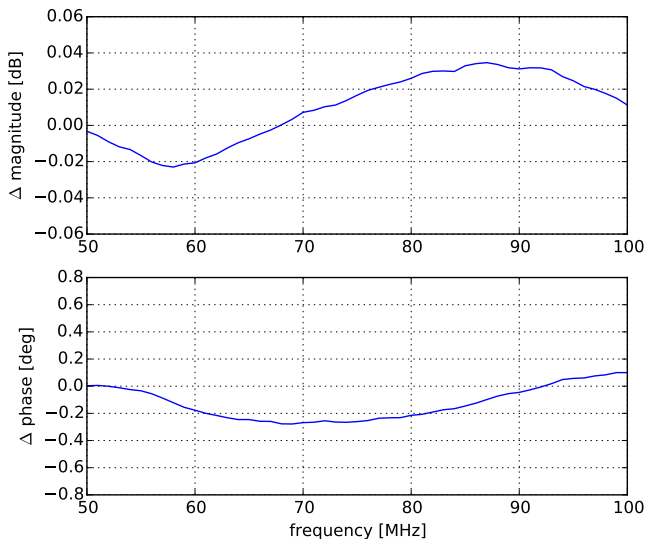


Figure : (6): Difference between average measurement from day 342 (2015/12/08), and day 289.