

# Reflection Coefficient Measurements of the EDGES High-Band Fourpoint Antenna Starting on 2015/06/06

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June 11, 2015

# Description

The reflection coefficient of the high-band fourpoint EDGES antenna was measured between UTC 2015/06/06-03:51:00 and 2015/06/10-18:37:00 ( $\sim 4.5$  days). There were clear skies and stable weather during that period, which allows to quantify the stability of the antenna under good conditions.

The time resolution of the calibrated measurements is 1 minute. In other words, within 1 minute the automated system measures the reflection standards (open, short, match) and the antenna. At this rate, 6612 calibrated antenna reflection traces were produced for the  $\sim 4.5$  days.

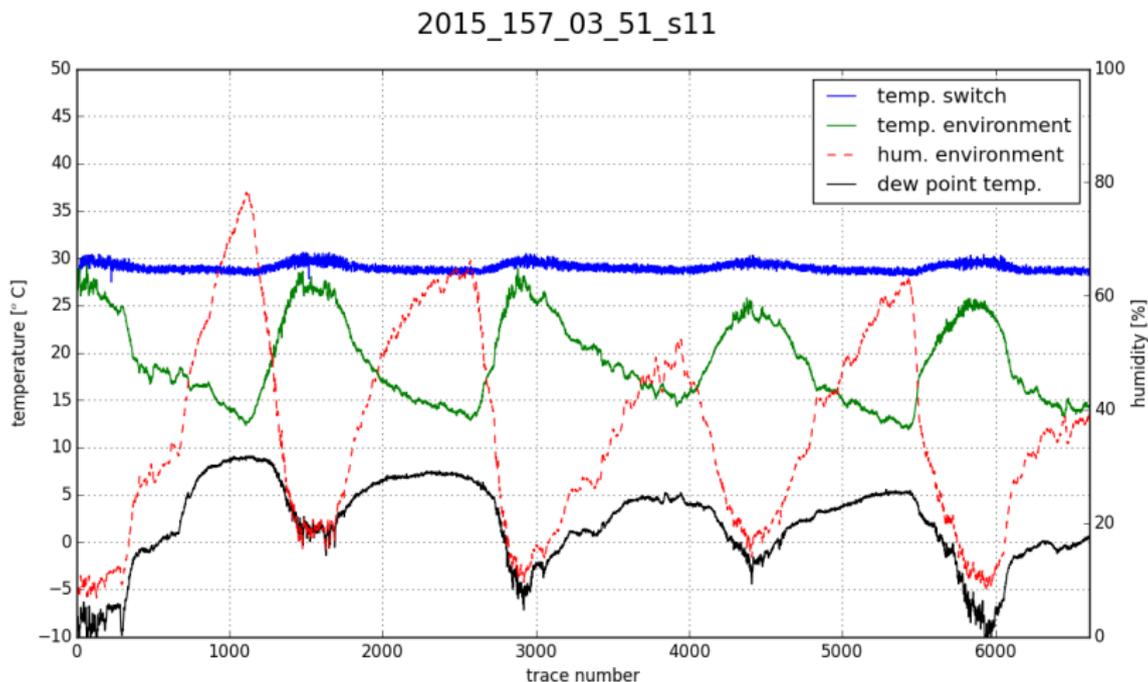
The first-level calibration references the antenna measurement to the 4-position switch (where the standards are connected), and the final calibration yields the antenna reflection referenced to the  $50\text{-}\Omega$  impedance at the input of the receiver. With the receiver kept at  $25^\circ\text{C}$ , the 4-position switch stayed at a temperature of  $\sim 29 \pm 1^\circ\text{C}$  throughout the measurement (after a 30-minute stabilization period).

The dew point temperature stayed at least  $3.6^\circ\text{C}$  below air temperature. This closest approach occurred in the first night of measurements when the relative humidity reached  $\sim 80\%$ .

In summary, the variations in reflection coefficient stay within  $\pm 0.05$  dB and  $\pm 0.4^\circ$  below 190 MHz, in the ambient temperature range  $11.8^\circ\text{C} - 29.2^\circ\text{C}$ , after sufficient noise averaging.

The results are presented in the following figures.

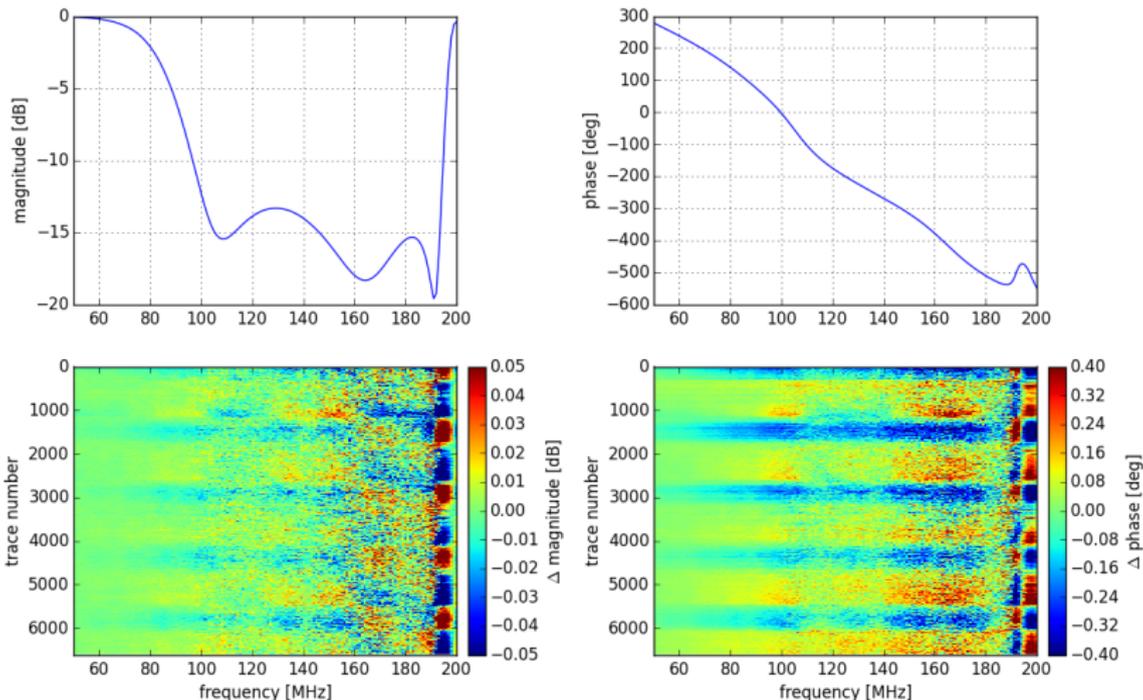
# Results



**Figure : (1):** Temperature of the 4-position switch, along with ambient temperature, humidity, and dew point temperature, which stayed at least 3.6°C below ambient temperature.

# Results

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**Figure : (2):** (TOP) Average reflection coefficient, and (BOTTOM) variations from the average. The variations stay within  $\pm 0.05$  dB and  $\pm 0.4^\circ$  below 190 MHz, in the ambient temperature range  $11.8^\circ\text{C} - 29.2^\circ\text{C}$ , after sufficient noise averaging.

# Results

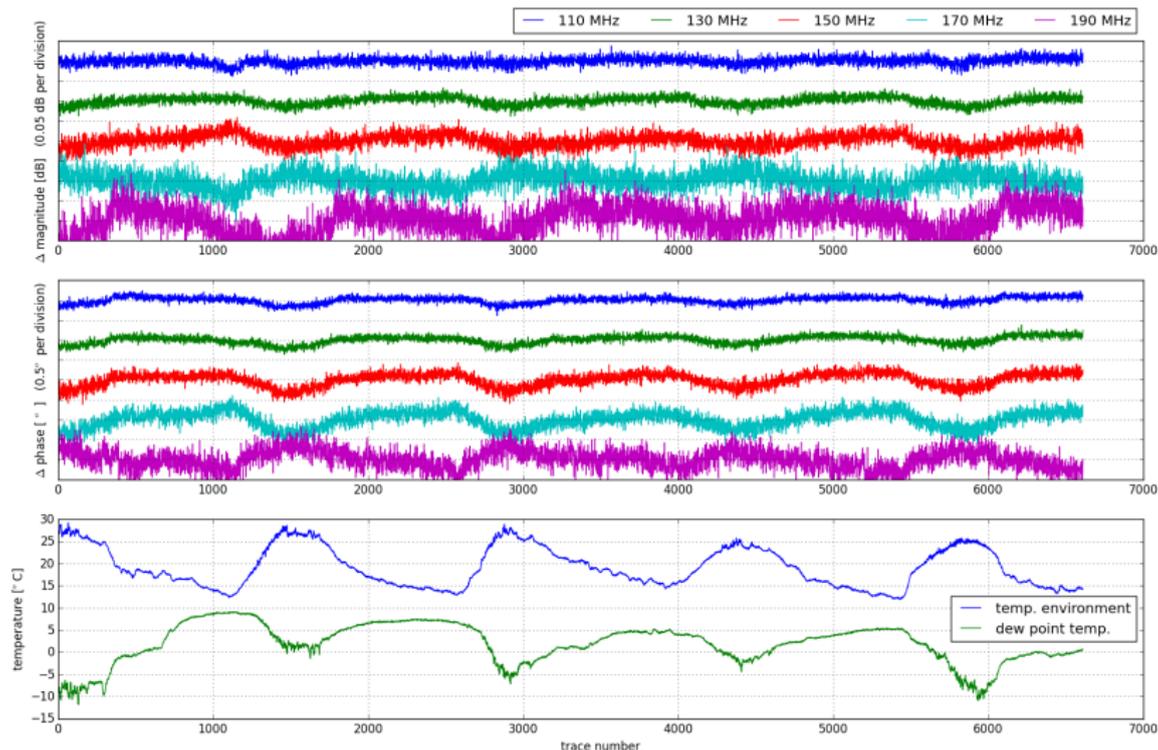


Figure : (3): Time evolution of 5 representative frequency channels (110, 130, 150, 170, and 190 MHz), and corresponding temperatures.

# Results

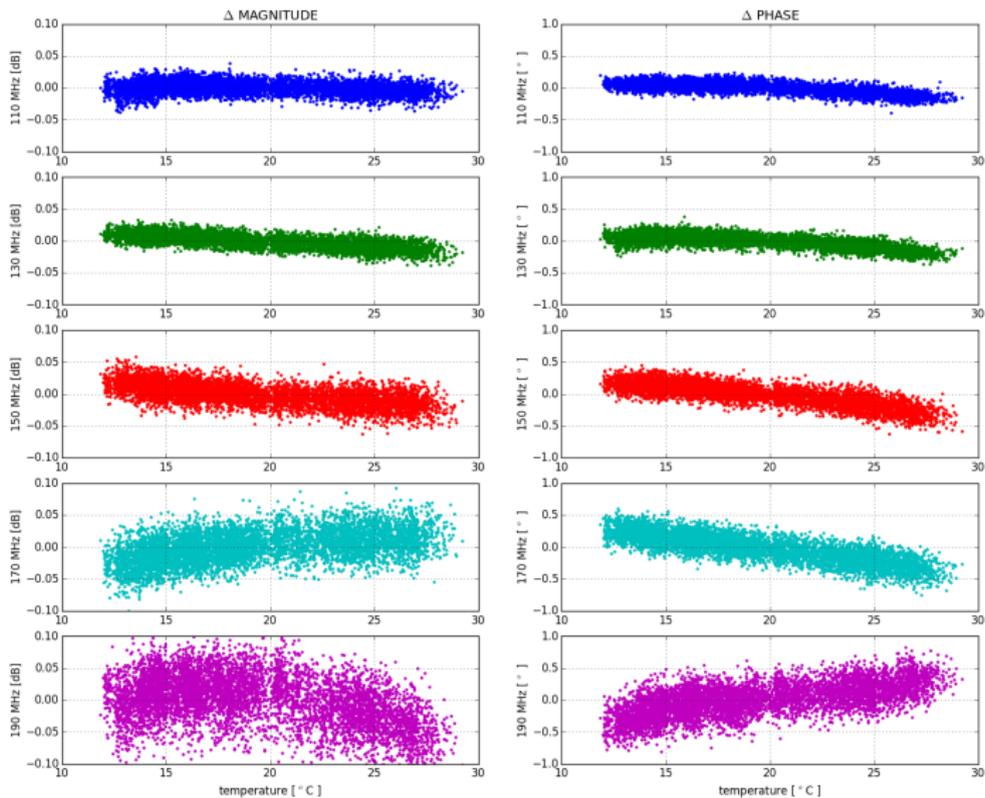


Figure : (4): Correlations between reflection and ambient temperature.