

Summary of Antenna S_{11} Measurements at MRO Starting on 2015/02/27

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Description

The antenna S_{11} was measured remotely between 2015/02/27 and 2015/03/04. This corresponds to 6500 minutes. Throughout that time it rained every day. This provides an opportunity for observing the behavior and stability of the antenna under unstable conditions (rapidly varying temperature, humidity, and wind speed).

The following plots are self explanatory. The rough conclusions are:

- ▶ The rain episodes were short, and the antenna came back to its normal behavior in a time scale of hundreds of minutes (between ~ 100 and 500 minutes).
- ▶ There are no unexplained jumps. All the significant changes are continuous and attributed to rain. This verifies that the antenna is well tightened mechanically.
- ▶ When the antenna returns to normal after a rain episode, it is repeatable within the noise, at least at the frequencies most sensitive to changes in temperature and humidity (~ 135 and 165 MHz).

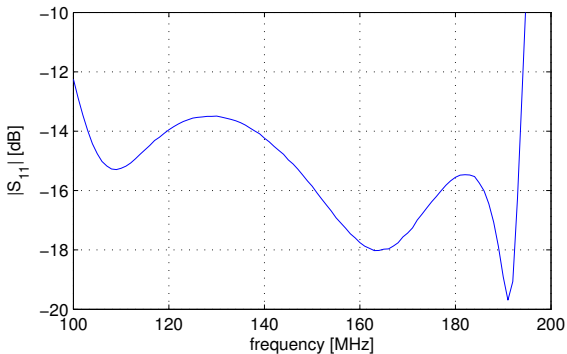


Figure : (1): First measured trace. It was taken at 32.8°C and a humidity of 31%. This trace is used as reference for all the subsequent measurements. The following figures show the data as *deltas* relative to the first trace.

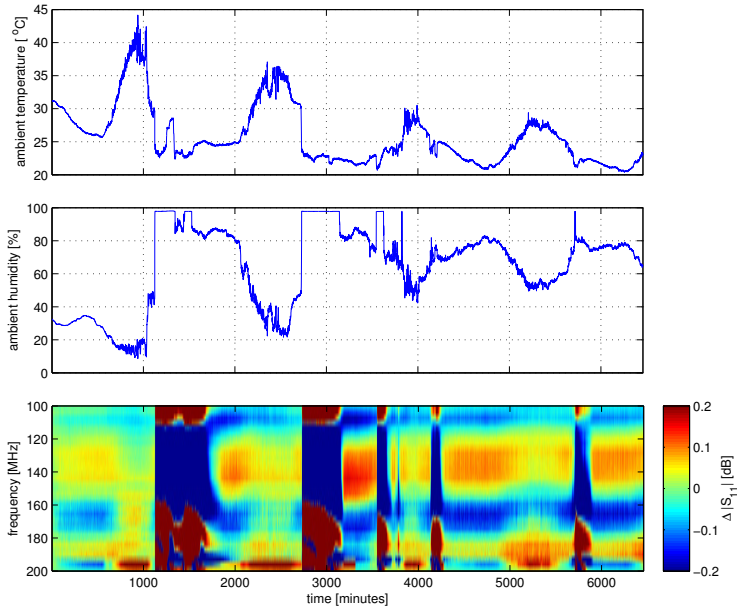


Figure (2): Ambient temperature, humidity, and S_{11} data. The changes in S_{11} saturate the color scale during the rain episodes.

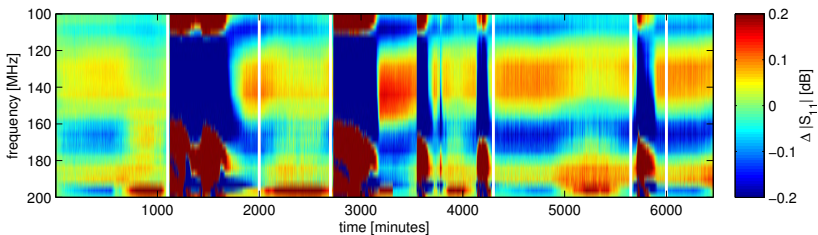


Figure : (3): $\Delta|S_{11}|$ data, where white lines separate sections of *good* and *bad* data. Four sections of good data are identified: between minutes 1-1100, 2000-2700, 4300-5650, and 6000-6500.

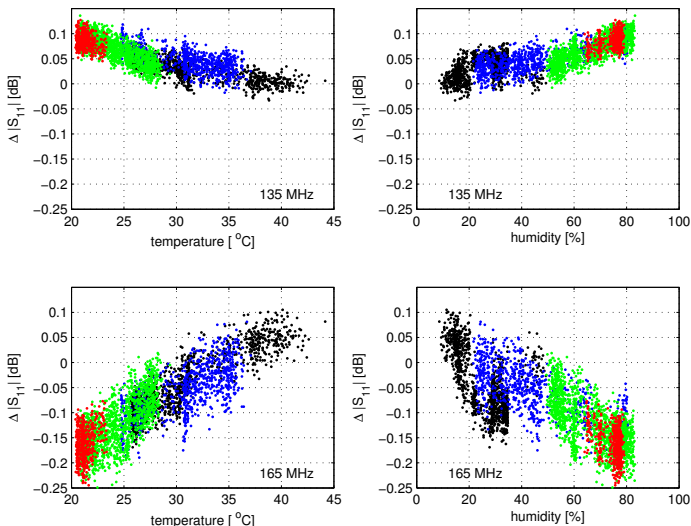


Figure (4): Correlation plots of $\Delta|S_{11}|$ versus temperature and humidity, at 135 and 165 MHz. The four colors represent the data in the four sections of good data in Figure 3. The correlations are clear at these frequencies, and there is excellent repeatability between the four sections, especially when plotted against temperature. The worst case is the non-linear correlation against humidity of the data in the first section (black points in the lower right panel).