Stability of the Antenna Reflection Coefficient Measurements at the MRO

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Description

These slides show the calibrated reflection coefficient of the Fourpoint and Blade high-band EDGES antennas from days 2015 157 and 262, along with ambient temperature, the raw measurements of the Open, Short, Match, and antenna, and the derivative of the raw measurements computed as $m(i) - m(i-1)$ for trace i.

The plots only show the magnitude of the reflection coefficient.

Comments are provided on the final slide.

FOURPOINT ANTENNA MEASUREMENTS

Results

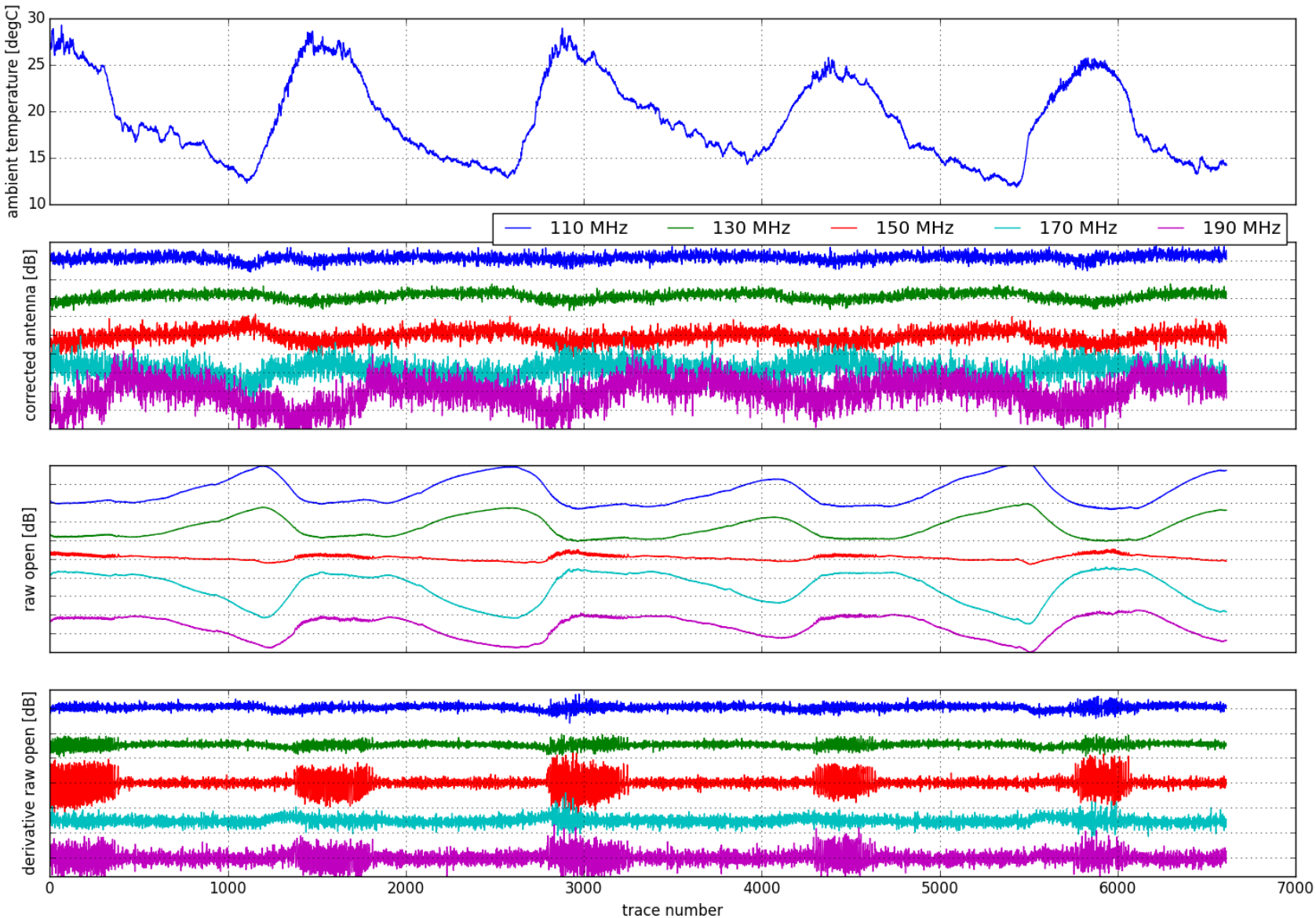

Figure : (1): Data from Fourpoint antenna masurements. The third and fourth panels correspond to the raw Open data, and the derivative of the raw Open data (trace-to-trace difference).

Results

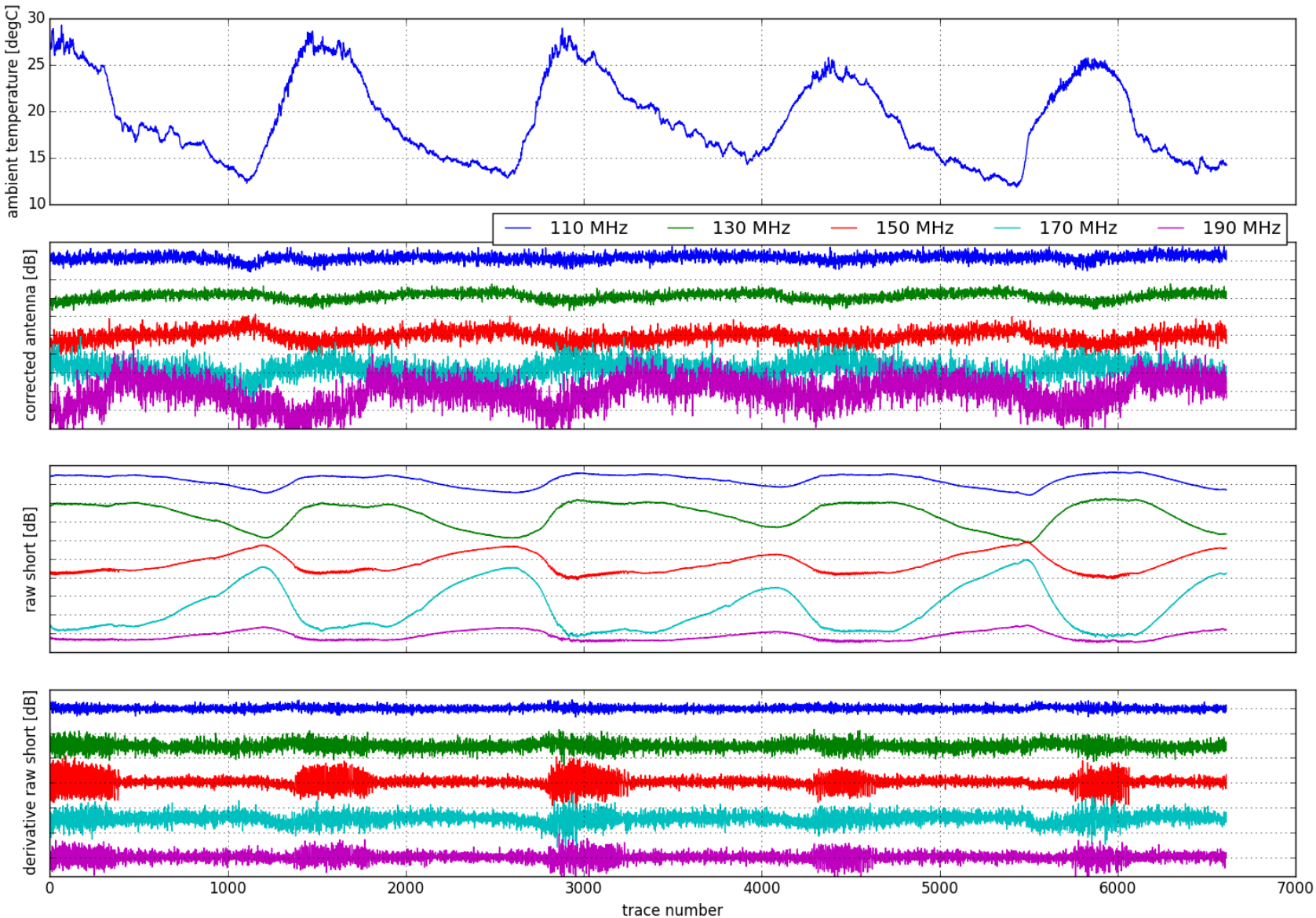

Figure : (2): Data from Fourpoint antenna masurements. The third and fourth panels correspond to the raw Short data, and the derivative of the raw Short data (trace-to-trace difference).

Results

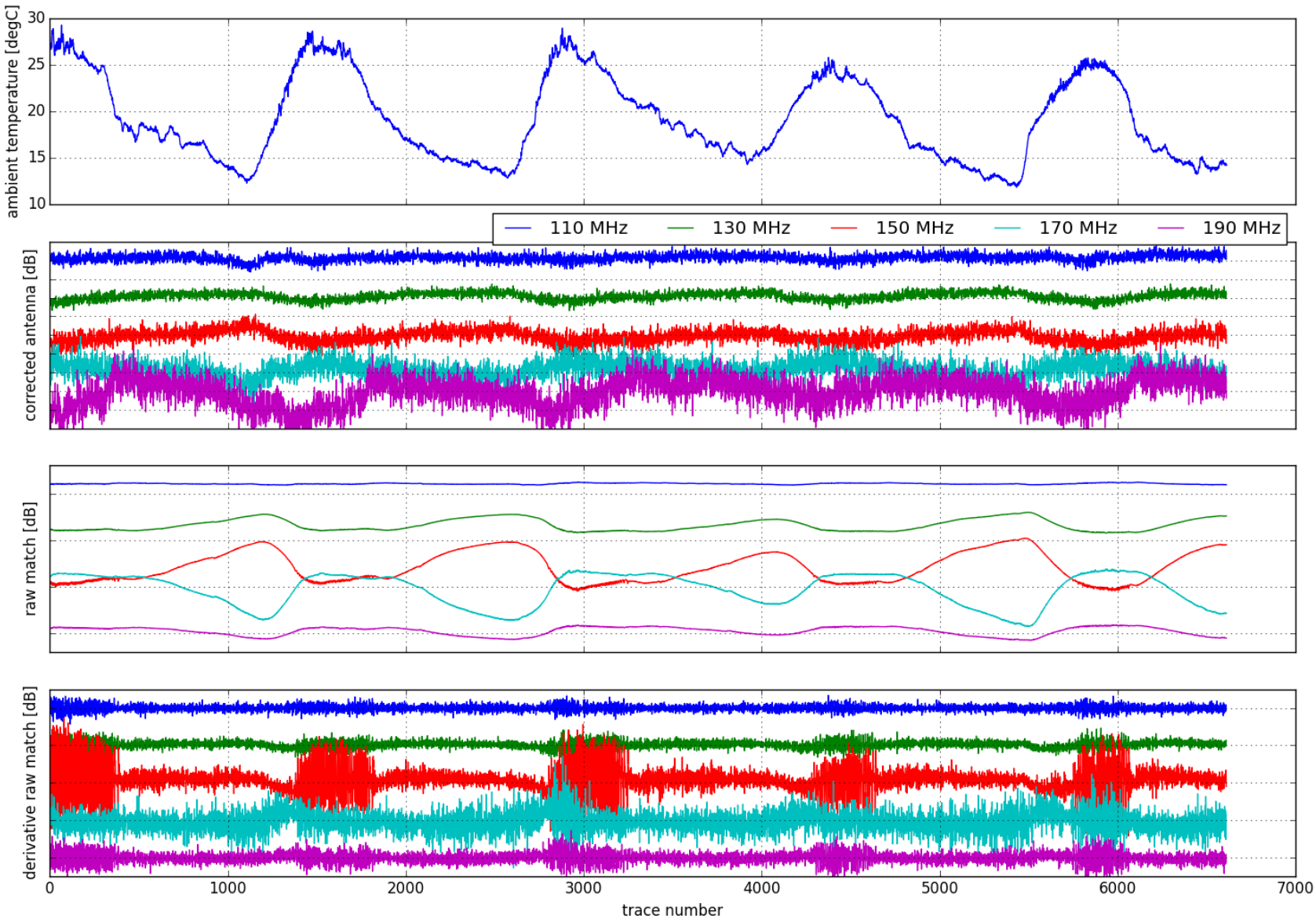

Figure : (3): Data from Fourpoint antenna masurements. The third and fourth panels correspond to the raw Match data, and the derivative of the raw Match data (trace-to-trace difference).

Results

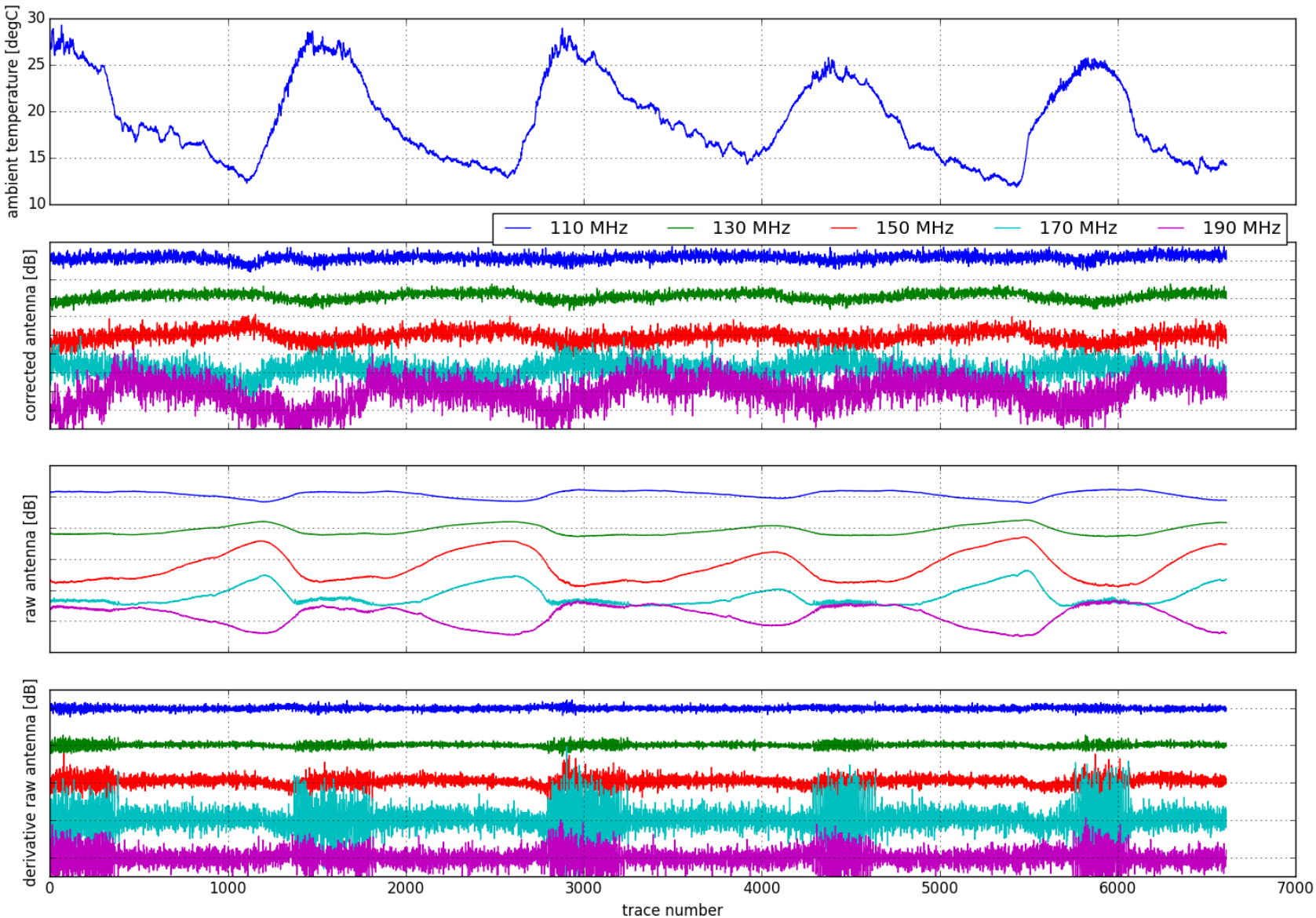

Figure : (4): Data from Fourpoint antenna masurements. The third and fourth panels correspond to the raw Antenna data, and the derivative of the raw Antenna data (trace-to-trace difference).

BLADE ANTENNA MEASUREMENTS

Results

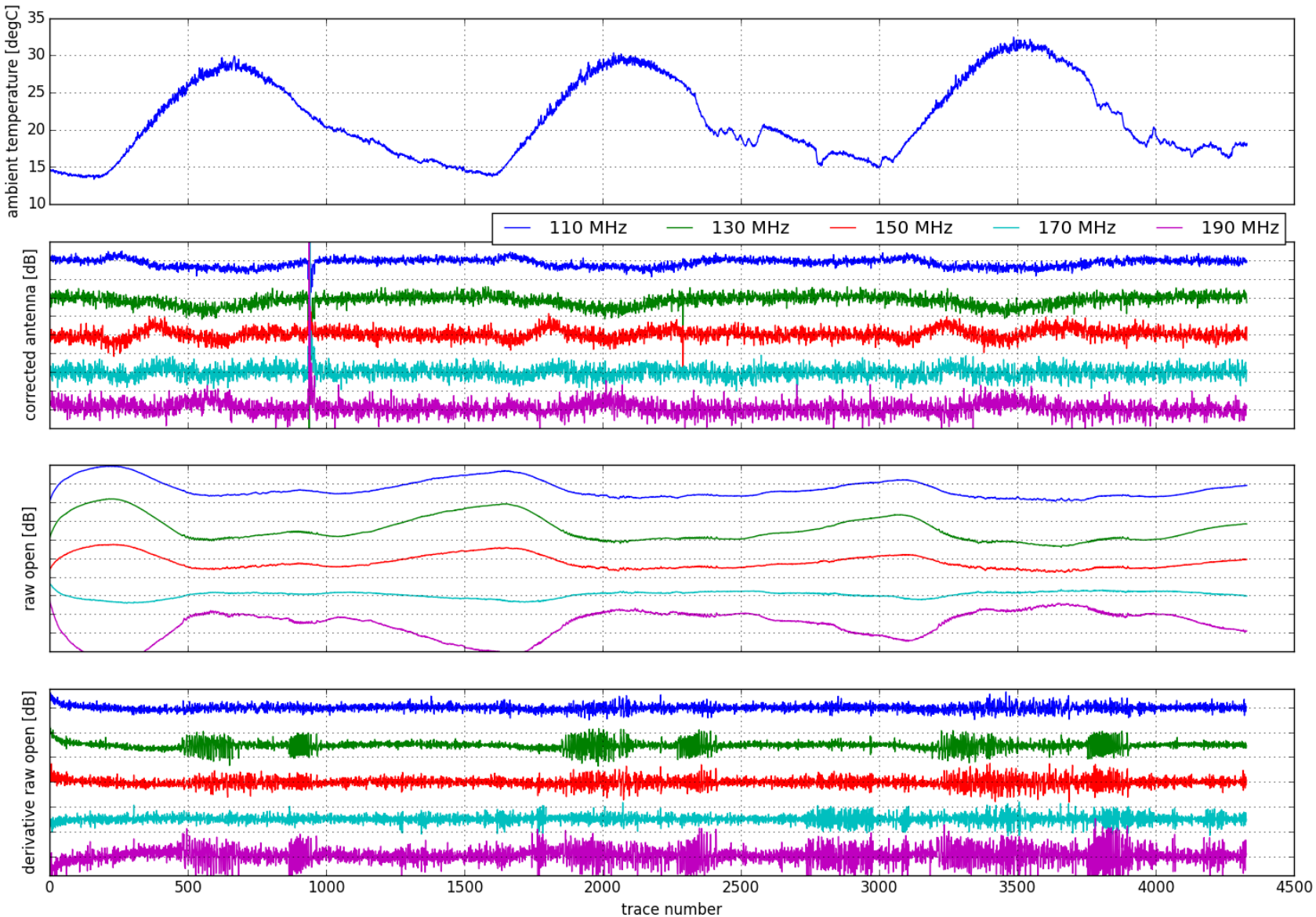

Figure : (5): Data from Blade antenna masurements. The third and fourth panels correspond to the raw Open data, and the derivative of the raw Open data (trace-to-trace difference).

Results

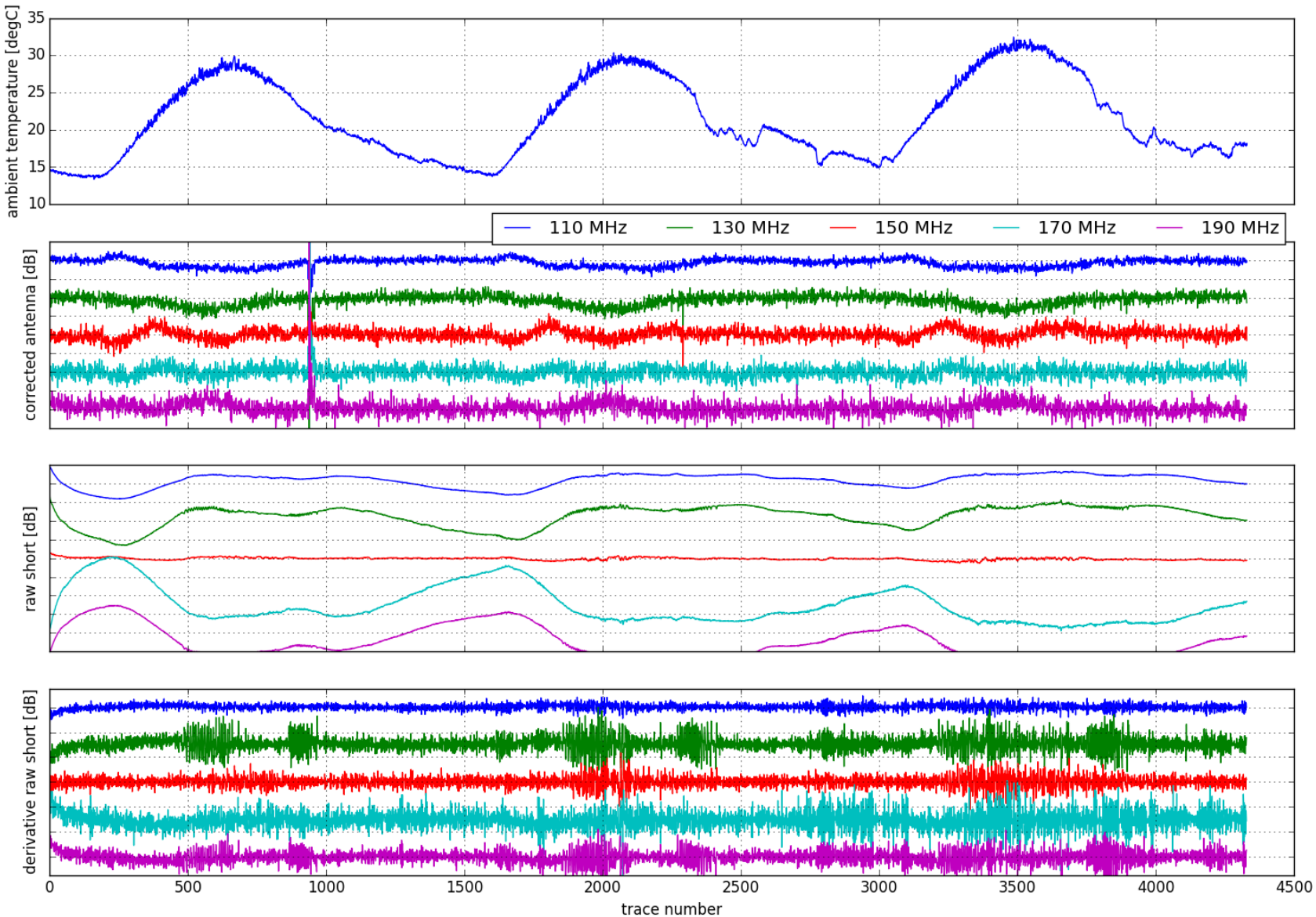

Figure : (6): Data from Blade antenna masurements. The third and fourth panels correspond to the raw Short data, and the derivative of the raw Short data (trace-to-trace difference).

Results

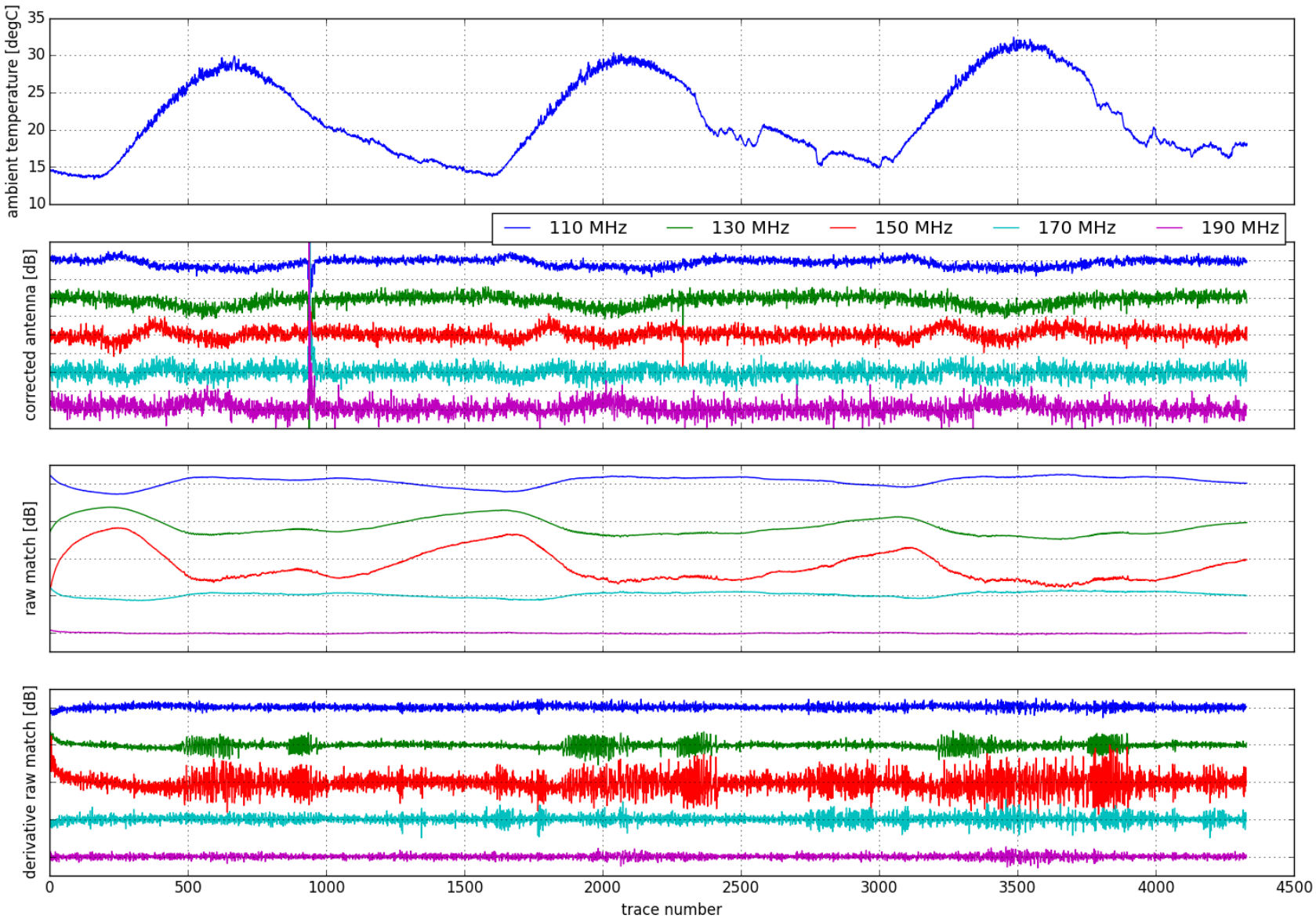

Figure : (7): Data from Blade antenna masurements. The third and fourth panels correspond to the raw Match data, and the derivative of the raw Match data (trace-to-trace difference).

Results

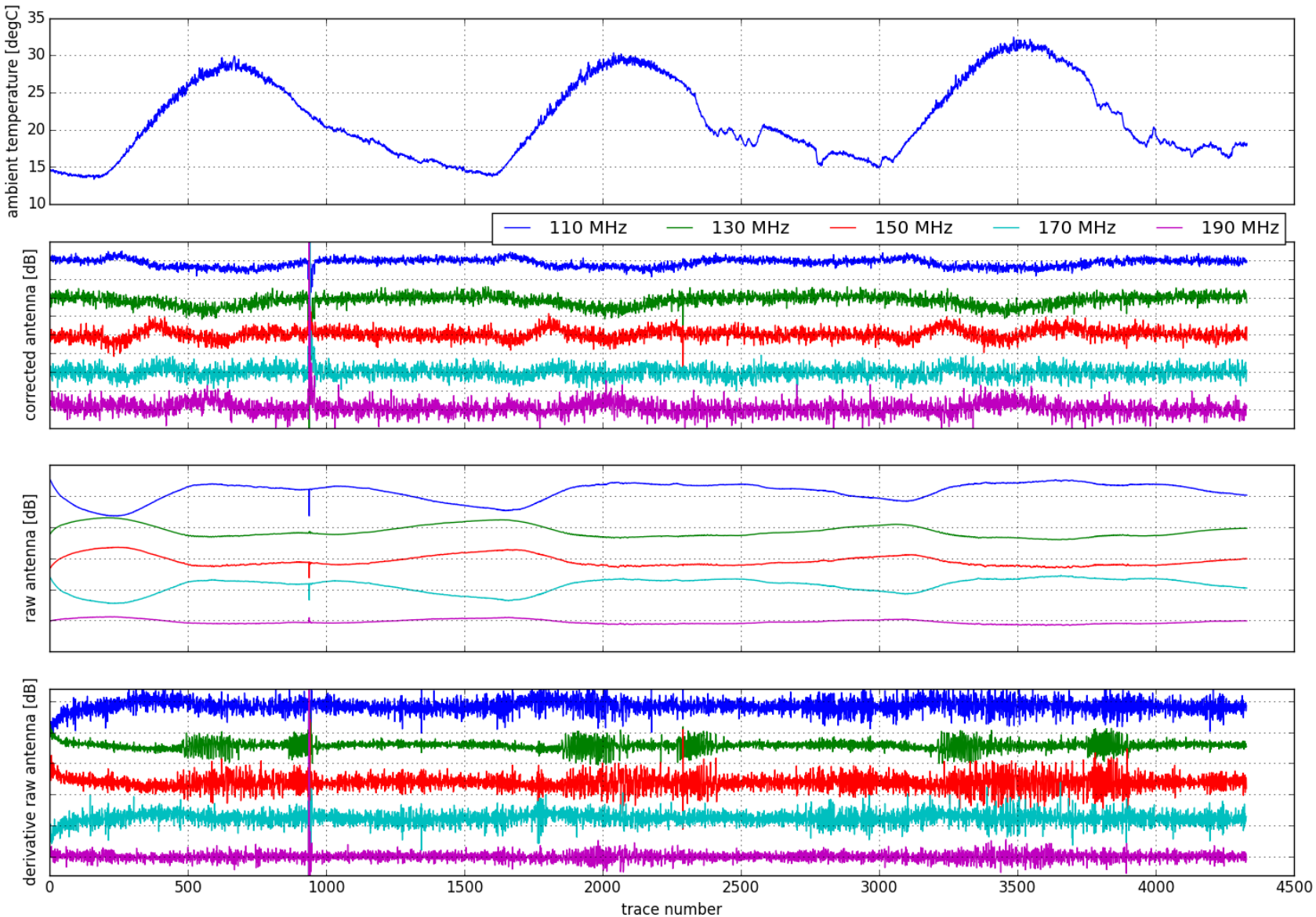

Figure : (8): Data from Blade antenna masurements. The third and fourth panels correspond to the raw Antenna data, and the derivative of the raw Antenna data (trace-to-trace difference).

Comments

1. The previous plots are provided for visual inspection of the features in the time streams.
2. For clarity, no numbers are provided for the Y axes of the raw data plots. However, it is obvious that variations in the raw data (from the reflection standards and antenna, third panel from the top) are strongly correlated with ambient temperature, well above their noise. On the other hand, they don't show clear correlation with the daytime ripples in the corrected antenna data (second panel from the top in all figures). Such small artifacts could exist at a very low level. Or maybe they cannot be appreciated in data from a single standards, but arise due to the slightly different time constants between time streams.
3. The derivative plots (at the bottom) show that, in general, changes in the time streams on $\sim$ 1 minute scales are not very significant. Even during fast changes in ambient temperature, the derivatives barely rise above the noise (except for the beginning section of the Blade antenna, when the switch was stabilizing). In these streams there are periods of higher noise, which correspond to moments of high ambient temperature. This could be attributed to a change in VNA performance.
4. Despite the low significance, in the Fourpoint case (Figures 1-4) the derivative streams from the three standards do show some changes that correlate with changes in the corrected antenna data. Thus, this could explain to some extent the variations observed in the corrected antenna data. In other words, some of the observed antenna variations could be explained as an imperfect calibration.
5. In the Blade case (Figures 5-8), the derivative plots show less variation, they are flatter than in the Fourpoint case. Thus, not much can be inferred from them.
6. To conclude, it seems that if the variations observed in the calibrated antenna data are due to bad calibration, their origin corresponds to small unaccounted drifts in all the standards instead on having a single obvious responsible.