Supplementary Material to “Airborne Mid-Infrared Cavity enhanced Absorption spectrometer (AMICA)”

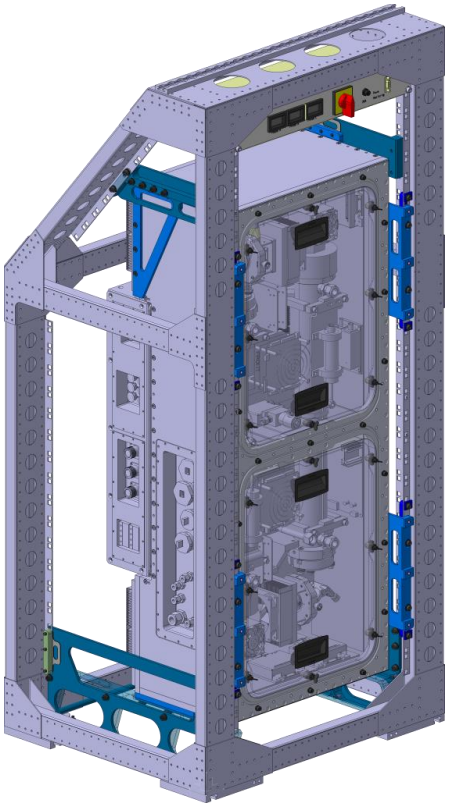

Figure S1 Technical drawing of AMICA mounted in a HALO rack. Special mounting adapters are shown in blue colour.

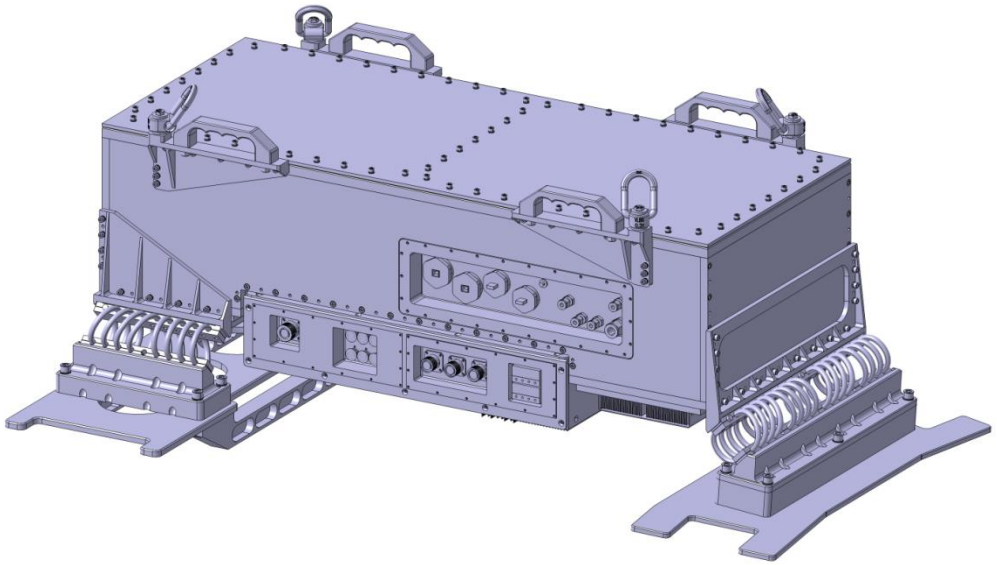

Figure S2 Technical drawing of AMICA with M55 mounts.

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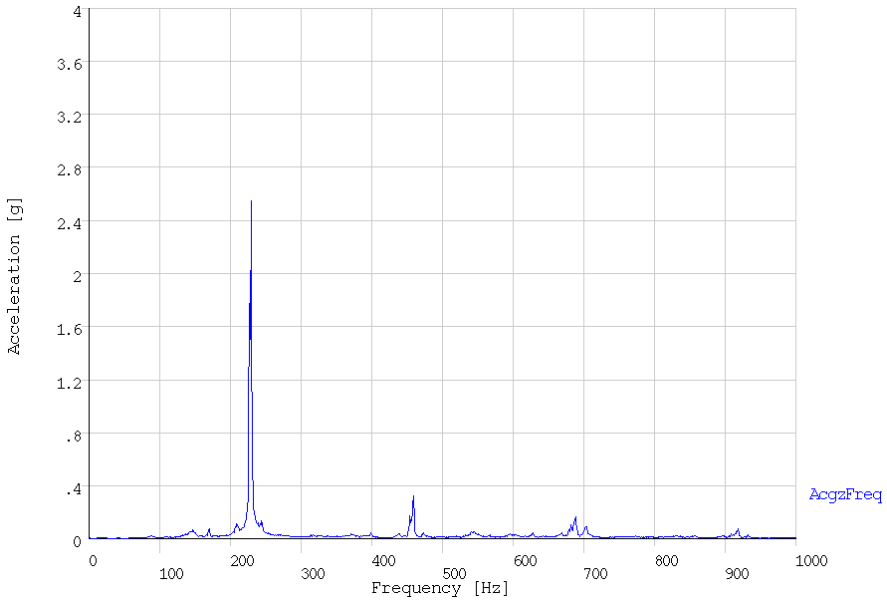

Figure S3 Fast Fourier Transform of the measured acceleration signal in z-direction on the M55-side of the springs for a 30 second time window during a M55 Geophysica flight.

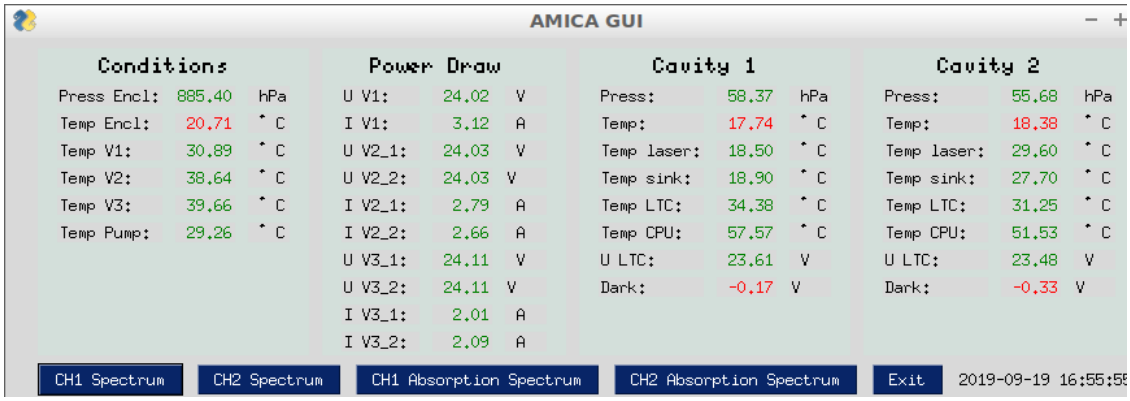

Figure S4 Screenshot of the interactive version of the AMICA software. Parameters are displayed green/red when they are within/outside their respective nominal ranges (the example shown was taken just after instrument startup, when enclosure and cavity temperatures as well as preAMP dark current adjustments have not yet stabilized). Buttons on the bottom of the panel allow for displaying spectra in transmission and absorption space in separate windows.

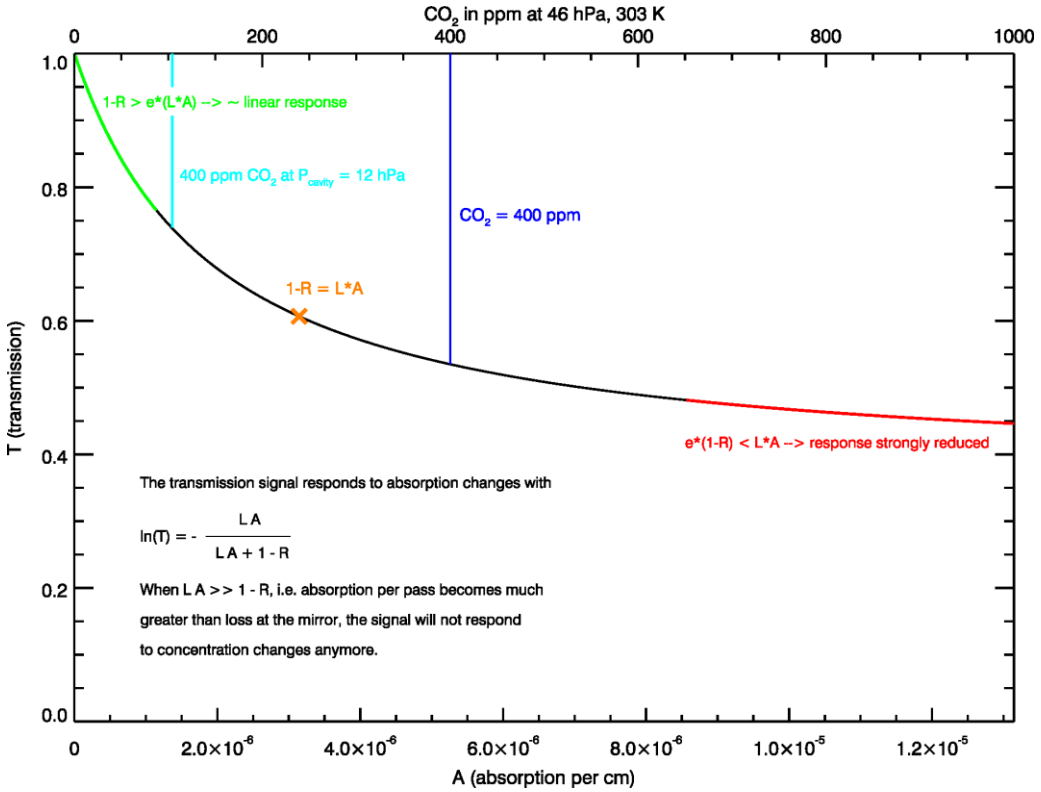

Figure S5 Illustration of sensitivity reduction for the CO_2 peak in AMICA Setup I when the condition in Equation (3) is not met. The graph shows transmission as a function of absorption per cm *A*, which is converted to ppm CO_2 at nominal cavity pressure (46 hPa) on the top axis. Because transmission is a function of single path length *L*, mirror reflectivity *R* and *A* as shown in the figure, an increase in CO_2 mixing ratio near 400 ppm will, in the observed spectrum, lead to a broadening of the CO_2 peak rather than a significant increase in peak height. This effectively reduces the nominally large S/N ratio for this peak, and it makes the retrieval sensitive to even minute uncertainties in the wavenumber scale derived from the etalon fit.