HNO_3 $\nu_2+\nu_4$ band

This band is centered at 2999 cm^{-1} and has always been missing from HITRAN.

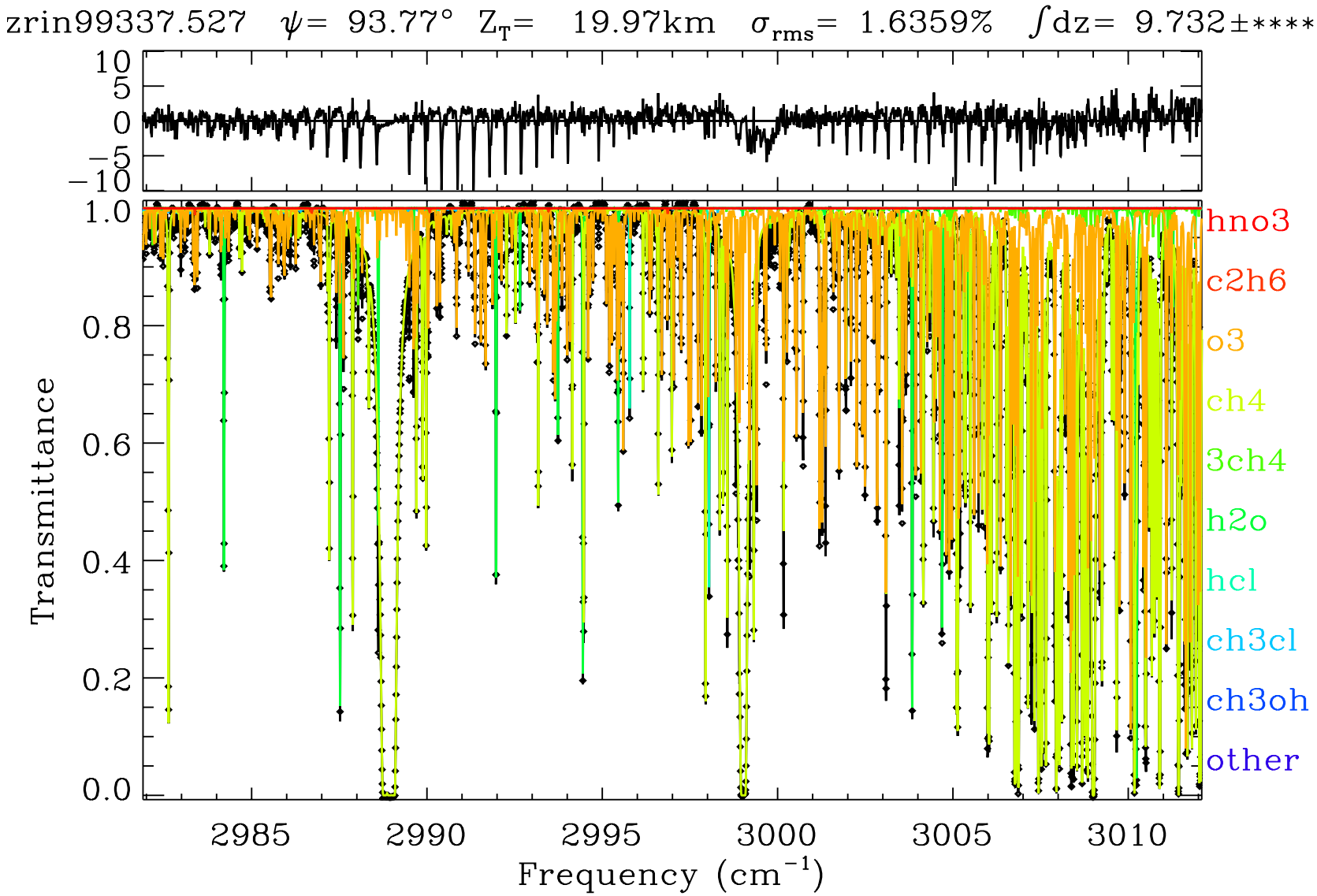
In high latitude balloon spectra, the absorptions reach 10% and interfere with the retrieval of other gases (e.g. C_2H_6) in this region.

Currently, poor interfering spectroscopy limits the number and width of C_2H_6 windows.

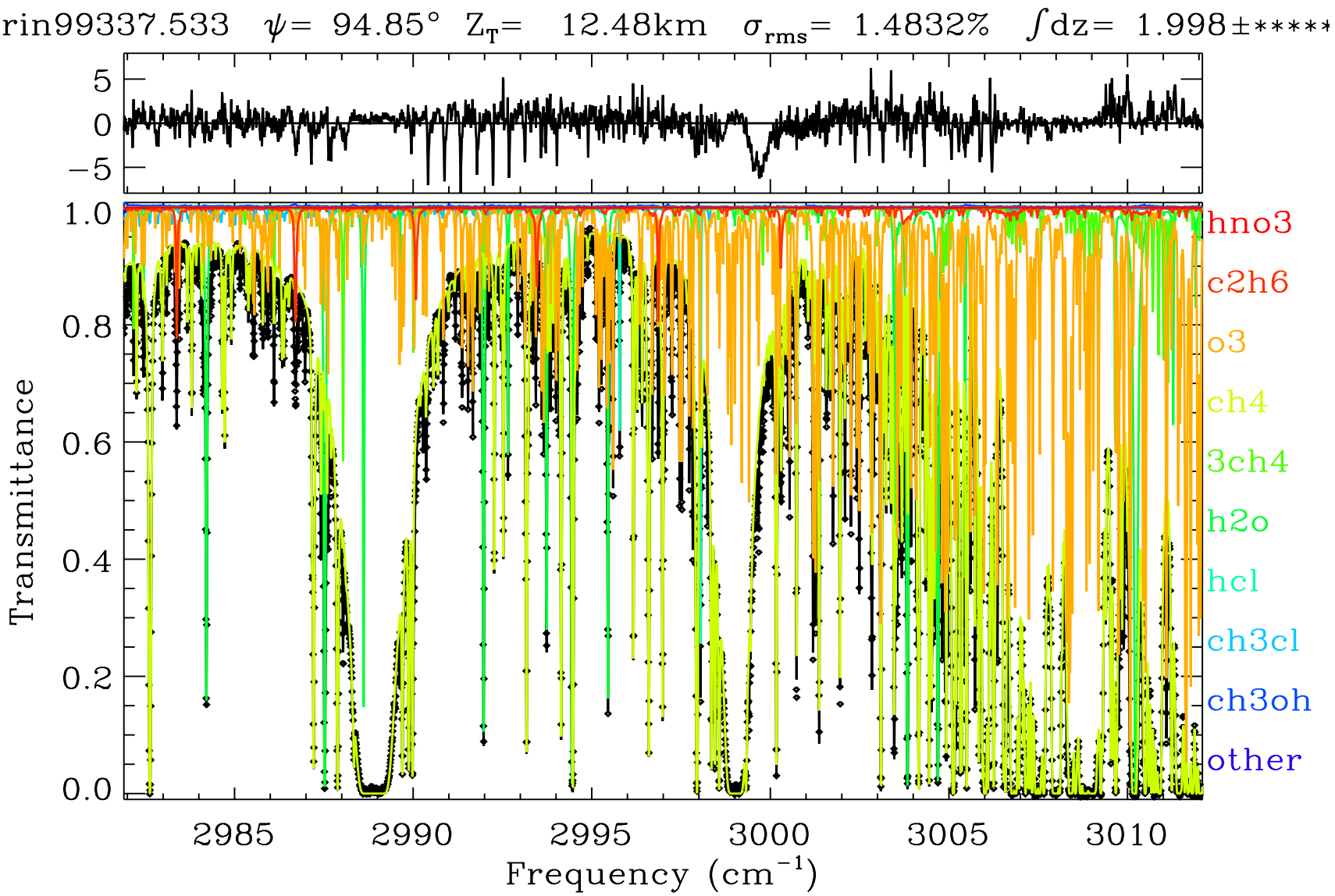
We therefore developed an empirical pseudo-linelist for this band based on MkIV balloon spectra (line positions) and PNNL laboratory spectra (line intensities, E").

This is far from ideal because the MkIV balloon spectra have alot of interfering absorptions and the PNNL lab spectra only cover the 278 to 323K temperature range at 1 atm, whereas atmospheric HNO_3 typically resides at ~200K and 0.05 atm pressure.

This is the 5'th HNO_3 band that has been identified in MkIV balloon spectra, but is missing from HITRAN, for which we have generated an empirical PLL.



MkIV balloon spectrum at 20 km tangent altitude from Dec 1999 flight from Esrange, Sweden. The residuals (Top panel) clearly show signature of P, Q, and R-branches of missing $\nu_2+\nu_4$ HNO_3 band.



MkIV balloon spectrum at 12.5 km tangent altitude of same occultation. Although the HNO_3 signature is less clear, especially in R-branch, this figure shows the overlap of the C_2H_6 Q-branches (red) at 2983.4, 2986.7, 2990.0, 2993.4, and 2996.8 cm^{-1}, with the missing HNO_3 absorption.