H_2CO Spectroscopy Evaluation

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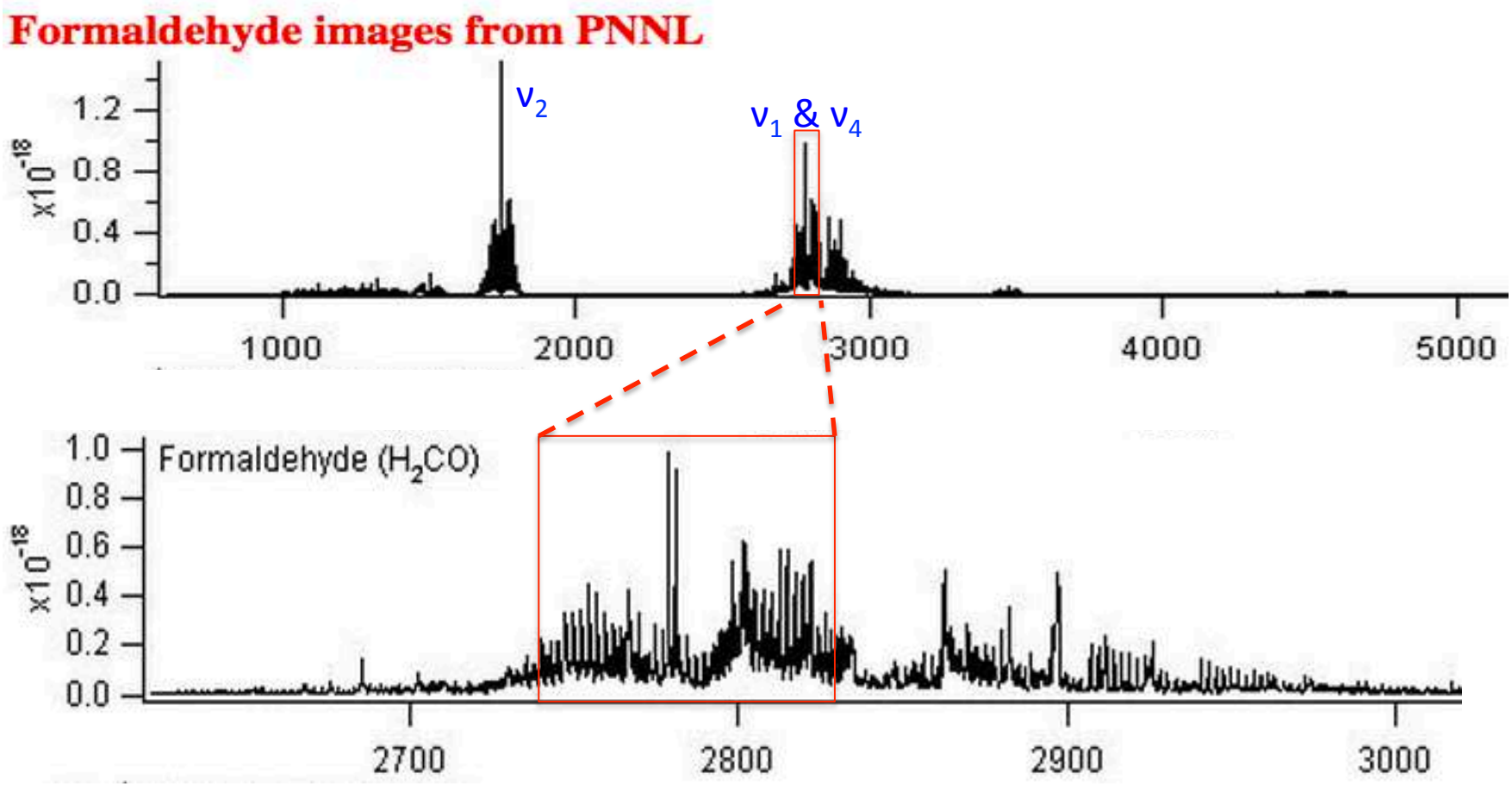
Two Motivations:

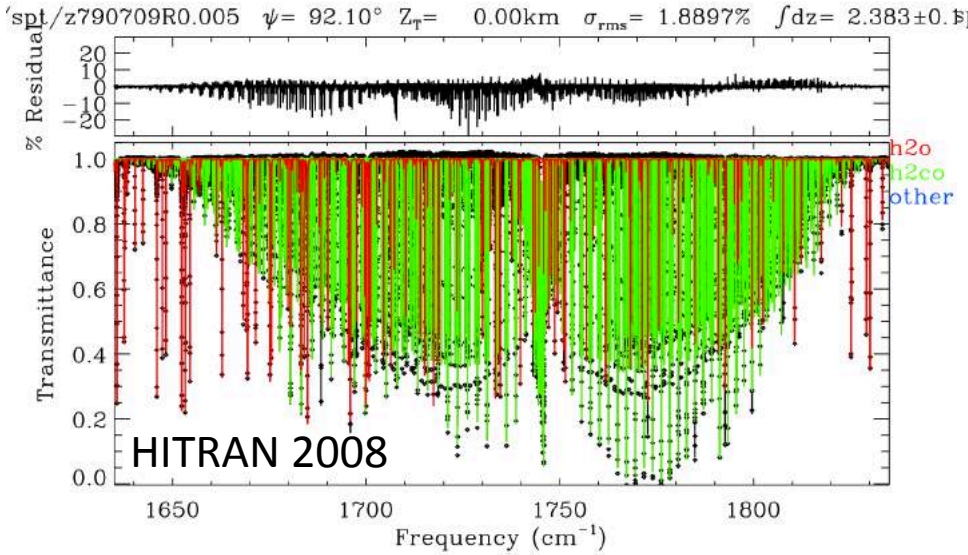
- H_2CO is an important tropospheric pollutant
- H_2CO is a contaminant in Kitt Peak Lab spectra of other gases. So in spectral regions where H_2CO has strong absorption bands, poor H_2CO spectroscopy is an impediment to evaluating the analysis of other gases (e.g. H_2O, CH_4).

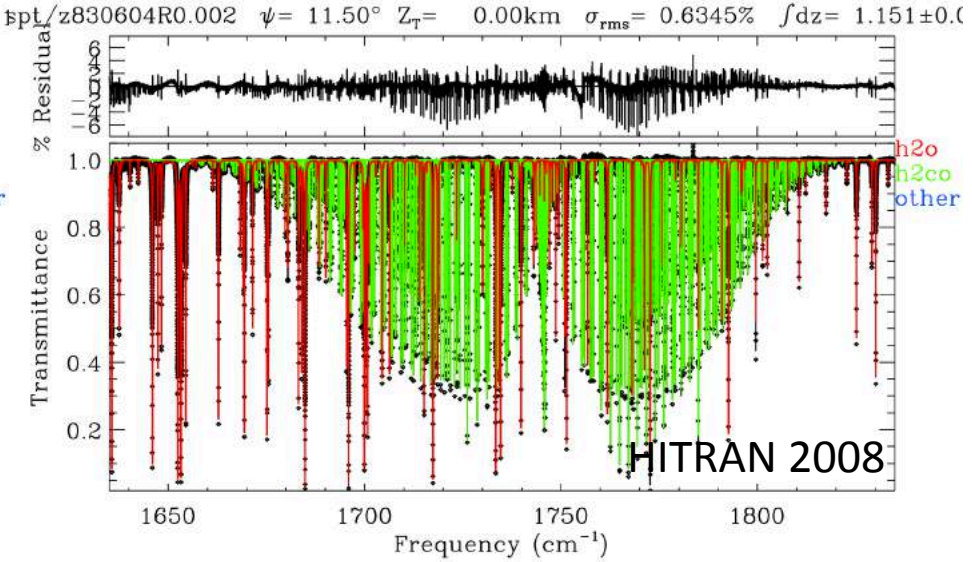
PNNL H_2CO absorption spectrum

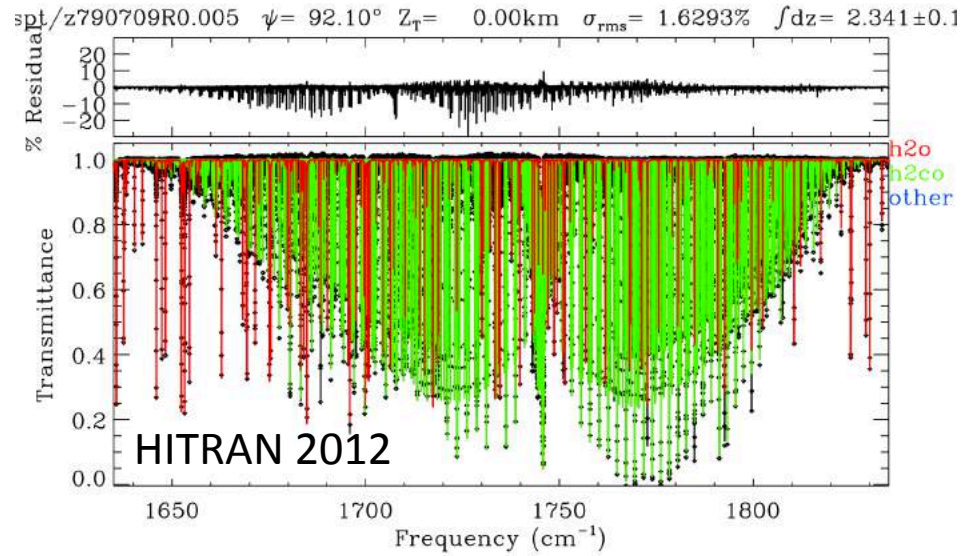


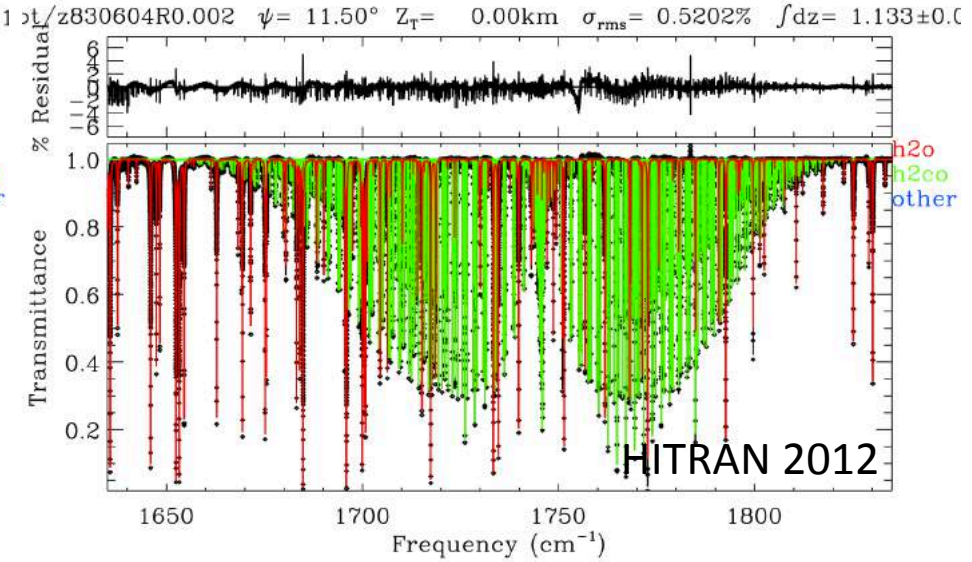
Although the ν_2 band centered at 1747 cm^{-1} is the strongest band, this region is typically blacked out from the ground. The ν_1 and ν_4 bands covering 2740 to 2830 cm^{-1} provide the best windows for ground-based observations.

Spectral Fits to Kitt Peak H_2CO v_2 band

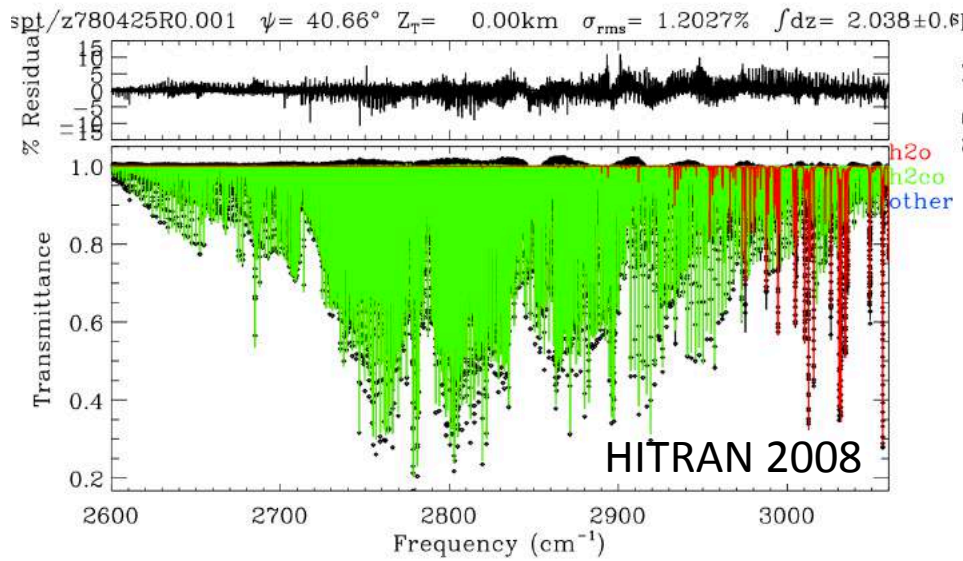


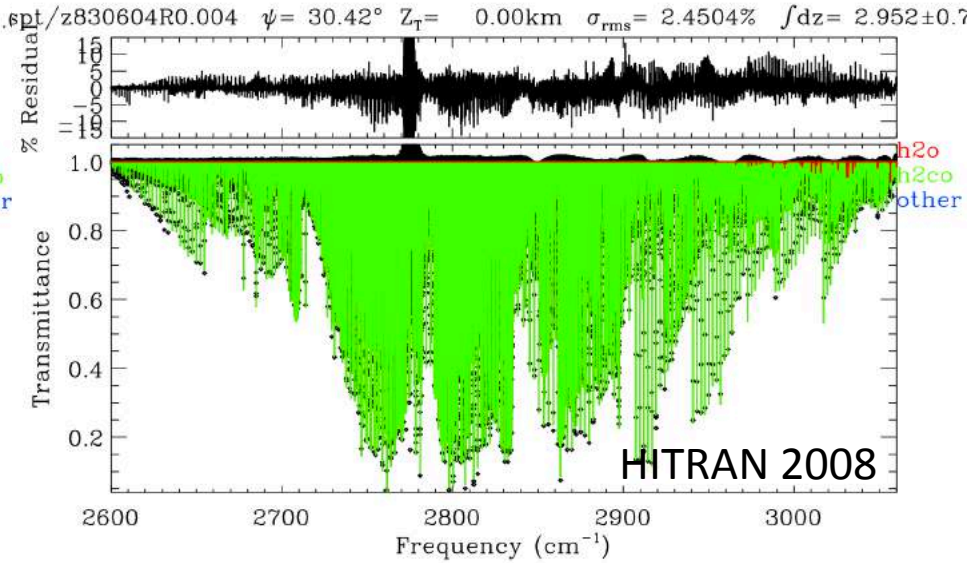


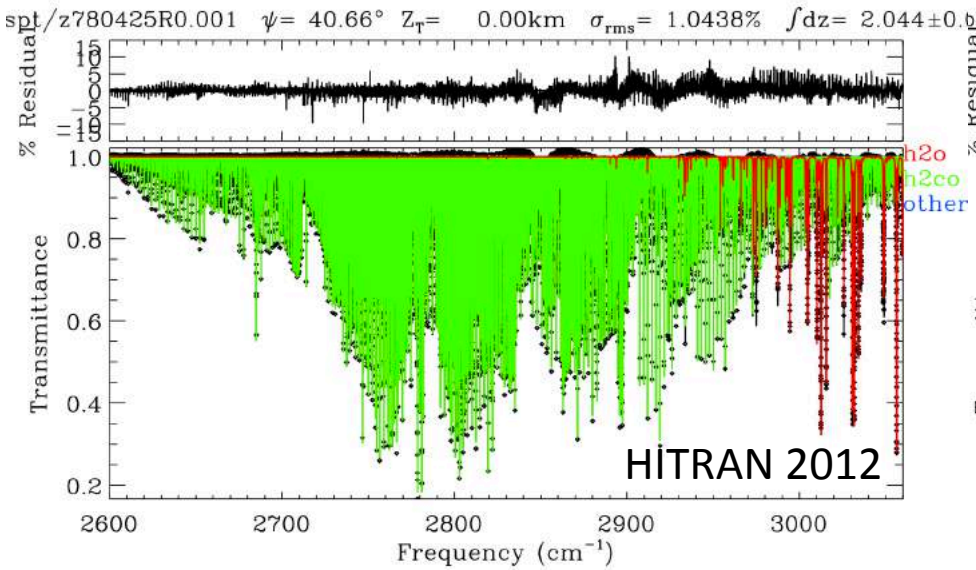


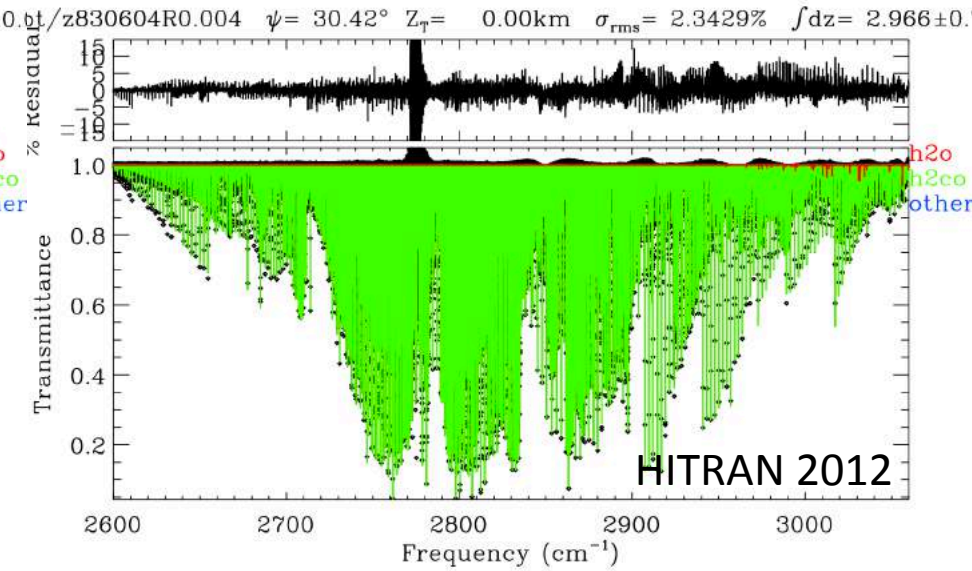


Spectral Fits to KP H_2CO v_1 & v_4 bands









H_2CO Spectroscopy Conclusions

Fits to Kitt Peak Laboratory spectra of H_2CO have been performed.

HITRAN 2012 H_2CO linelist is a definite improvement over HITRAN 2008 due to the improved width parameters of Jacquemert et al. [2010]. This is true both in the ν_2 band around 1745 cm^{-1} and the ν_1 & ν_4 bands around 2800 cm^{-1}

There are still some obvious deficiencies in the HITRAN 2012 H_2CO.

- The missing ν_2 $H_2{}^{13}CO$ band with its Q-branch at 1708 cm^{-1}
- Many lines throughout the bands have large intensity & position errors.

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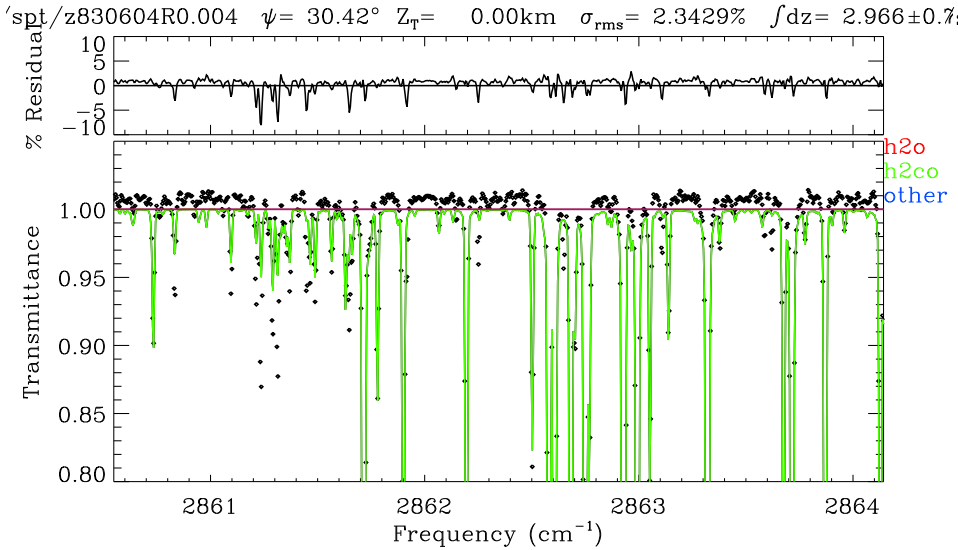
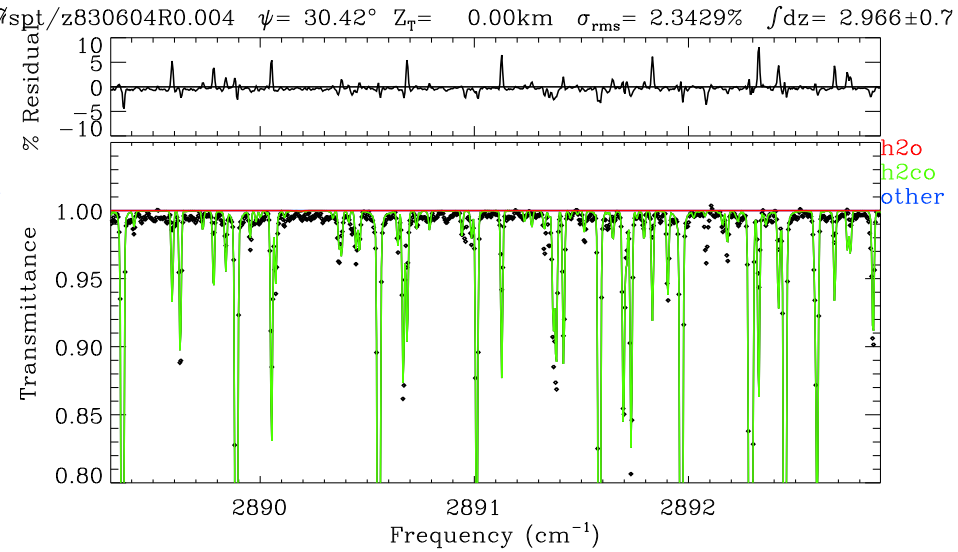
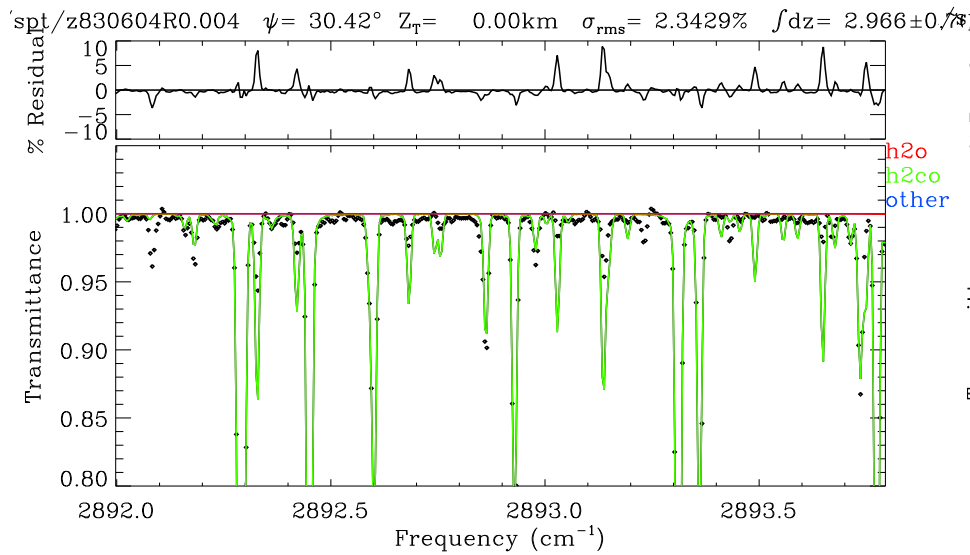
Formaldehyde around 3.5 and 5.7-μm: Measurement and calculation of broadening coefficients

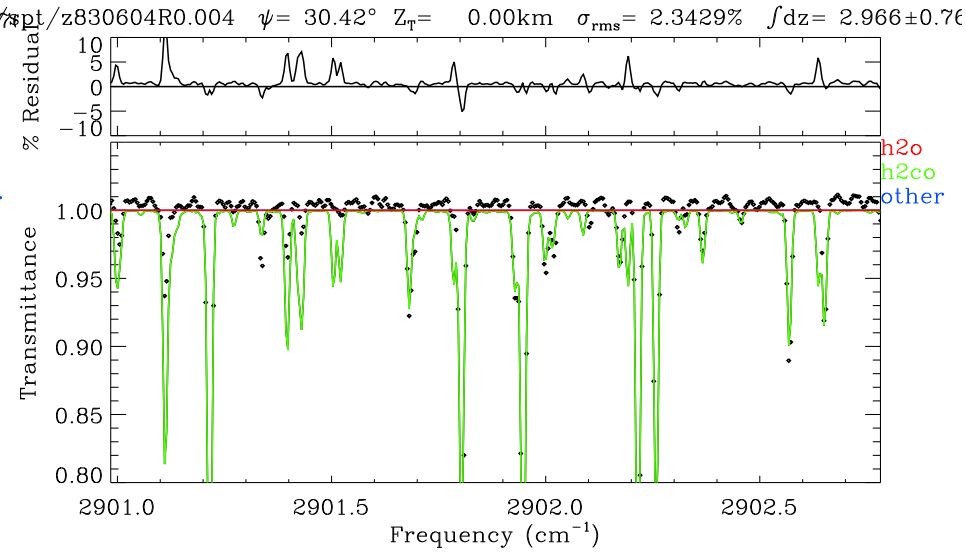
D. Jacquemart[a, b], A. Laraia[c], F. Kwabia Tchana[a, b, 1], R.R. Gamache[c], A. Perrin[d], N. Lacome[a, b]

Examples of large residuals 2800-3000 cm^{-1}









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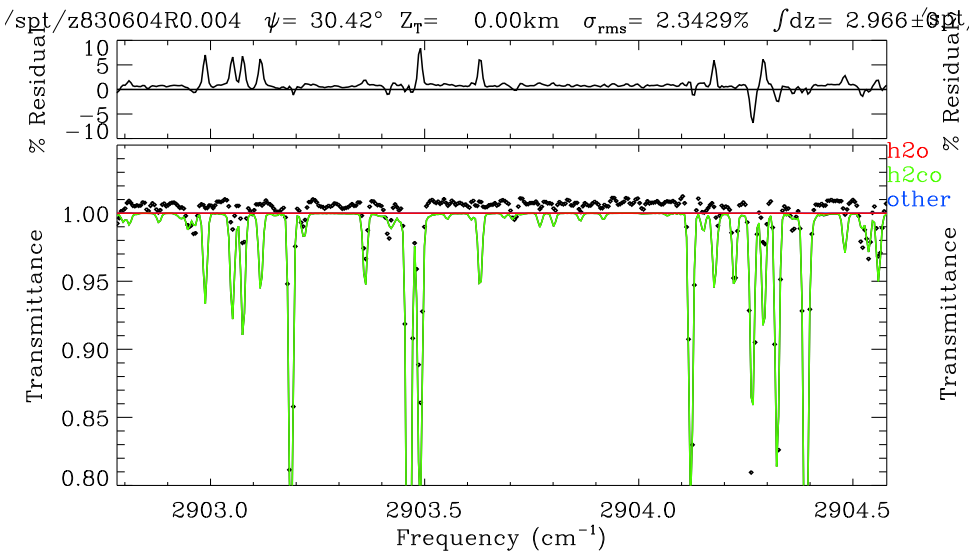

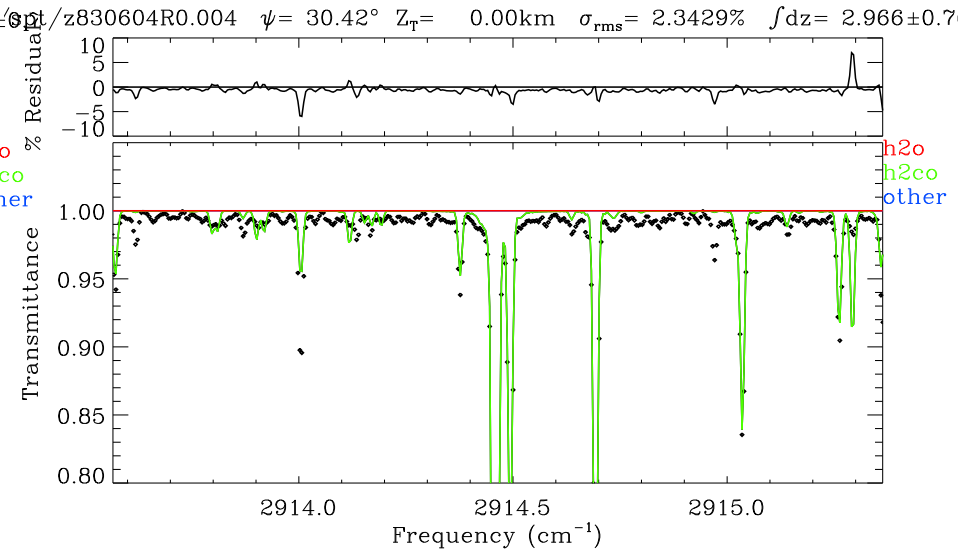

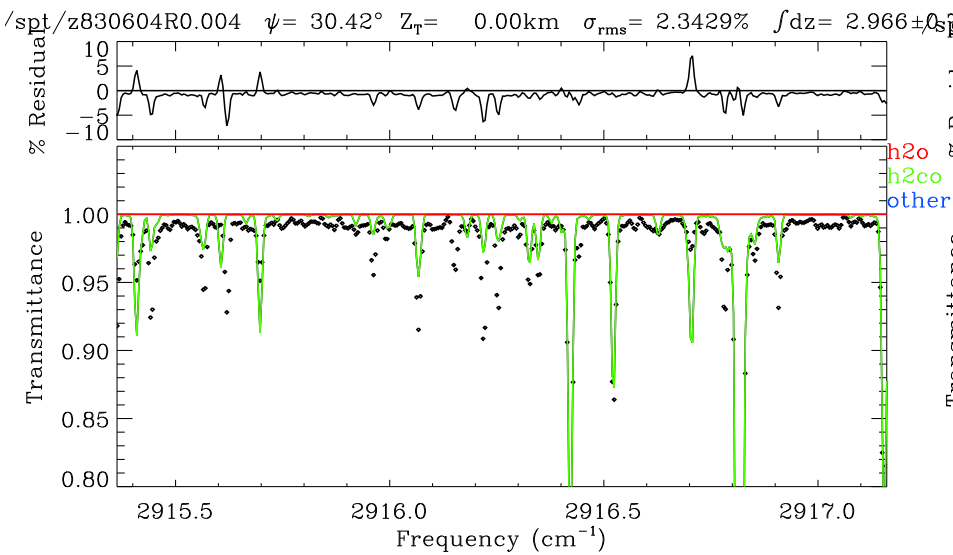

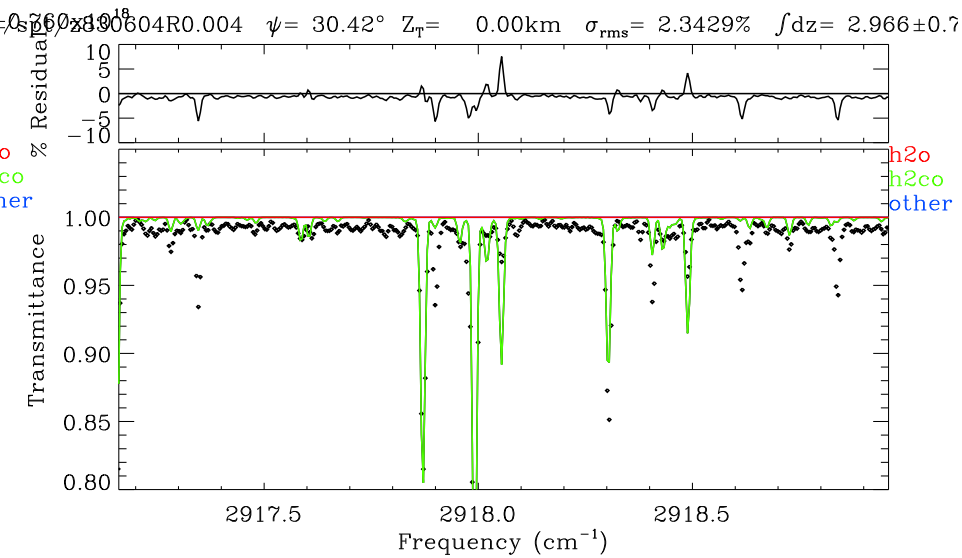

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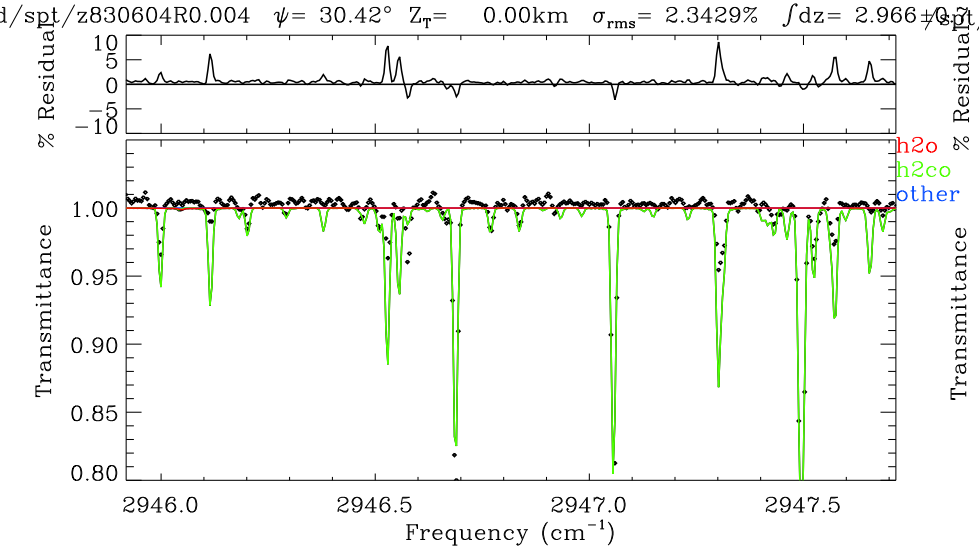

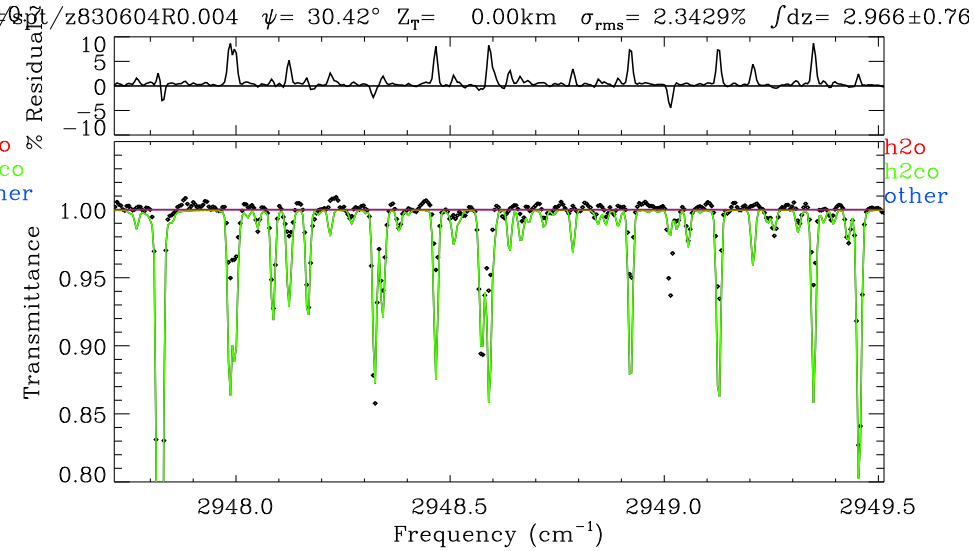

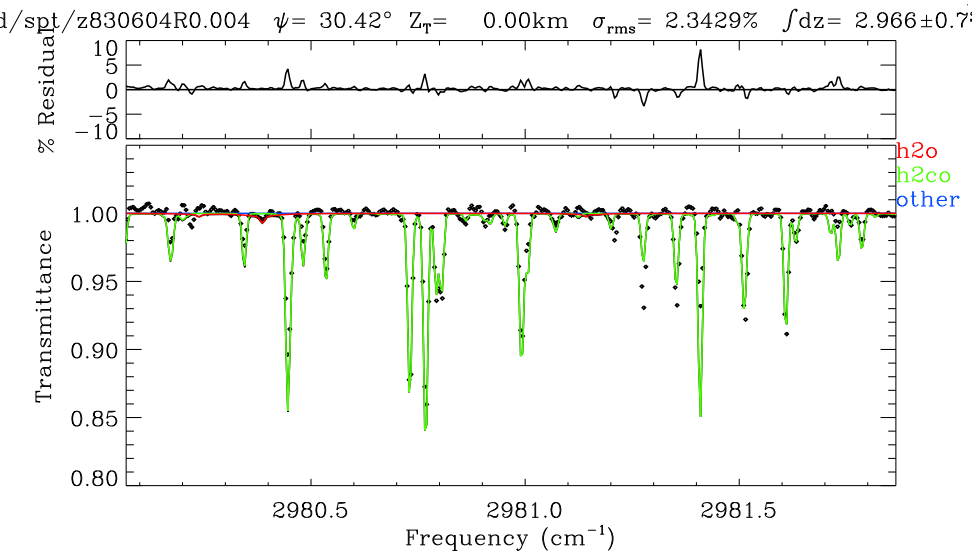

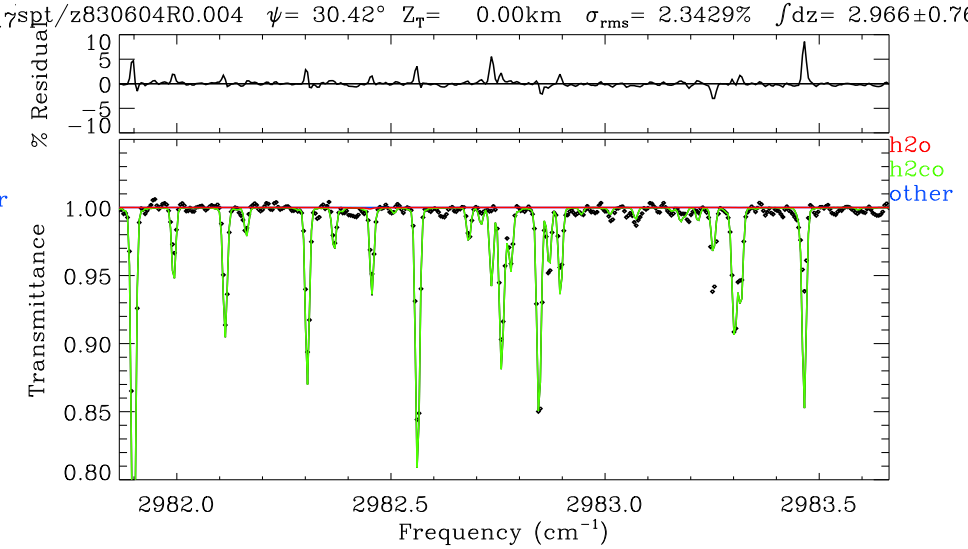
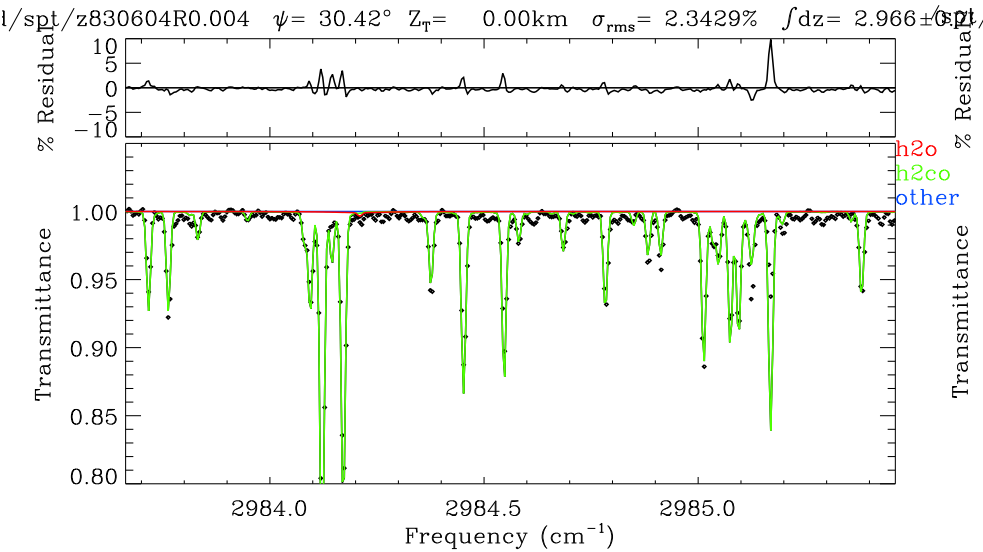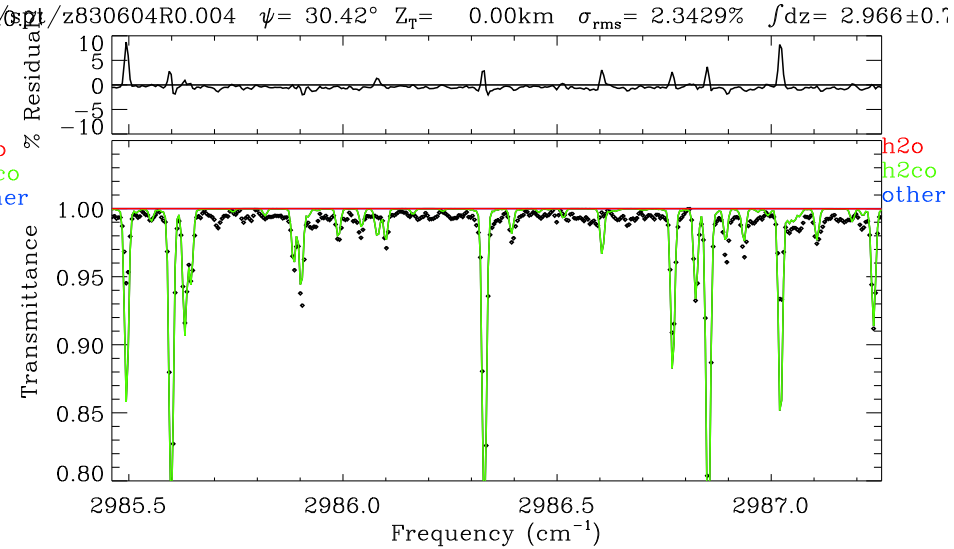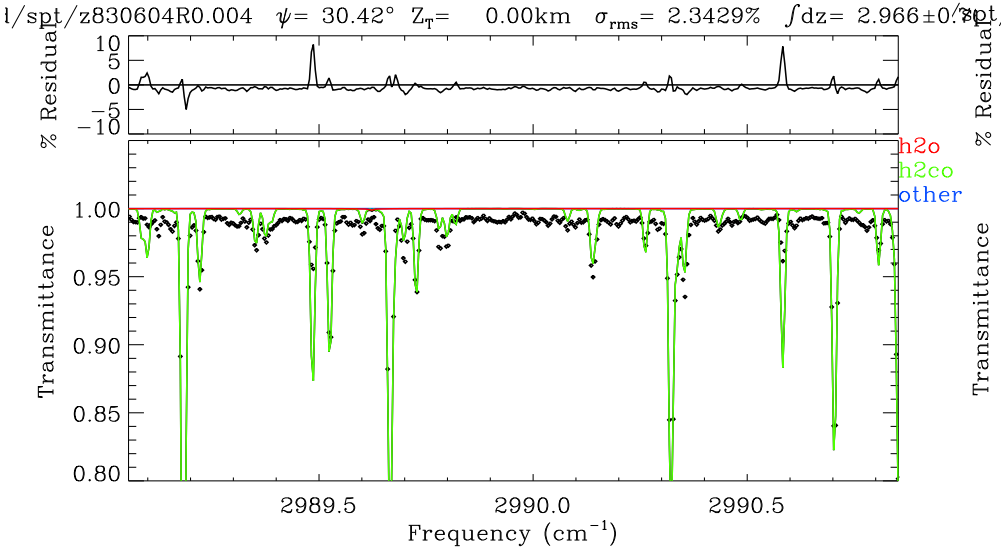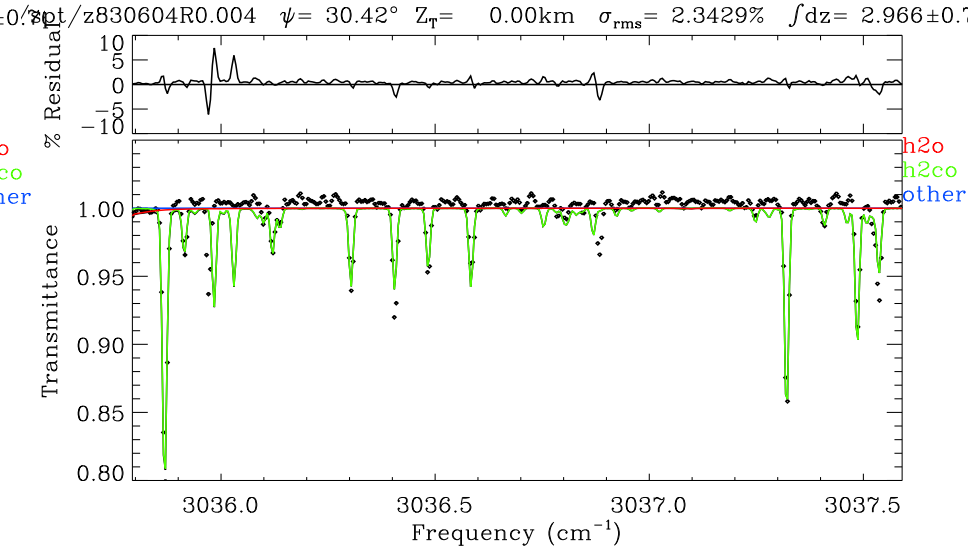
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