INTRODUCTION

- The computer codes developed to predict Global Warming all use a band average CO2 absorption as input for the heating/forcing function to save on computational time.
- The band averaging of each of the 16 CO2 vibrational/rotational absorption manifolds leads to serious errors when saturation is important in a v/r manifold and line by line absorption must be used for accurate CO2 absorption/forcing function data for the codes.
- There are also serious differences between the code calculations and experimental data on global climate and these are discussed.

THE QUESTION IS WHAT ARE THE MAJOR CONTRIBUTORS TO THE PRESENT DAY GLOBAL CLIMATE?

CO2 ABSORPTION COMPARISON LINE vs. BAND THEORY

In order to evaluate the 2 methods we separate the absorption from the complex problem of the total simulation of global climate modeling. One can always use the Beer’s Law for the transmission of radiation through an absorbing medium which is

\[
\frac{dI}{dR} = \alpha I
\]

with I the intensity, R the range and the a volumetric absorption.

### NUMERICAL EXAMPLE COMPARING LINE vs. BAND MODEL ABSORPTION

- There are 14 v/r manifolds of CO2 absorption in the 12 to 20 micron infrared spectrum consisting of over 100 lines each which absorb the earth’s IR radiation and lead to the green house effect. If an increase in CO2 causes an increase in IR absorption then there is an increase in temperature rise and global warming.
- The present computer codes use the band model for CO2 heating/forcing function.

This is the absorption spectrum of 1 of the 14 v/r manifolds of CO2 in the 12 to 20 micron wavelength. The red horizontal line is the absorption corresponding to 99% absorption of a line in the atmosphere. The yellow line is the band average absorption with a line width of 50 lines or 70 cm-1.

### FORCING FUNCTION FOR DOUBLE CO2 from 320 to 640 ppm

- The band model calculates a heating 10 times too large.
- For bands that are very saturated (>100) the band absorption is also saturated and the model predicts 0 heating. This is wrong because the band model misses those lines in the far wings of the manifold which are only lines by line “picks up” that contribute 0.26 W/M2
- When saturation is not involved (5 v/r bands) the 2 methods agree within 10%

### CONCLUSIONS

- The case is not closed for the causes of global warming and even the mechanisms responsible for climate change.