

Igor Pro for plotting

Using the program IgorPro we can illustrate each column of the spreadsheet for a fixed set of parameters.

We examine the columns of the Excel worksheet. The first column is the wavenumber (cm^{-1}). The second column is the intensity given in the HITRAN database.

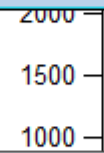
You may change the ppm of CO_2 on column and that will propagate through the worksheet resulting in the change in the earth's surface temperature.

The next slide shows the same data columns pasted into Igor.

n,co2,conv,ppm,optpath,Arel,...

0 0.01

	wn	co2	conv	ppm	optpa	Arel	trans	transcorr	transrel	tt	planck	trans_planck
0	0.01	1.46e-05	234878	0.000412	96.8	0.0014	0.998585	0.999027	0.997614	288	7.46794e-10	7.45013e-10
1	0.02	1.46e-05	234878	0.000412	96.8	0.0014	0.998585	0.999027	0.997614	288	2.9871e-09	2.97998e-09
2	0.03	1.46e-05	234878	0.000412	96.8	0.0014	0.998585	0.999027	0.997614	288	6.72082e-09	6.70478e-09
3	0.04	1.46e-05	234878	0.000412	96.8	0.0014	0.998585	0.999027	0.997614	288	1.19478e-08	1.19193e-08
4	0.05	1.46e-05	234878	0.000412	96.8	0.0014	0.998585	0.999027	0.997614	288	1.8668e-08	1.86235e-08
5	0.06	1.46e-05	234878	0.000412	96.8	0.0014	0.998585	0.999027	0.997614	288	2.68813e-08	2.68171e-08
6	0.07	1.46e-05	234878	0.000412	96.8	0.0014	0.998585	0.999027	0.997614	288	3.65875e-08	3.65002e-08
7	0.08	1.46e-05	234878	0.000412	96.8	0.0014	0.998585	0.999027	0.997614	288	4.77865e-08	4.76725e-08
8	0.09	1.46e-05	234878	0.000412	96.8	0.0014	0.998585	0.999027	0.997614	288	6.04783e-08	6.0334e-08
9	0.1	1.46e-05	234878	0.000412	96.8	0.0014	0.998585	0.999027	0.997614	288	7.46627e-08	7.44845e-08
0	0.11	1.46e-05	234878	0.000412	96.8	0.0014	0.998585	0.999027	0.997613	288	9.03396e-08	9.0124e-08
1	0.12	1.46e-05	234878	0.000412	96.8	0.0014	0.998585	0.999027	0.997613	288	1.07509e-07	1.07252e-07
2	0.13	1.46e-05	234878	0.000412	96.8	0.0014	0.998585	0.999027	0.997613	288	1.26171e-07	1.25869e-07
3	0.14	1.46e-05	234878	0.000412	96.8	0.0014	0.998585	0.999027	0.997613	288	1.46324e-07	1.45975e-07
4	0.15	1.46e-05	234878	0.000412	96.8	0.0014	0.998585	0.999027	0.997613	288	1.6797e-07	1.67569e-07
5	0.16	1.46e-05	234878	0.000412	96.8	0.0014	0.998585	0.999027	0.997613	288	1.91108e-07	1.90652e-07
6	0.17	1.46e-05	234878	0.000412	96.8	0.0014	0.998585	0.999027	0.997613	288	2.15738e-07	2.15223e-07
7	0.18	1.46e-05	234878	0.000412	96.8	0.0014	0.998585	0.999027	0.997613	288	2.41859e-07	2.41282e-07
8	0.19	1.46e-05	234878	0.000412	96.8	0.0014	0.998585	0.999027	0.997613	288	2.69472e-07	2.68829e-07
9	0.2	1.46e-05	234878	0.000412	96.8	0.0014	0.998585	0.999027	0.997613	288	2.98576e-07	2.97864e-07



Plotting_the_Excel_Spreadsheet

- rename wave11 trans_planck
- display trans_planck,planck vs wwn
- display co2 vs wwn
- display Arel vs wwr
- display trans vs wwn
- display transrel vs wwn

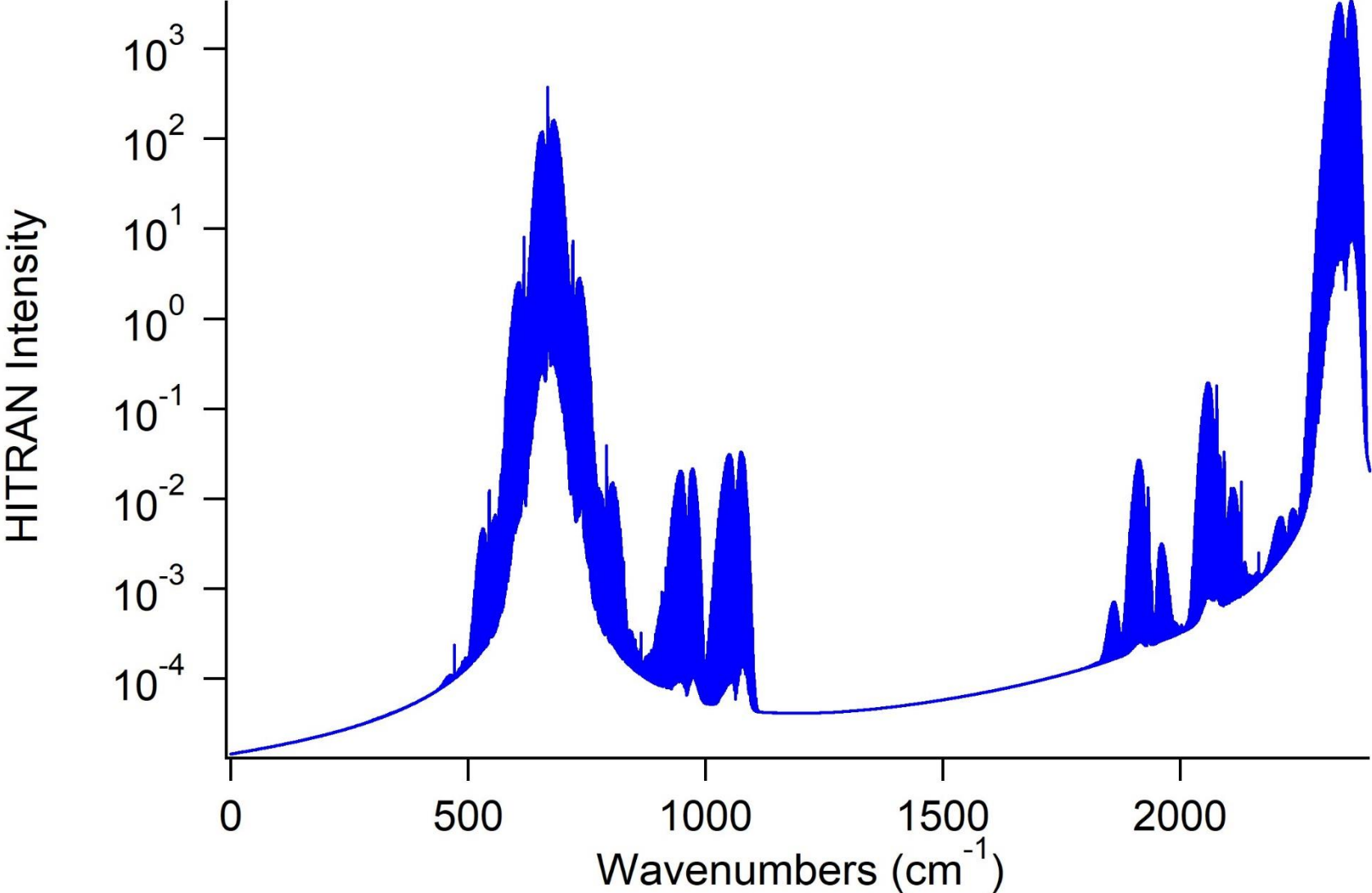
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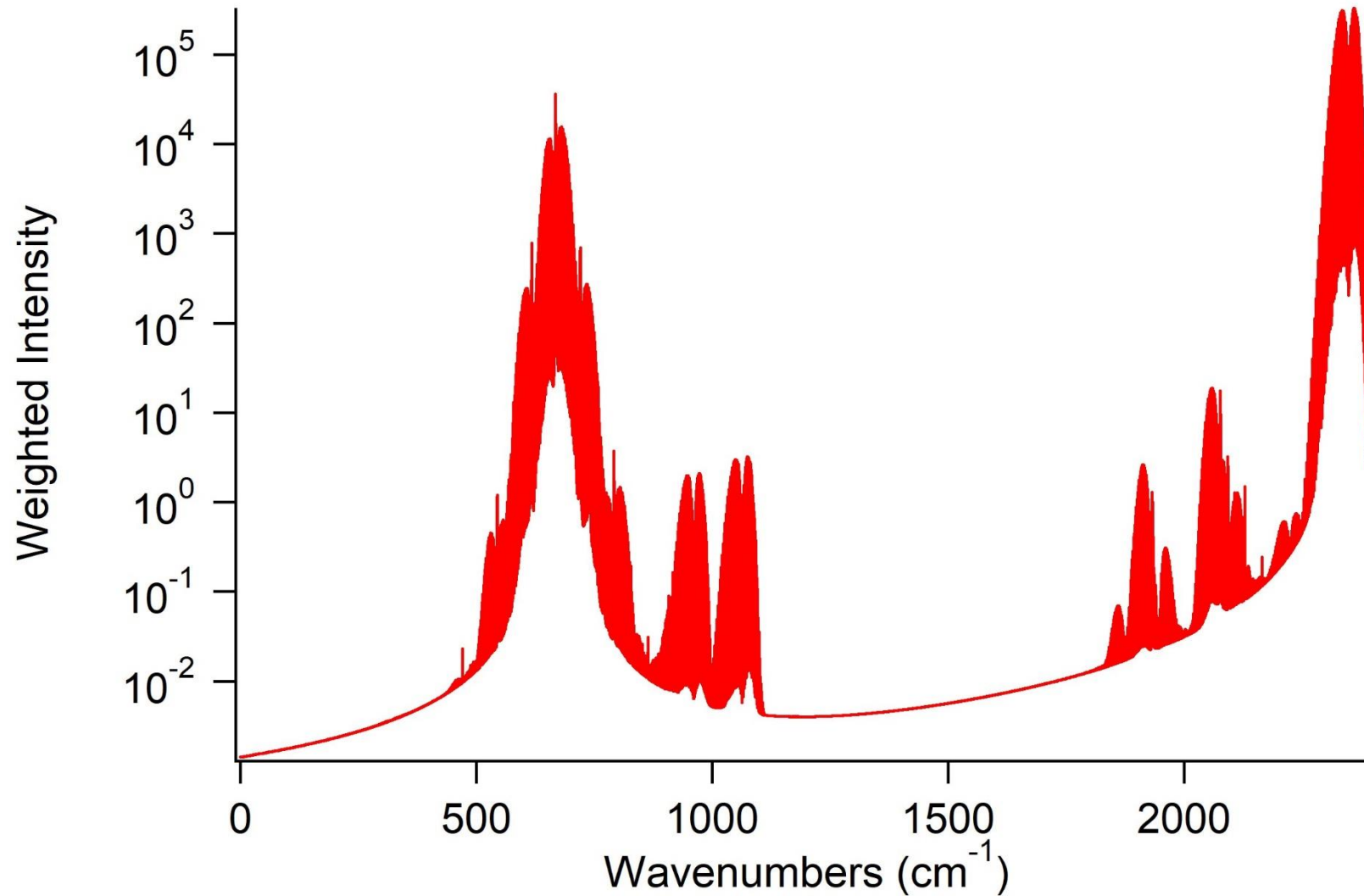
You may change the ppm of CO_2 on column and that will propagate through the worksheet resulting in the change in the earth's surface temperature.

The next slide shows the same data columns pasted into Igor. We can display vs columns, such as “ CO_2 vs wvn”, which shows the CO_2 spectrum obtained from HITRAN as a function of the wavenumber.

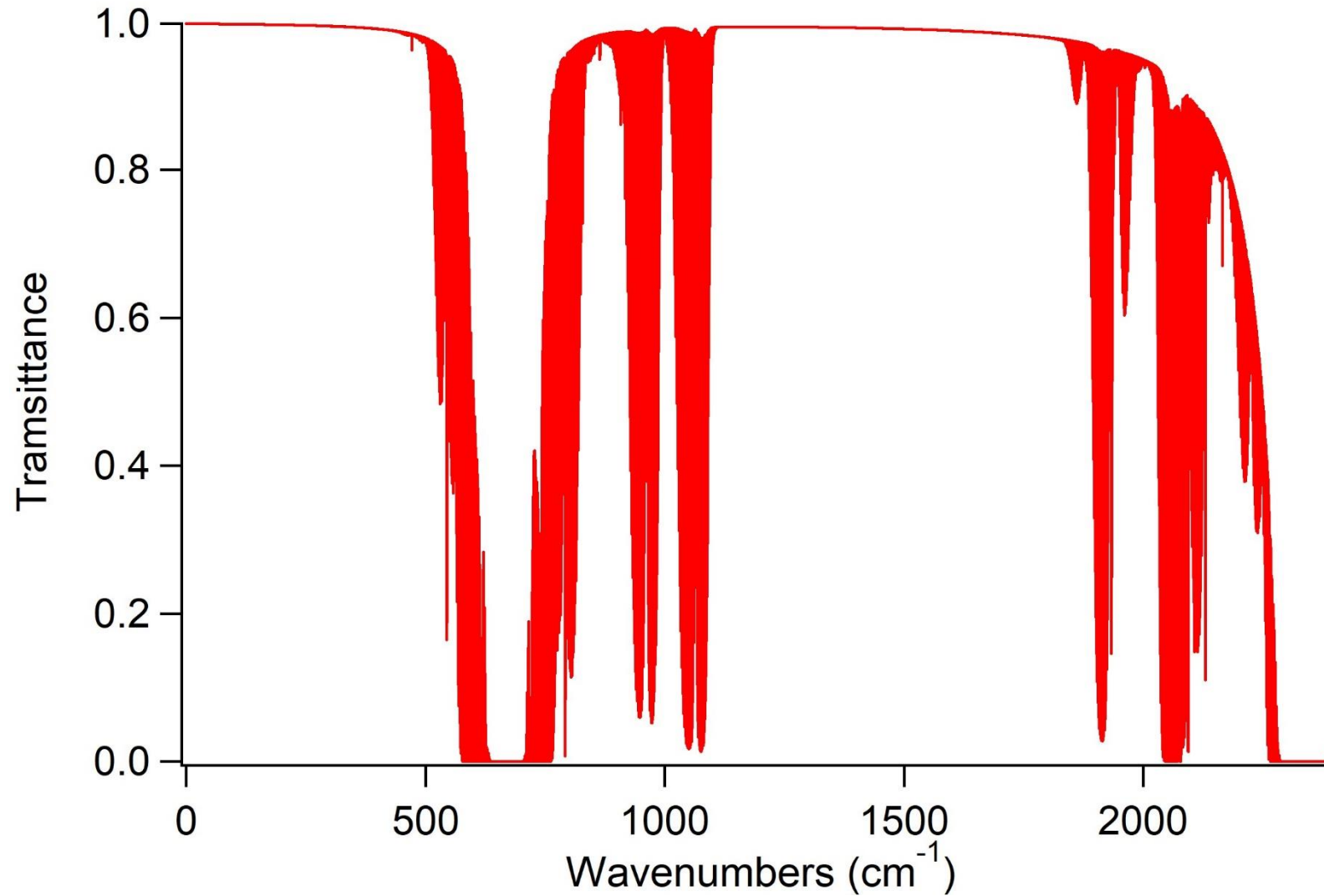
Plotting column B vs column A gives the CO₂ spectrum shown below.



Plotting column F vs column A gives the CO₂ spectrum as the weighted intensity used to calculate the flux absorbance in the integral. The optical path was included.



The corrected transmittance of CO₂ in the atmosphere (CO₂ = 410 ppm) is given by a plot column I vs A



The Planck emission curve that includes the atmosphere (red) has major losses due do CO₂ compared to an ideal Planck curve (blue). This is shown by plotting columns L and K vs A.

