XYLENE POWER LTD.
20190 Kennedy Road
Sharon, Ontario
L0G 1V0
Tel: (905) 473-1704
Email: crhodes@sympatico.ca

September 8, 2008
VIA EMAIL AND LETTER MAIL
To: Ms. Kirsten Walli, Board Secretary,
Ontario Energy Board,
P.O. Box 2319,
27th Floor,
2300 Yonge Street,
Toronto, ON , M4P 1E4
Tel.: 416-440-7677
Fax: 416-440-7656
Email: boardsec@oeb.gov.on.ca

and to:

Miriam Heinz, Regulatory Coordinator
Ontario Power Authority
Suite 1600
120 Adelaide Street West
Toronto, ON ,
M5H 1T1
Tel.: 416-969-6045
Fax: 416-967-1947
Email: Miriam.Heinz@powerauthority.on.ca

and to:

Mr. Kai Millyard, Case Manager,
GEC-Pembina-OSEA
Kai Millyard Associates,
72 Regal Road,
Toronto, Ontario
M6H 2K1

and to:

Carol Chudy,
Clean Affordable Energy Alliance,
Box 931,
Corunna, Ontario
N0N 1G0

and to:

Mark Kitchen, Director, Regulatory Affairs,
Union Gas,
P.O. Box 2001,
50 Keil Drive North,
Chatham, Ontario
N7M 5M1

and to all OEB EB-2007-0707 **Registered Intervenors** via email

Re: **OEB File Number EB-2007-0707**

Dear Ms. Walli:
Please find attached hereto various graphs that Xylene intends to use in the cross examination of both OPA and Intervenor witnesses panels relating to the OPA IPSP. This graphical data is of particular relevance to the OPA witness panels dealing with both Renewable and Non-Renewable Supply Resources and Plan Performance and is also relevant to the witnesses for the intervenors GEC-Pembina-OSEA, Clean Affordable Energy Alliance and Union Gas-Enbridge. Xylene will look to the OEB for assignment of Exhibit numbers for these graphs.

Regards,

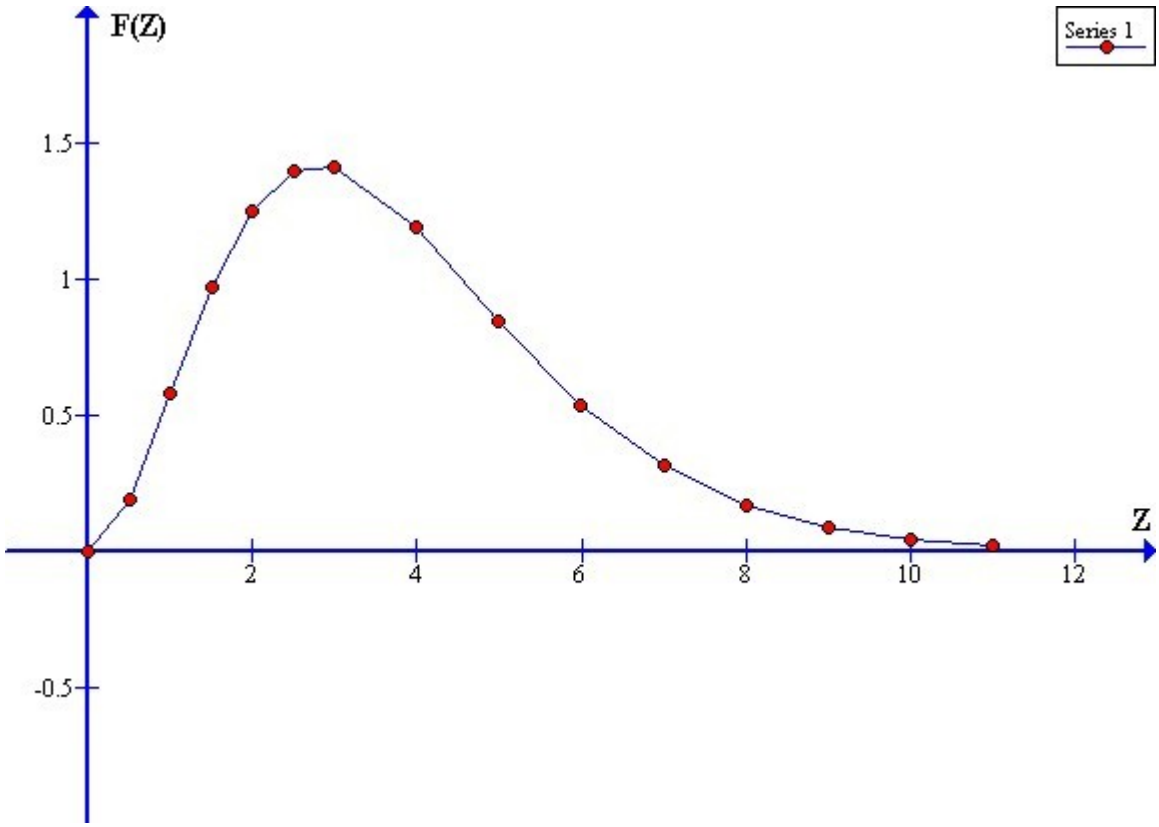
Charles Rhodes

EB-2007-0707

IN THE MATTER OF section 25.30 and 25.31 of the *Electricity Act*, 1998;

AND IN THE MATTER OF an application by the Ontario Power Authority for review and approval of the Integrated Power System Plan and proposed procurement processes.

XYLENE HEREBY PROVIDES SOME EXHIBITS THAT IT ANTICIPATES USING IN ITS PLANNED CROSS EXAMINATIONS OF OPA WITNESSES AS WELL AS WITNESSES FOR GEC-PEMBINA-OSEA, CLEAN AFFORDABLE ENERGY ALLIANCE AND UNION GAS LIMITED / ENBRIDGE GAS DISTRIBUTION INC.



A theoretical black body radiation emission spectrum. This curve shows the relative radiation emission as a function of frequency at any particular black body temperature. Note that the horizontal axis is proportional to frequency or wavenumber.

Note that the vertical axis has units of emitted power / unit area – unit frequency

The area under the curve is proportional to the total radiated power.

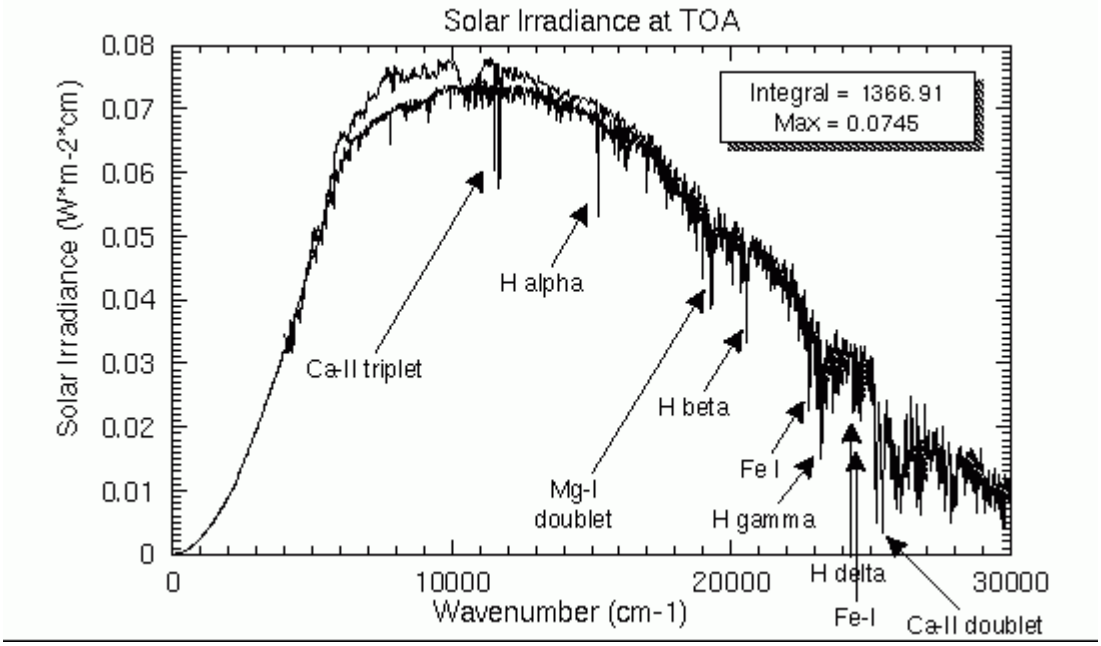
As the temperature increases the frequency corresponding to the peak in the radiation curve increases and the total radiated power increases.

Z = HF / KT

H = Planck's constant
F = frequency
K = Boltzmann constant
T = absolute temperature (K)

The radiation peak is at Z = 2.82

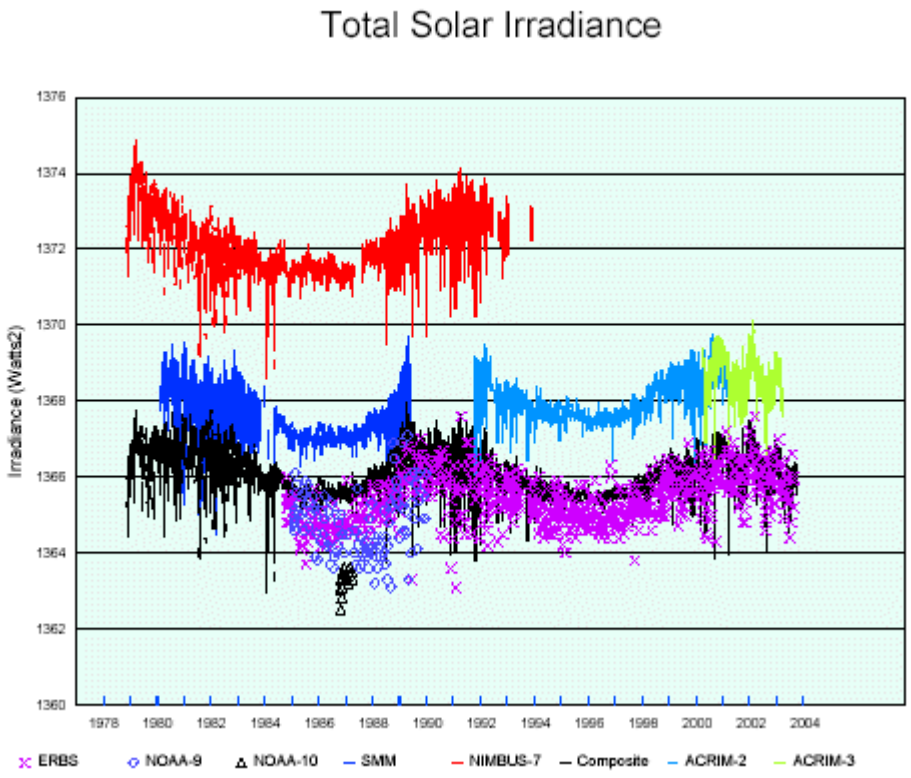
For an ideal black body the total radiated power is proportional to T^4



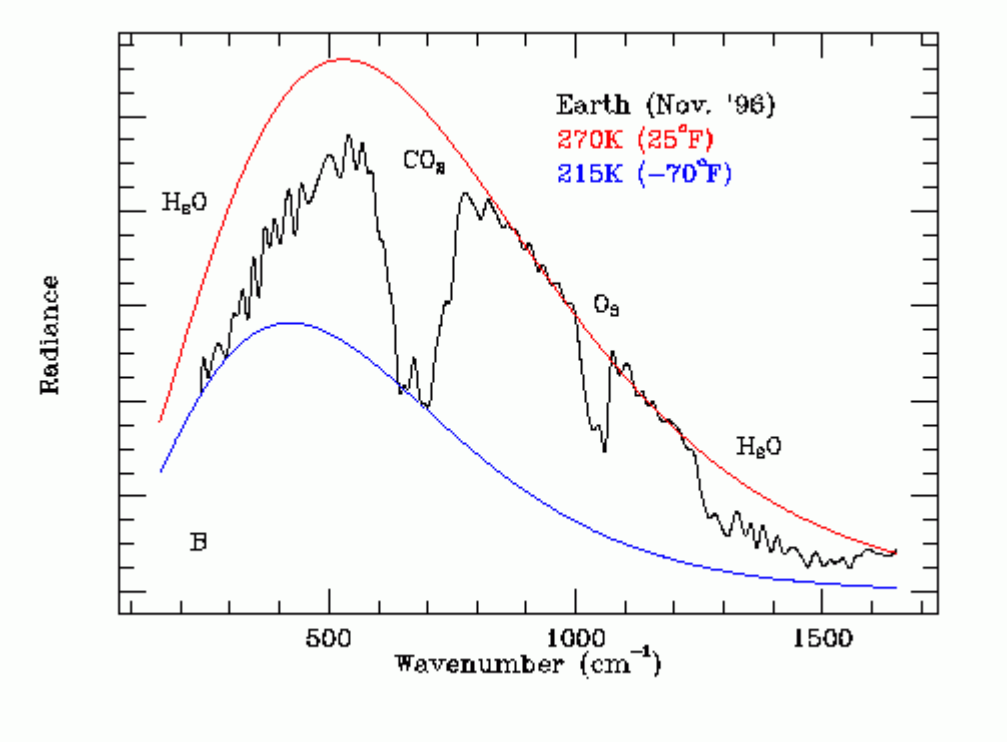
The experimentally measured spectrum of solar irradiance measured by various NASA satellites. Upper line is NIMBUS-7 data. Lower line is post 1992 data and is considered correct. Note the absorption bands due to various components of the solar atmosphere. Note that the area under this curve is the total solar irradiance.

Note that the horizontal axis units are Wavenumber = Frequency / (Speed of light).

The visible range is .4 um to .7 um (14,285 cm^-1 to 25,000 cm^-1)



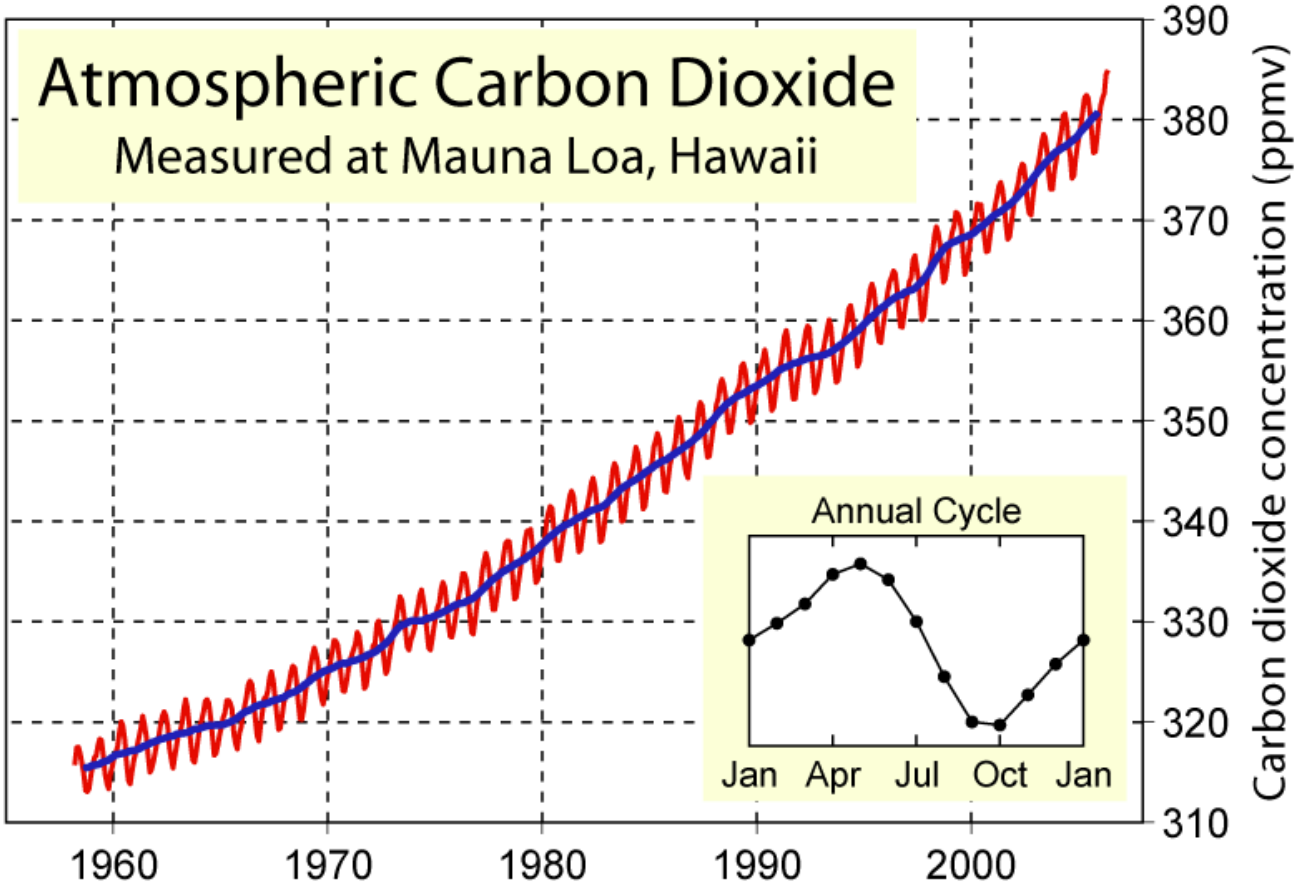
The total solar irradiance in watts / m^2 as measured by various NASA satellites over a 25 year period. Note that the Nimbus 7 data contains a systematic error. Note the slight variation in solar irradiance with the eleven year sunspot cycle. Note that except for the sunspot cycle there is no change in solar irradiance over the measurement period.



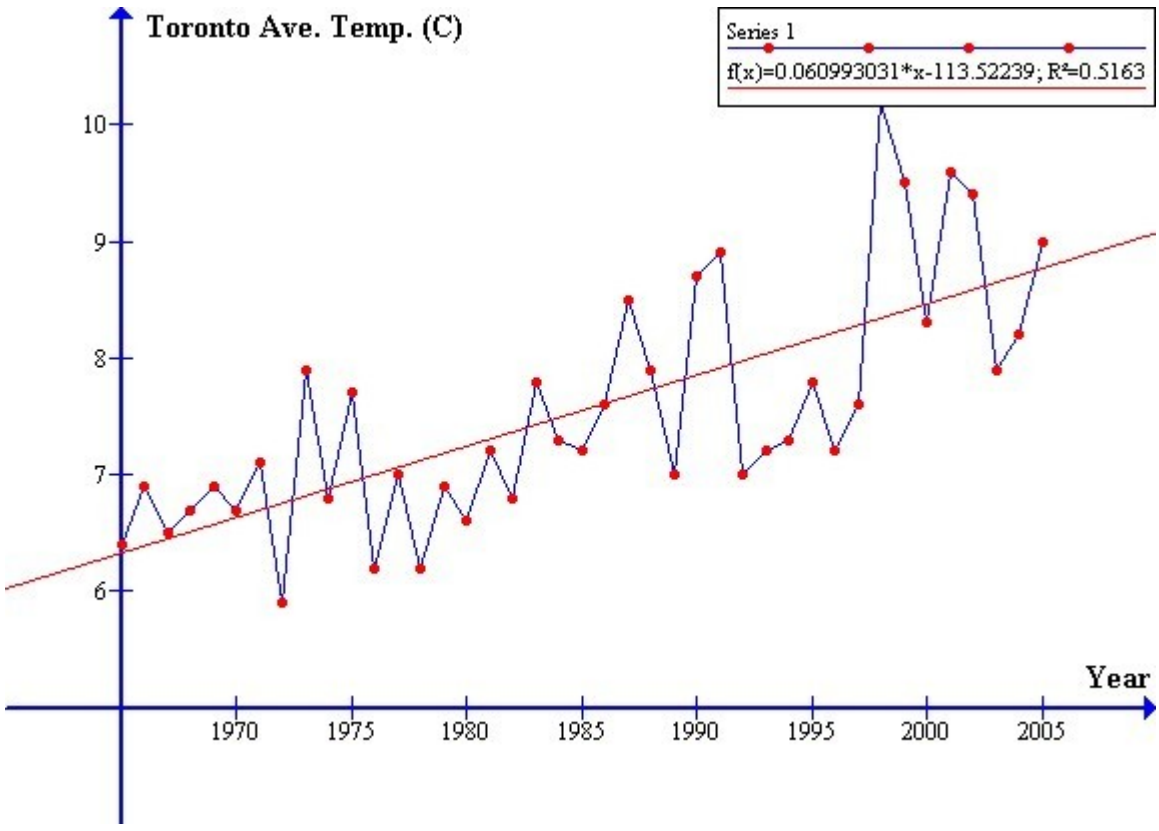
The black line shows a plot of the thermal emission spectrum of the planet Earth as measured in November 1996 by the Thermal Emission Spectrometer carried by the NASA Mars Global Surveyor spacecraft. The red line shows a theoretical black body emission curve for 270 K (-3 C).
The blue line shows a theoretical black body emission curve for 215 K (-58 C).

Note the substantial effect of CO2 in spite of its concentration being only 36 / 100,000 of the Earth's atmosphere. Note that the Earth's atmosphere is opaque near the middle of the CO2 absorption band.

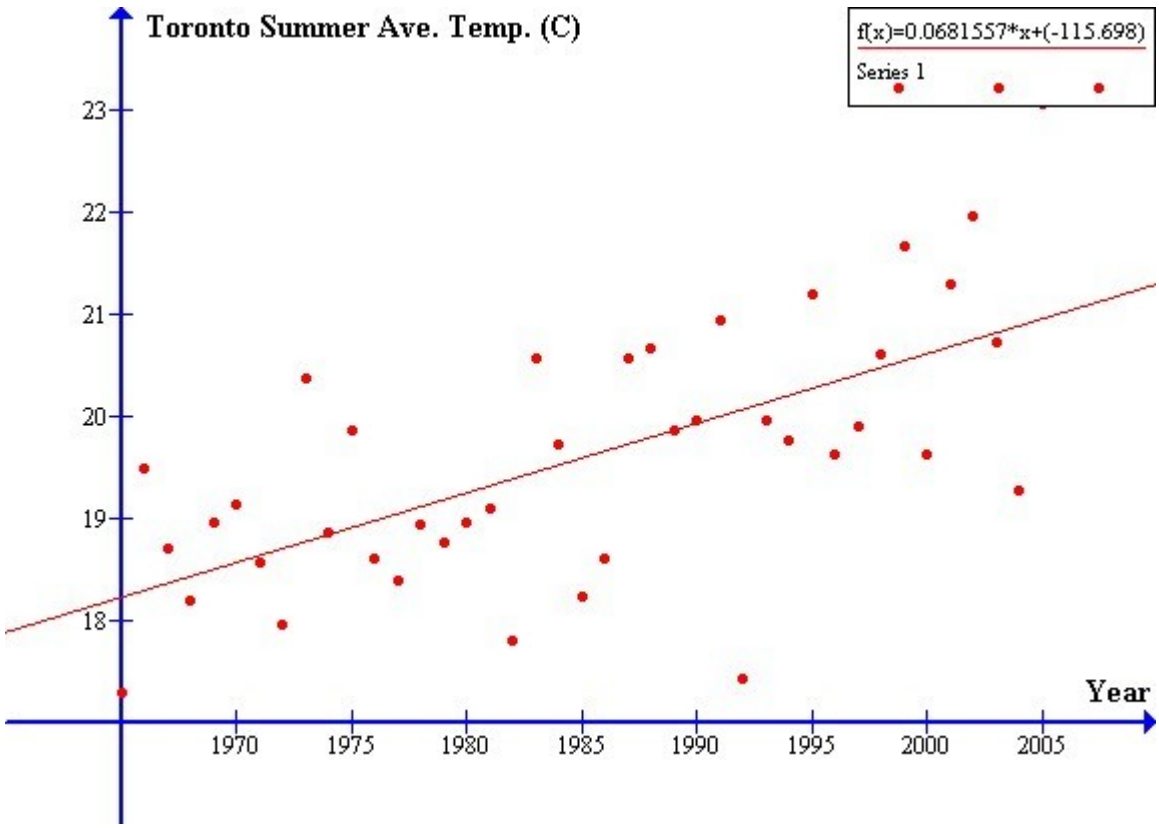
Note that as the ocean temperature increases the equilibrium vapor pressure of sea water increases and the infrared absorption by water vapor increases, magnifying the net thermal absorption caused by the increased atmospheric CO2 concentration.



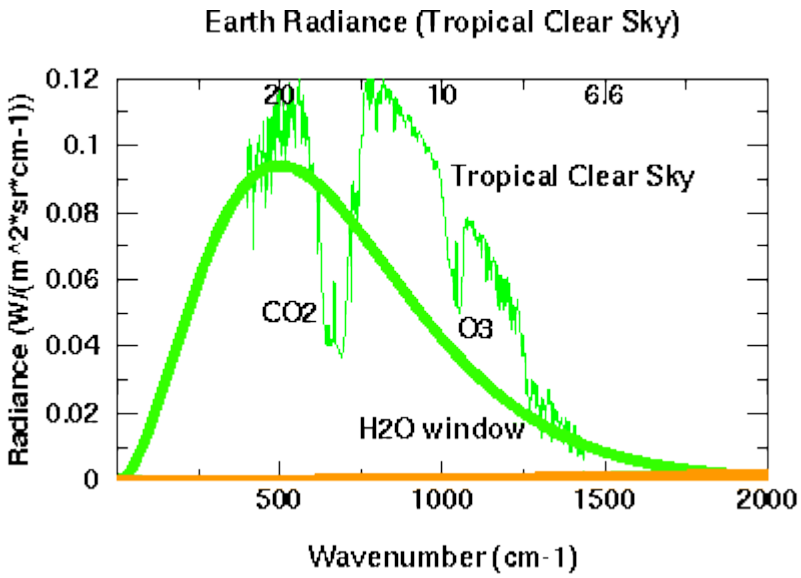
Plot of atmospheric carbon dioxide concentration versus month as measured at Mauna Loa, Hawaii by various US government agencies



Plot of annual average temperature versus year at the Toronto International Airport. Data courtesy of Environment Canada.



Plot of average summer (June, July, August) temperature versus year at the Toronto International Airport. Data courtesy of Environment Canada.



Thermal emission spectrum of a 100 km diameter spot of tropical ocean measured on a clear day in 1969-1970 by the NASA Nimbus-3 or Nimbus-4 satellite.

The solid green line is a theoretical 255 K black body emission curve.

Note that the CO2 absorption band is narrower near its top than for the Mars Global Surveyor data from 1996. Between 1970 and 1996 CO2 side bands merged with the main absorption band.