

## Accounting principle verify reconstruction the Past Climate Records

Our simple model could be valid, which can reconstruct **the past global temperature records with that of CO2 concentration change from 1860~2010**. <2014/5/28, 6/3>

The physical foundation (algorithm) had already be showed in below.

<http://www.777true.net/Definition-on-Radiative-Forcing.pdf>

.....

### [ 3 ] : Solving the Temperature Equation:

(1) Now we will derive temperature trend by each carbon parameter policy. The non-linear equation is solved **by approximation** by step by step integration in time interval.

\*  $C_G$  = **Global ocean active heat capacity**;  $C_{G\#} = C_G / YS = (55 \text{ W/m}^2\text{K}), = 64 \text{ W/m}^2\text{K}$ .  
 $= 3.61 \times 10^{14} \text{ m}^2 \times (600 \text{ m}) \times 700 \text{ m} \times 1020 \text{ kg/m}^3 \times 4.02 \times 10^3 \text{ J/kg} = (8.89 \times 10^{23} \text{ J/K}), 1.04 \times 10^{24} \text{ J/K}..$

\* Normalization factor  $YS \equiv \text{years time in seconds} \times \text{earth surface area}$   
 $= 3600 \times 24 \times 365 \times \pi (6.38 \times 10^6 \text{ m})^2 = 1.61 \times 10^{22} \text{ m}^2\text{s}$ .

\*  $@(0) = 0.6120 = \text{GHG permeability at 1850}$ .

\*  $\sigma = 5.67 \times 10^{-8} \text{ W/m}^2\text{K}^4$ , Stefan Boltzmann constant.

**Heat input from sun — Heat output to space = Heat Debt rising earth temperature**  
**= Heat capacity of earth  $\times$  Temperature rise/year  $\langle = dT(t)/dt \rangle$**

$C_G(dT(t)/dt) \equiv \Delta F_e(t) \langle \text{heat debt as effective radiative forcing} \rangle$

$= \Delta F_G(t) \langle T(t)/T(0) \rangle^4 - @(0) \sigma \langle T(t)^4 - T(0)^4 \rangle$ .

**= GHG radiative forcing — negative temperature forcing.**

$dT(t)/dt = C_G^{-1} \Delta F_G(t) [T(t)/T(0)]^4 - C_G^{-1} @(0) \sigma \langle T(t)^4 - T(0)^4 \rangle$ .

$\Delta F_G(t) = 12.95 \times \ln(C(t)/C_0)$ . **the Carbon radiative forcing.**

$C_0 = 280 \text{ ppm}, C(t=2014) = 400 \text{ ppm}$ ,

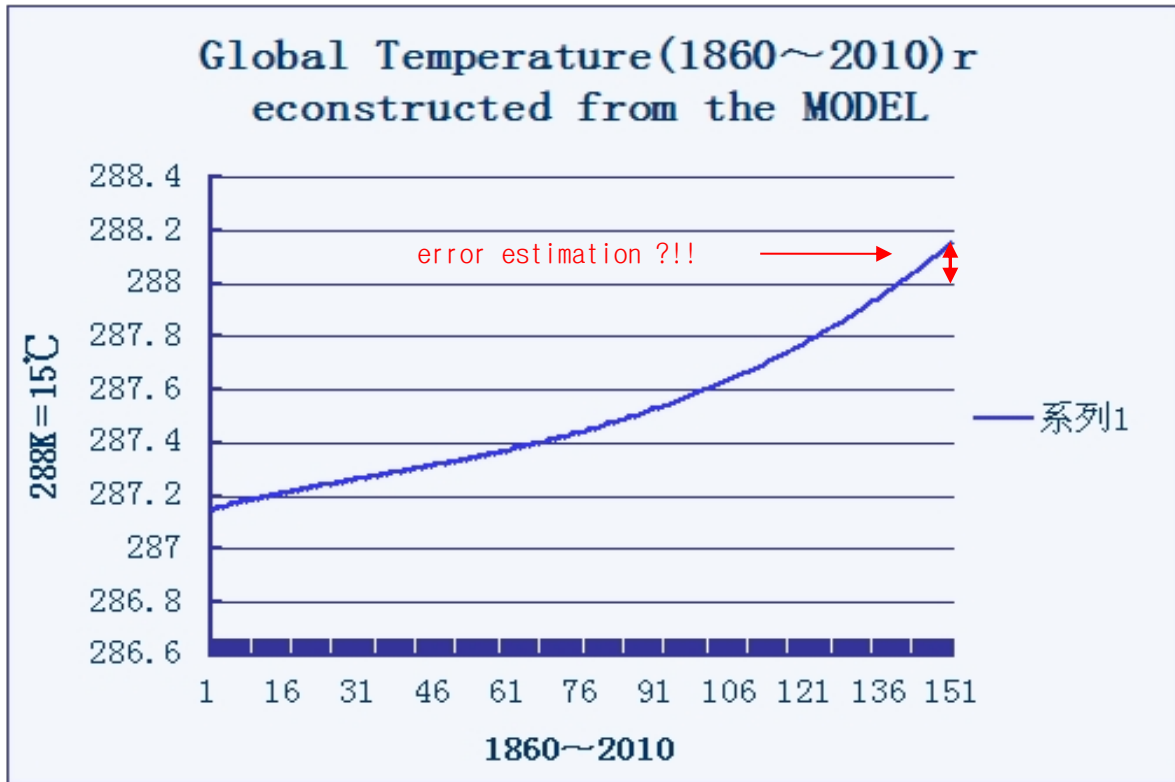
$T(t+dt) = T(t) + dt \langle dT(t)/dt \rangle$ .

$T(N+1) = T(N) + C_G^{-1} \Delta F_G(N) (T(N)/T_0)^4 - C_G^{-1} @(0) \sigma \langle T(t)^4 - T_0^4 \rangle$ . ( $dt = 1, N = 1, 2, 3, \dots$ )

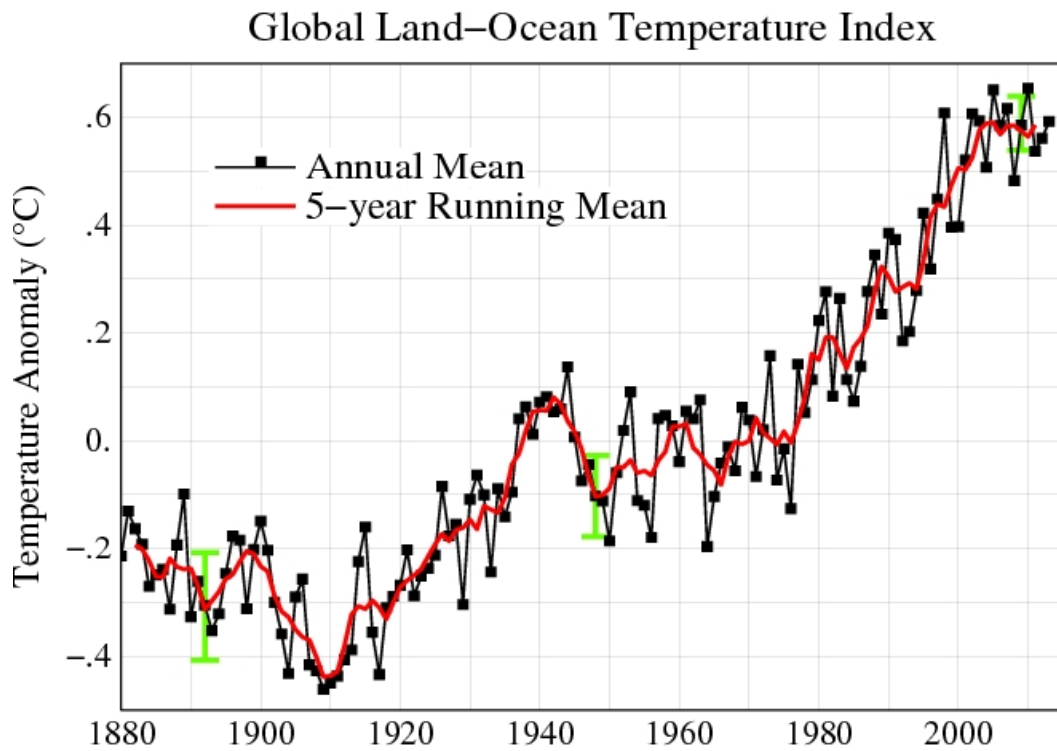
The solution can be calculated by **EXCEL** or **Spread Sheet** (King Soft inc).

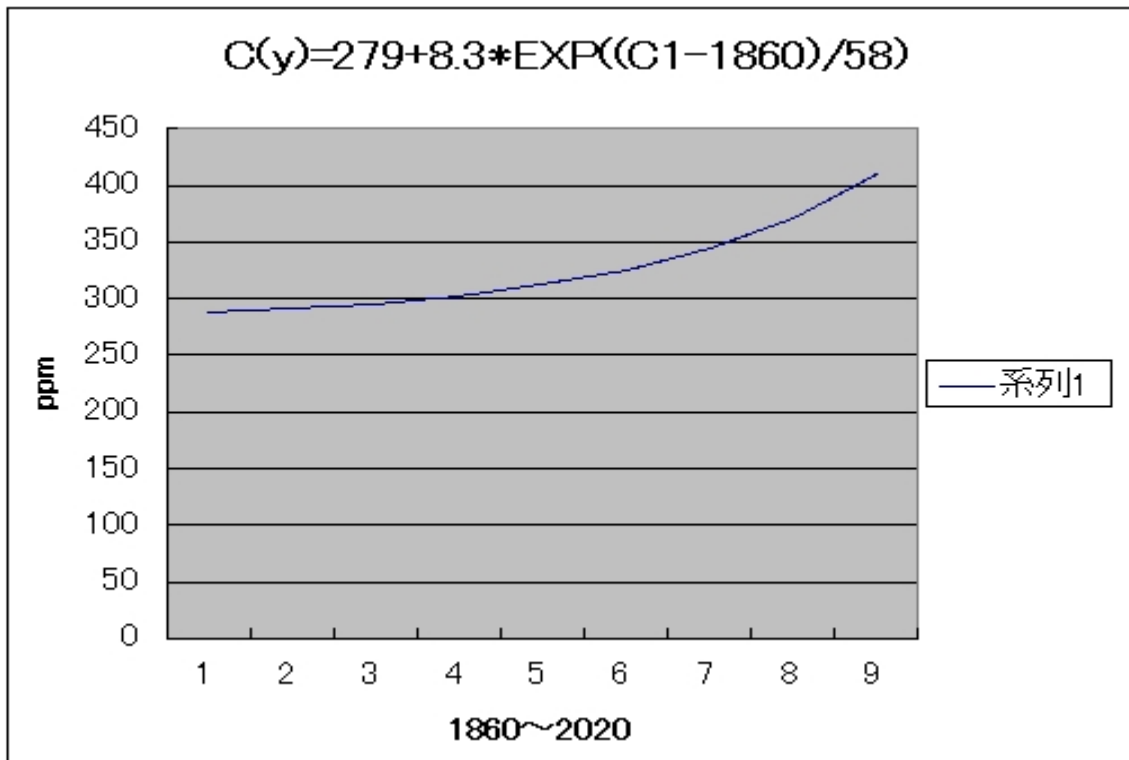
$B2 = B1 + (12.953/64) * ((B1/287.15)^4) * \text{LN}((283 + 3.63 * \text{EXP}(A1/45))/280) - (0.612/64) * 5.67 * 10^{-8} * (B1^4 - 287.15^4)$ .....sample coding for the calculation.

$B1 = 287.15 \text{ K}, \dots, A1 = 1, 2, 3, 4, \dots, 150$ .

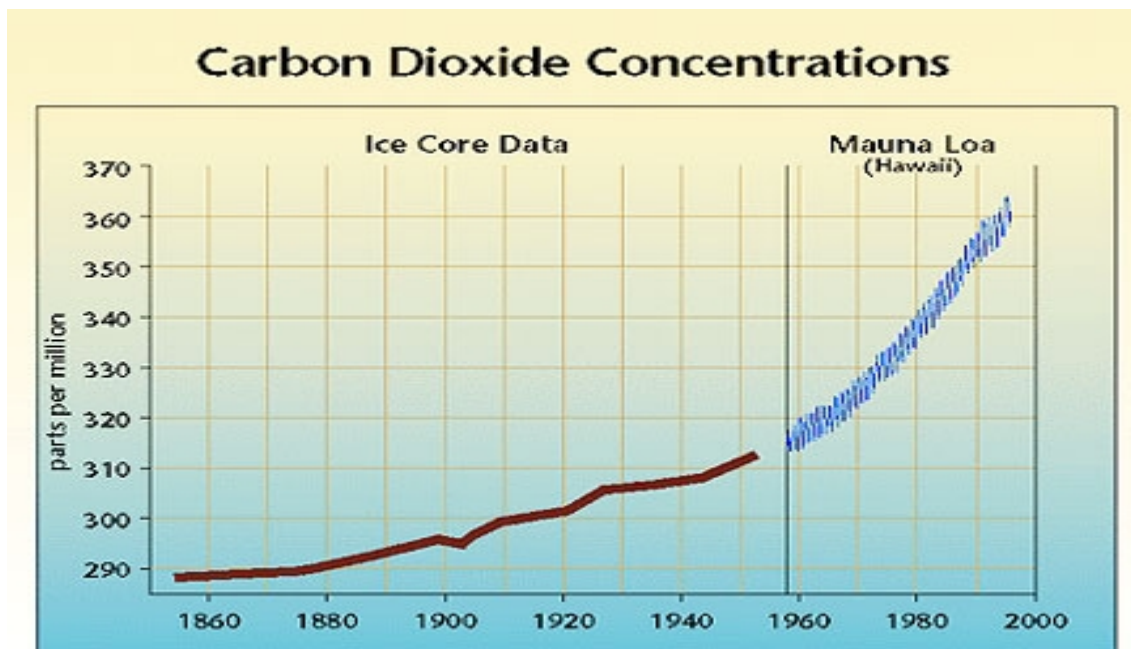


[http://data.giss.nasa.gov/gistemp/graphs\\_v3/](http://data.giss.nasa.gov/gistemp/graphs_v3/)





[https://www.esr.org/outreach/climate\\_change/mans\\_impact/man1.html](https://www.esr.org/outreach/climate_change/mans_impact/man1.html)



**Discussion:**

Our method of very primitive and simple, but exact **accounting principle** could be verified to be almost reliable. The temperature rise of **0.85°C in 1850~2010** is almost reconstructed in above model. Consequently global temperature could be described by **zero dimensional model** with **principal ruling of carbon concentration change so long as nothing fatal massive methane emission...**

\* **A possible defect of zero dimensional model** may be **earth heat capacity**, which is represented by ocean heat capacity by depth about 700m. This should be a **seasonal parameter** (**heat pushing in summer and pulling in winter**), while **long years capacity** should be **deeper due to slow heat invasion toward sea floor by perpetual tide stirring**. Which should be considered as lowering temperature. Therefore this model tend to derive rather higher temperature trend.

A decisive conclusion is once again, **CO2 is certainly dominant ruler of climate**. Coming wild climate world, **climate stirring** (increasing violent flow in atmosphere and ocean) would act to weaken temperature rise speed by heat dissipation to wide and deep. However **the process itself** is nothing but climate violence. **Climate-Dynamics** itself has been endeavoring to weaken temperature rise speed.

**Appendix\_1 :Carbon concentration data and the quasi function values**

A	B	C	D
1860	288		287.3
1880	291		290.7174959
1900	295		295.5421338
1920	301		302.3532993
1940	308		311.9689385
1960	315		325.5437833
1980	337		344.7080229
2000	370		371.763071
2020	410		409.9579402

**-CO2 concentration change-**  
**B** is data mapped from original  
**D** is quasi value of function  
 $C=279+8.3*EXP(A1/58)$   
 \*A1=1,2,3, . . . . , 150, . . . . , 160.

Note the function = " C " was derived by math experiments by few trials. Which estimates rather higher concentrations.

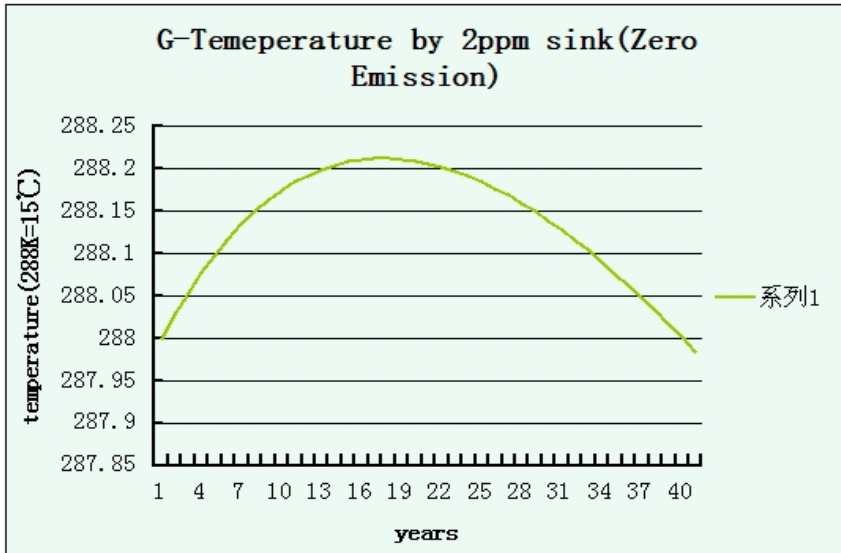
**Appendix\_2 :Other important predictions by the model.**

Following only (2) & (3) could be possible salvation scenarios.

**(2)Spread sheet function<Excel for function table calculation >:**

$$B2=B1+(12.953/64)*((B1/287.15)^4)*\ln((400-2*A1)/280)-(0.612/64)*5.67*10^{-8}*(B1^4-287.15^4).$$

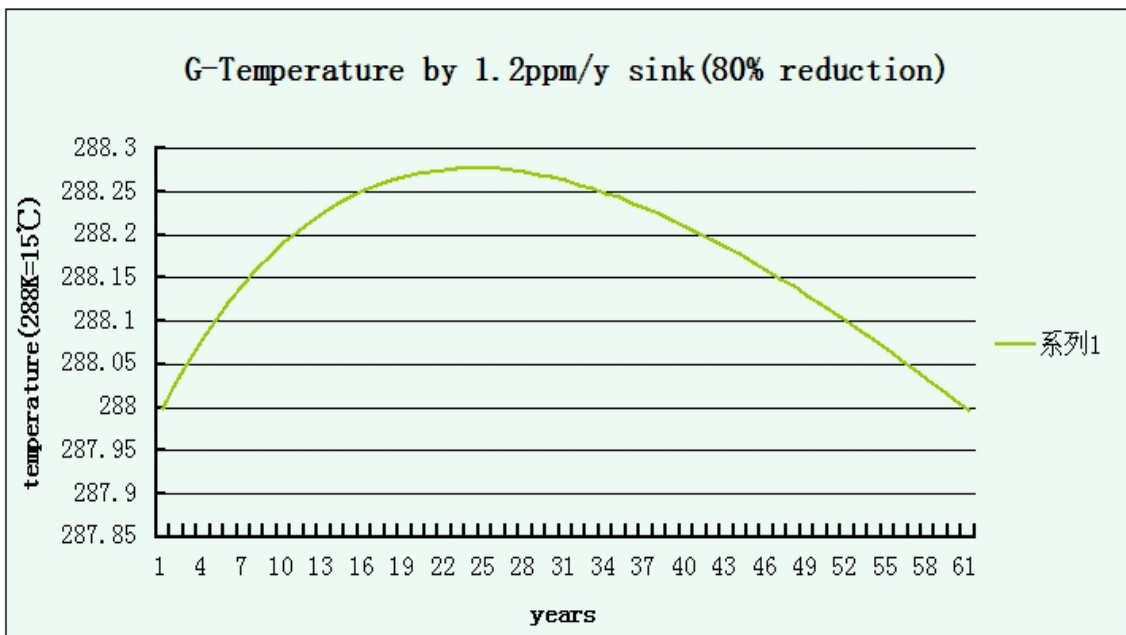
<B1=288,....., A1=1,2,3,.....>



**(3)Spread sheet function:**

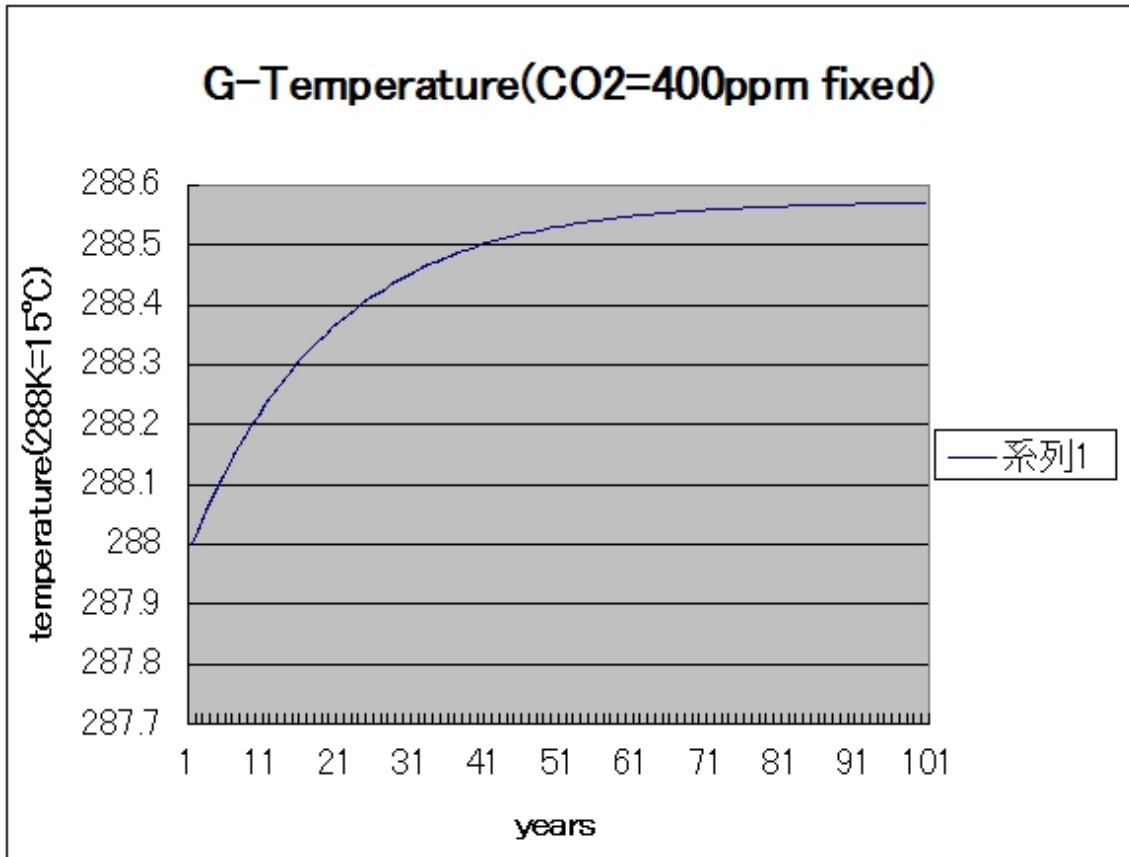
$$=B1+(12.953/64)*((B1/287.15)^4)*\ln((400-1.2*A1)/280)-(0.612/64)*5.67*10^{-8}*(B1^4-287.15^4).$$

5^4)



(4) **Spread sheet function**<addendum 6/3>:

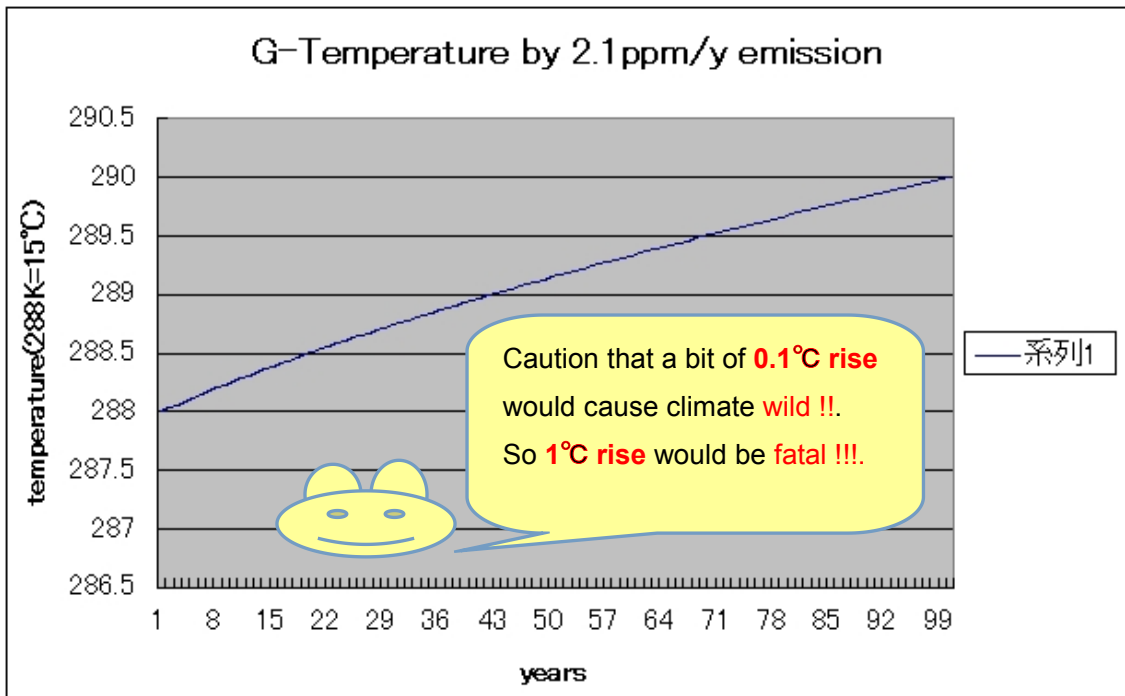
$$=B1+(12.953/64)*((B1/287.15)^4)*LN((400)/280)-(0.612/64)*5.67*10^{-8}*(B1^4-287.15^4)$$



For accomplishing fixed concentration, it takes **about 50% CO2 reduction**. And also even by such huge effort, however, we could not be saved by the same reason as following (5).

(5) **Spread sheet function:**

$$=B1+(12.953/64)*((B1/287.15)^4)*\ln((400+2.1*A1)/280)-(0.612/64)*5.67*10^{-8}*(B1^4-287.15^4)$$



(5) **Caution** above naive model does assume **constant reduction or emission rate** which could not be assured in coming uncertain future. The possible reason may be as follows.

(a) a(t): clouds **albedo change** by temperature rise,

\* massive humidity would increase clouds which prevent both insolation and Cooling R.

(b) @ (t): **natural emission increasing** from **organics** by by temperature rise,

\* **Arctic Methane eruption risk** is highly possible, if ice shield would have vanished.

(c) @ (t): **natural CO2 sink ability decreasing** in **ocean & lands** by temperature rise.

The possible emergent defence method at now is only two.

**I :emergent implementation on Arctic Cooling Engineering.**

**II :emergent implementation on more than 80% CO2 reduction.**

**III : some rightists group might take final strategy operation EndGame.**

It should be told highly possible to **breakout global nuclear war** with nuclear winter.

**However, such world would be no use by massive radiation contamination.**

**Then how to survive ?? . Or final mass suicide ?? .**