GLOBAL DECLARATION

WAR on CARBON

with Geo-Engineering

(part_C:Methane Clathrate the Mass Destructive Thermal Bomb in Arctic)
(the highest priority problem at now world).

You have been entirely decieved,
The fact is teribbly upside down !!
NOTIFICATION:The fatal error for Arctic Heat Cap
was fixed to recover again.

2011/10/24,11/11,12/4(**version2**)

PART-C : **Methane Clathrate the Mass Destructive Thermal Bomb in Arctic**
(the highest priority problem at now).

http://www.realclimate.org/

People consider so called global warming is gradual process in coming decades and the crisis would be in future.However the fact is not so optimistic.Now many scientists fear for huge amount of unstable MC＝methane clathrate(ice,hydrade)melting in Arctic sea flor by rising sea temeperature 2~3℃.The estimated amount of Arctic MC is 400～1000G ton in carbon standard, of which 10 GtC eruption is catastrophic.MC is more 25 times potent as GHG effect than CO2.Once they emitted to atmosphere, temperature rising accelate that of sea to enhance more emission of methane.It becomes FEEDBACK process to spike out temperature rising<Clathrate Gun Mechanism> .
Abrupt and irreversible Climate Change Crisis is to attack on earth. Paleo-climatology recently recogninzed mass extinction of pieces by methane burps in Permian(251.4my) and Paleocene–Eocene Thermal Maximum(55.8my=million years ago).
The final stage might be fire hell.

KEY WORDs:

(1)Methane and Methane clathrate.

Methane is bubbling in wetland and ditch.Methane clathrate(MC)is a solid ice form of water that contains a large amount of methane within its crystal structure (a clathrate hydrate).MC is 25 times stronger GHG than CO2.Ice and MC is similar in those thermal property.

	methane-clathrate	**ice**
specific heat		2.114KJ/Kg.K
melting heat	440.KJ/Kg.K	334.7KJ/Kg.K

Methan is organic and has been enormously accumulated in wetland and sea flor as 7000MtC.(Mega ton=10^6 ton as C only).

(2)Arctic sea is a pond accumulating organic MC for long years by many flowing rivers.

(3)Radiative forcing by MC eruption of 10GtC is 1.6W/m^2.Then T_G rise could be twice.

Note Arctic reseves MC amount 400GtC～1000GtC,in sea flor, 500CtC in zundra.

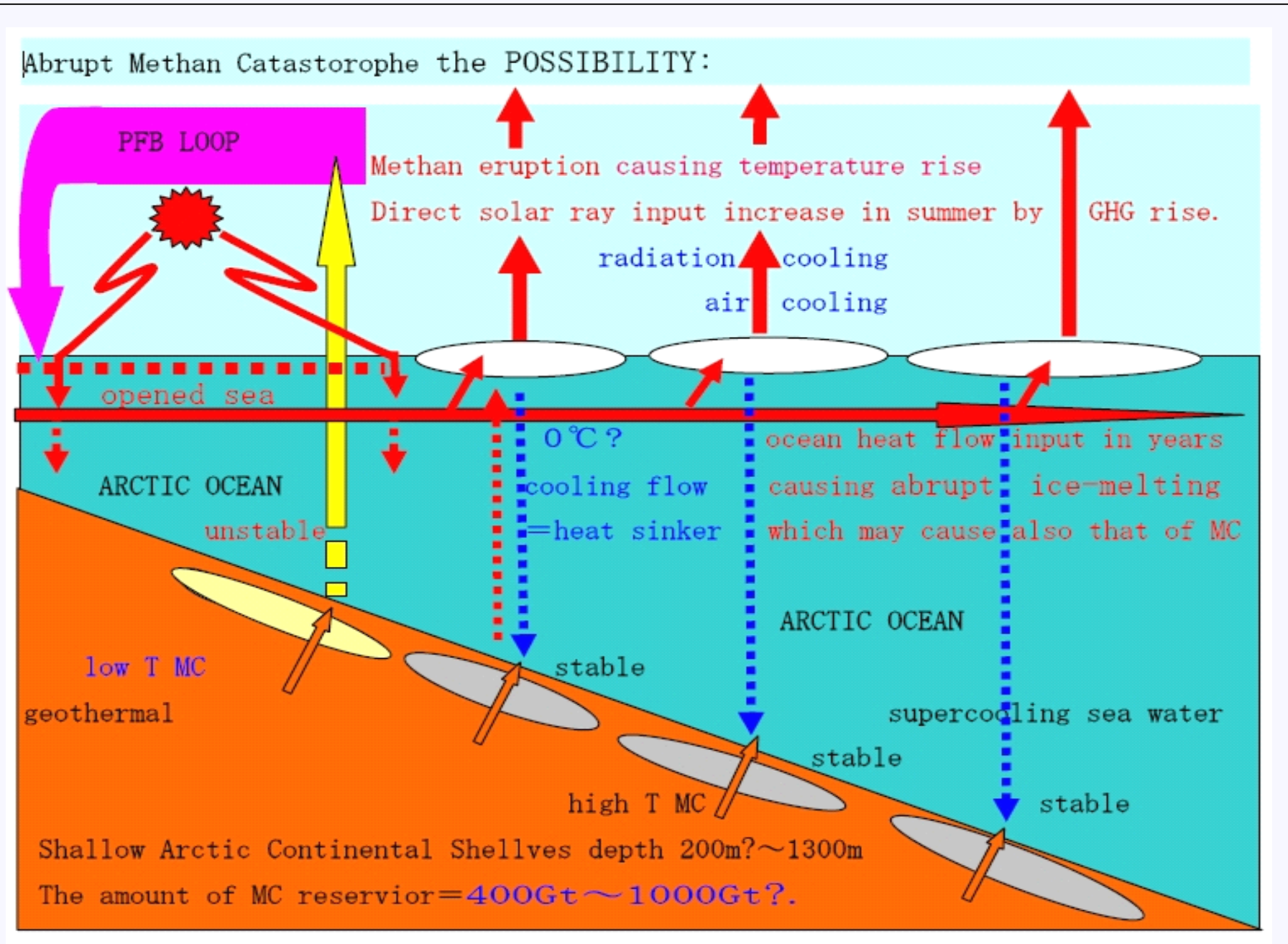
400GtC～1000GtC in Arctic sea flor

Heat hitting into small fragment of 10GtC would become fatal.

MC amount kg/m^2＝MC total wegiht/Arctic area

＝(44/12)x1000x10^12kg/1.4x10^13m^2＝100~260Kg/m^2.

http://www.giss.nasa.gov/research/features/200409_methane/


Abrupt Methan Catastorophe the POSSIBILITY:
PFB LOOP
Methan eruption causing temperature rise
Direct solar ray input increase in summer by
GHG rise.
radiation cooling
air cooling
opened sea
0℃?
ocean heat flow input in years
ARCTIC OCEAN
cooling flow
causing abrupt ice-melting
unstable
=heat sinker
which may cause also that of MC
ARCTIC OCEAN
low T MC
stable
geothermal
supercooling sea water
stable
high T MC
stable
Shallow Arctic Continental Shellves depth 200m?～1300m
The amount of MC reservior=400Gt～1000Gt?.

[C1]: The paleo-climatology evidences of mass extinction facts by Methane Catastrophe.

Recent Paleo-climatology enables observation on detailed paleocene enviroments by fine chemial analysis on soil and air captured ice in that era.As the consequence,following remarkable facts had become evident(clathrate gun mechanism).

(1)Permian mass extinction by Methane Catastrophe(251.4my).
http://en.wikipedia.org/wiki/Permian%E2%80%93Triassic_extinction_event
http://science.nationalgeographic.com/science/prehistoric-world/permian-extinction/
http://www.youtube.com/watch?v=hDbz2dpebhQ

(2)PETM mass extinction by Methane Catastrophe(55.8my=million years ago)..
http://en.wikipedia.org/wiki/Paleocene%E2%80%93Eocene_Thermal_Maximum
http://www.realclimate.org/index.php/archives/2009/08/petm-weirdness/

[C2]：**Possibility of Coming Methane Catastrophe in Decades.**

❶The highest priority emergent propblem<methan clathrate melting crisis>

❷Clathrate Gun Hypothesis the past history and the current situation:

⑴A Japanese Congress asked the National Assembly on dangerous MC(2000).
He poited out necessity of taking into acccout of MC action in IPCC model of climate change predicting system.But they have not done !!
http://www.sangiin.go.jp/japanese/joho1/syuisyo/150/syuh/s150005.htm <Japanese>

⑵Methane:A scietific journey from Obscurity to Climate Super-Stardom by Gavin Schmidt(2004/9):
http://www.giss.nasa.gov/research/features/methane/

*Wei-Chyung Wang(1976),methane in atmosphere is significant greenhouse gas.
*Jerome Chappellaz established chemical precise analysis on trapped air in ice core for paleo-climatology analysis.
*Jerry Dickens(1995)suggested that massive air input of light carbon from MC,
*Jim Kennett(2000)proposed the so-called "clathrate gun hypothesis",

⑶Ticking Time Bomb by John Atcheson(2004/12/15):MC warning No1 website .http://www.commondreams.org/views04/1215-24.htm

⑷By Volker Mrasek,A Storehouse of Greenhouse Gases Is Openining in Siberia.(2008/4/18).
http://www.spiegel.de/international/world/0,1518,547976,00.html

⑸No Ice At The North Pole: Polar Scientists Reveal Dramatic New Evidence of Climate Change by Steve Connor(2008/6/27).
http://www.commondreams.org/archive/2008/06/27/9920/

☞:Arctic temperature rising is 2~3C,while global average is 1C.Hence Arctic sea flor has becomign more dangerous.See below eerie photo.
http://www.realclimate.org/

⑹Clathrates: little known components of the global carbon cycle：
MC reserviour is about 11000Gton much as twice of fossil resorces.By temperature 1^2 ℃ rising would trigger the burps bursting.
http://ethomas.web.wesleyan.edu/ees123/clathrate.htm

⑺Michael.J.Benton,WHEN LIFE NEARY DIED,Thame & Hudson Ltd,London,2003.
Permian mass extinction by MC eruption became spot lighted at a burst. Simultaneously also Antarctic MC became spot lighted at a burst.

⑻http://en.wikipedia.org/wiki/Extinction_event、

⑼http://www.google.co.jp/search?hl=ja&q=mass+extinction%2Cmethan+clathrate+&btnG=%E6%A4%9C%E7%B4%A2&l r

⑽IMPACTS:Investigation of the Magnitudes and Probabilities of Abrupt Climate Transitions has launched recently in USA.
http://www.sciencedaily.com/releases/2008/09/080918192943.htm

⑾http://www.climatesoscanada.org/blog/2011/02/17/the-real-weapons-of-mass-destruction-methane-propaganda-the-architects-of-genocide-part-i/

⑿Why is the IPCC so wrong regarding their methane projections?
http://uk.answers.yahoo.com/question/index?qid=20091221092156AAluMGh:

⒀ONLY ZERO CARBON|Planetary Emergency Response|Climate Science for Survibal.
http://timetobebold.wordpress.com/tag/ipcc/

⒁Runaway Global Warming—A Climate Catastrophe in the Making
http://www.zero-carbon-or-climate-catastrophe.org/runaway-heating.html

⒂IPCC Reasons for Concern
http://www.climate-change-emergency-medical-response.org/ipcc-reasons-for-concern.html

⒃Climate change likely to be more devastating than experts predicted
http://www.sciencecentric.com/news/09021506-climate-change-likely-be-more-devastating-than-experts-predicted.html

How to understand the emergency of Arctic Methane Catastrophe Possibility ?!.

Global trend of unconcern for Climate Crisis would make nothing save of us.

It is certain that unless drastic counte-rmeasure,we would be extincted in decades.

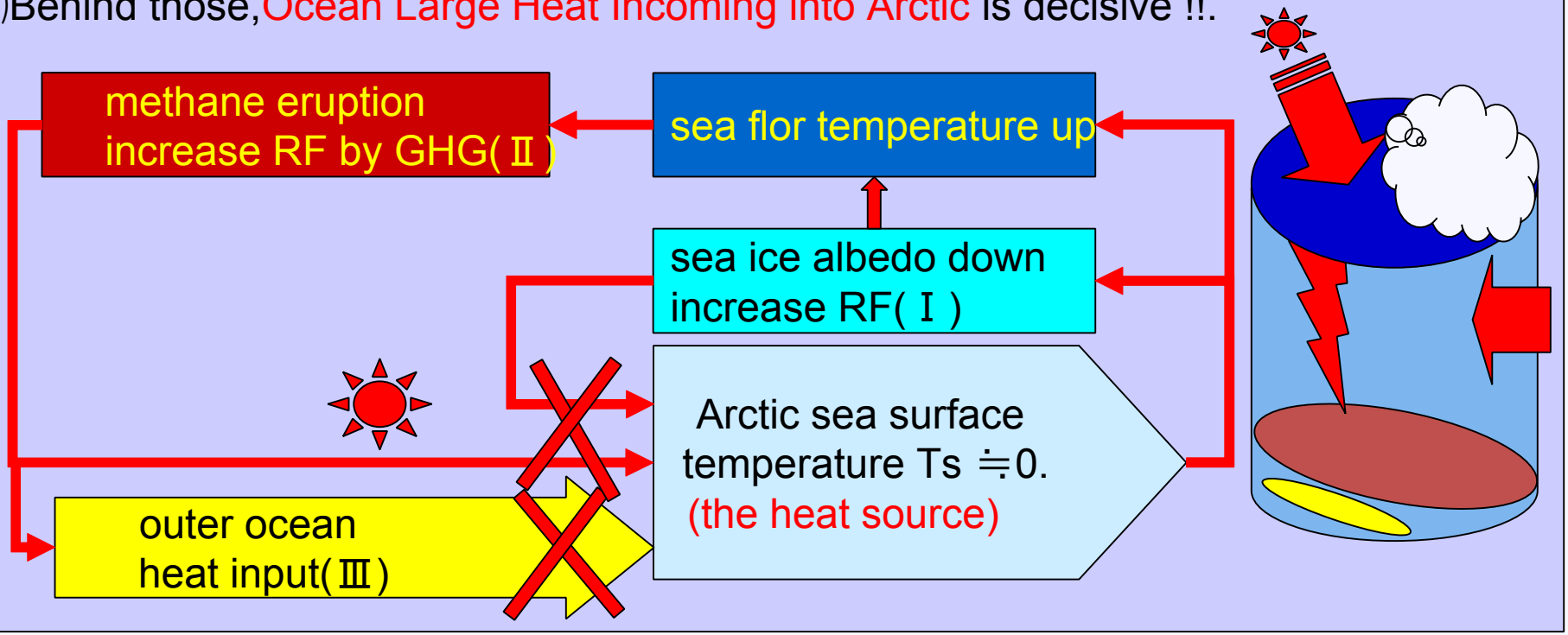
(1)In Arctic,rather stable 8MtC/year MC eruption has already begun,the stability is due to ice cover of wide area,which intercept sun heat invasion with sea water turbulence

(2)The kernel problem is being of FEEDBACK process,which must be cracked down. Frankly to tell,ice decreasing feedback has already begun,

(3)Rapid Sea Ice Albedo decreasing and insolation increasing is **Fatal Feedback**.

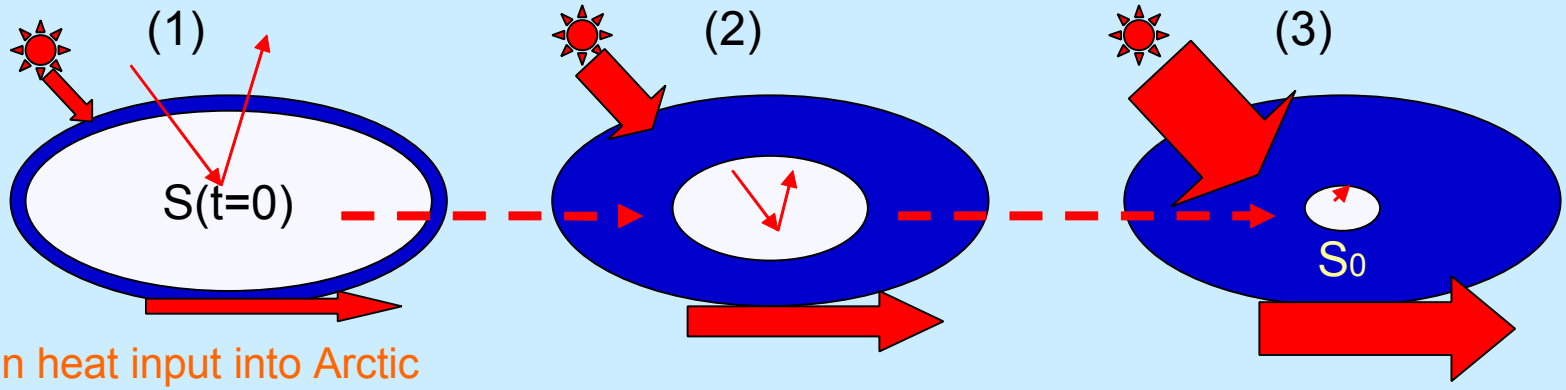
(4)Another is Methane Eruption Feedback causing stronger radiative forcing, and this could be principal and fatal, unless drastic counter measure.

(5)Behind those,Ocean Large Heat Incoming into Arctic is decisive !!.



Ⅰ：Rapid Sea Ice Lid
Diminishing with
the Rapid Heat Input Rise.

Ⅰ:Rapid Sea Ice Lid Diminishing with the Heat Input Rapid Rise.

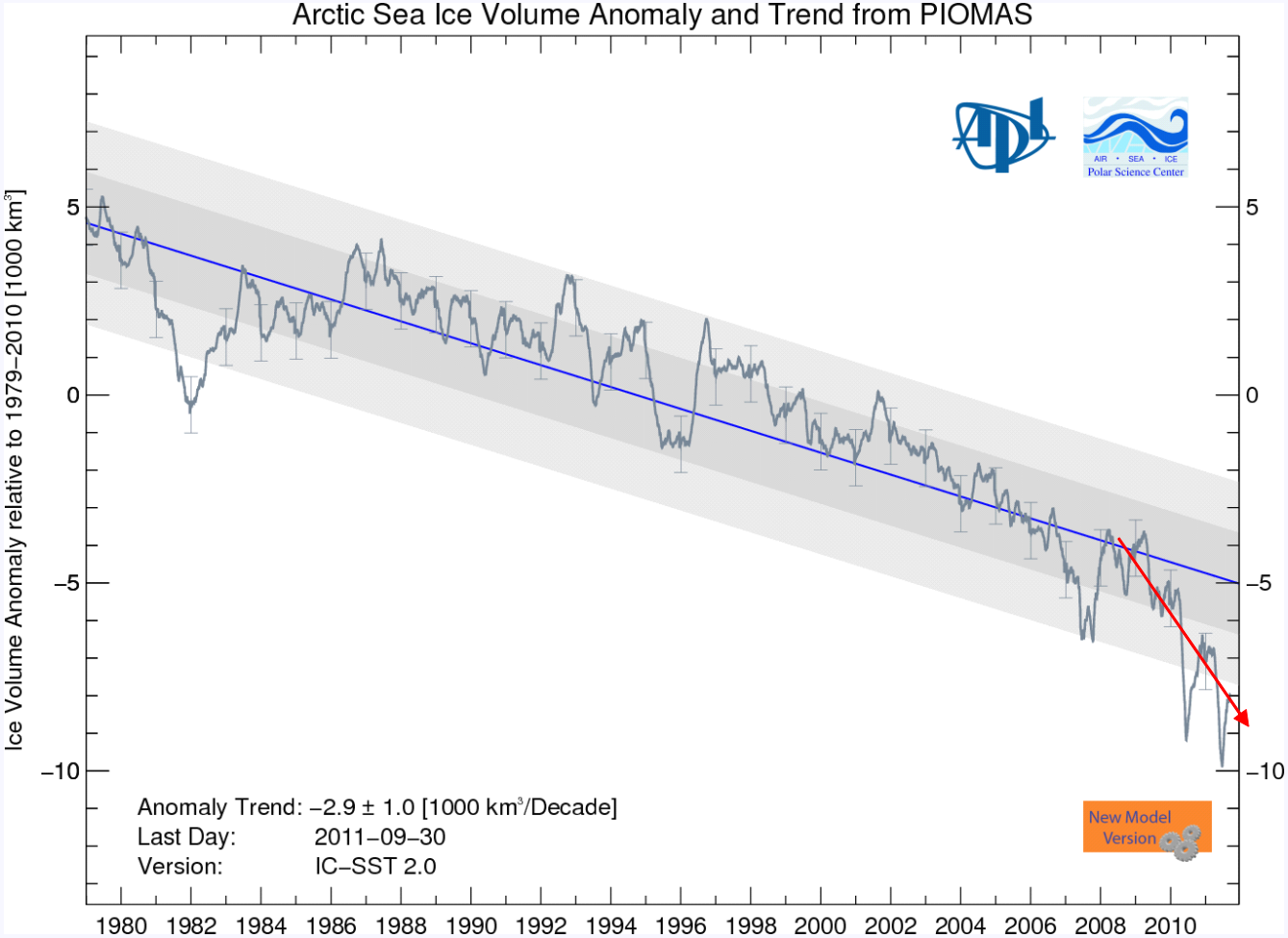


ocean heat input into Arctic

(1)At first ice extent S(t=0) was large enough for the stability,
then the extent could sufficiently reflect insolation not to melt ice cover.
(2) As time goes on,increased ocean heat flow decreased ice extent which turn to increase insolation input into **black sea water** to melt ice cover,
(3)ice cover diminising increasing

black sea surface increasing with solar ray input increasing into sea water
(4)rapid ice cover decreasing
by the feedback effect at last stage.
http://psc.apl.washington.edu/wordpress/research/projects/arctic-sea-ice-volume-anomaly/

P_m**(2007～2011)≒3.8x10^20J/y.**
<annual ice melting heat>



Arctic Sea Data:

*area=9.5x10^12m^2,
*mean depth=1200m
*Arctic sea heat capacity
＝**3.3x10^22J/K**≡C_A.
*Pf(albedo zero heat(p17))
≒**1.3.x10^22J/y.**

*Note that C_A and P_z are comparable, which might determine our fate ?!!!.

http://psc.apl.washington.edu/wordpress/research/projects/arctic-sea-ice-volume-anomaly/

ICE volme decreasing rate＝～melting heat input=Pm

P_m(1978～2006)＝2.6x10^11kgx334.7kJ/kg＝**8.9x10^19J/y**

P_m(2007～2011)≒8.9x10^19J/yx(5/4)/(2.9/10)＝4.3x8.9x10^19J/y≒**3.8x10^20J/y.**

Note that the recent(2007~2011) trend has become about
" 4 times" stronger than that of (1978~2006).This may be due to **sea ice albedo feedback**.

1:The Cause of Rapid Ice Melt by Albedo Feedback（Heat Exponential Growth).

Ice lid melt amount(volume)/year(＝dS(t)/dt) is proportional to heat input into ice/year,
which is also proportional to solar input to opened mouse sea area (also a volume heat reservour)
＝ (S(t)－S_0).Hence we derive,

＊(dS(t)/dt)＝k(S(t)－S_0)≡(S(t)－S_0)/ τ . <τ ≡1/k>.

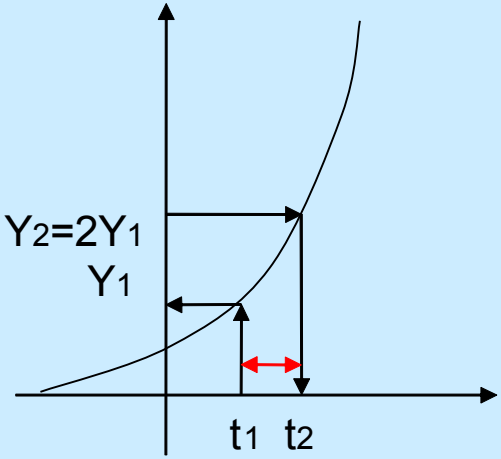
→ dS/dt－kS＝-kS_0.→ d(Sexp(-kt)]/dt＝-kS_0exp(-kt).
S(t)＝-S_0exp(kt)k ∫ (0,t)du<dexp(-ku)/du>＋Cexp(kt)＝S_0＋(C-S_0)exp(kt).
→ S(t=0)＝S0＋(C-S0).→ C≡S0－ δ . → δ is something small constant.

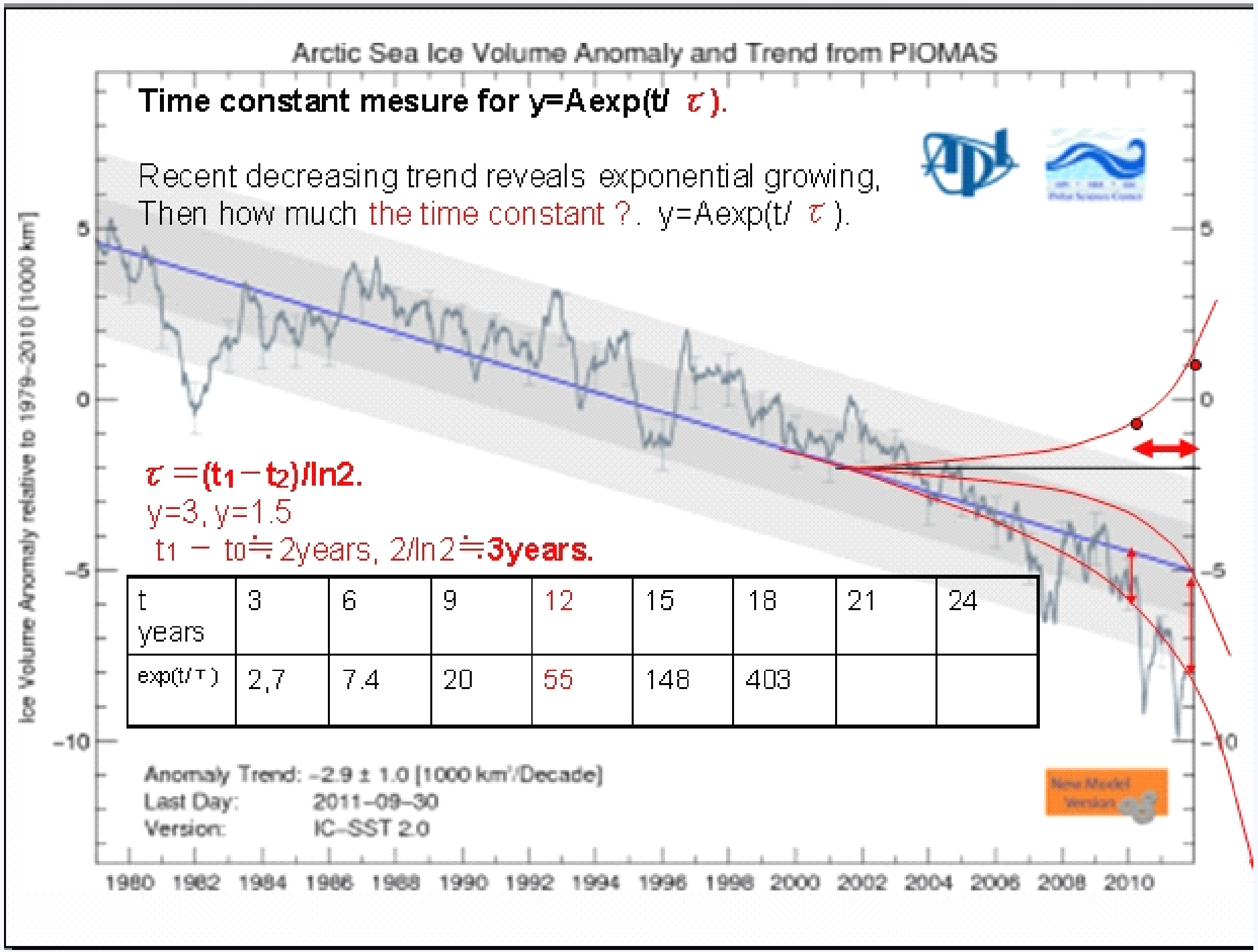
＊S(t)＝S_0－ δ exp(kt)≡S_0－S(t_m)exp(<t-t_m>/ τ)。<S(t_m)≡ δ exp(kt_m)>

verification:dS/dt＝－ δ 'exp(kt)－k δ exp(kt)＝－k δ exp(kt)＝k(S(t)－S0).

2:{S(t_m), τ =time constant}are observable value by

Y=A exp(t/ τ).→{Y_1=A exp(t_1/ τ);Y_2=A exp(t_2/ τ)
2exp(t_1/ τ)＝exp(t_2/ τ).→ τ ＝(t_2－t_1)/ln2.




Arctic Sea Ice Volume Anomaly and Trend from PIOMAS
Time constant mesure for y=Aexp(t/ τ).
Recent decreasing trend reveals exponential growing,
Then how much the time constant ?. y=Aexp(t/ τ).
τ =(t1−t2)/ln2.
y=3, y=1.5
t1 − t0≒2years, 2/ln2≒3years.
t years | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24
exp(t/τ) | 2,7 | 7.4 | 20 | 55 | 148 | 403 | |
Anomaly Trend: −2.9 ± 1.0 [1000 km²/Decade]
Last Day: 2011-09-30
Version: IC-SST 2.0
New Model Version
Ice Volume Anomaly relative to 1979–2010 [1000 km³]
5
0
−5
−10
1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010

The ice melt amount years function Y(t) may be $Y(t)=A\exp(t/\tau)+Bt+C$.

Then $dY(t)/dt$ = ice volume decrease/year = **melting heat input/y** (albedo feed back).

$*P(t)=(A/\tau)\exp(t/\tau)+B\fallingdotseq(A/\tau)\exp(t/\tau)$. <<B(ocean heat) is smaller as time goes on>>

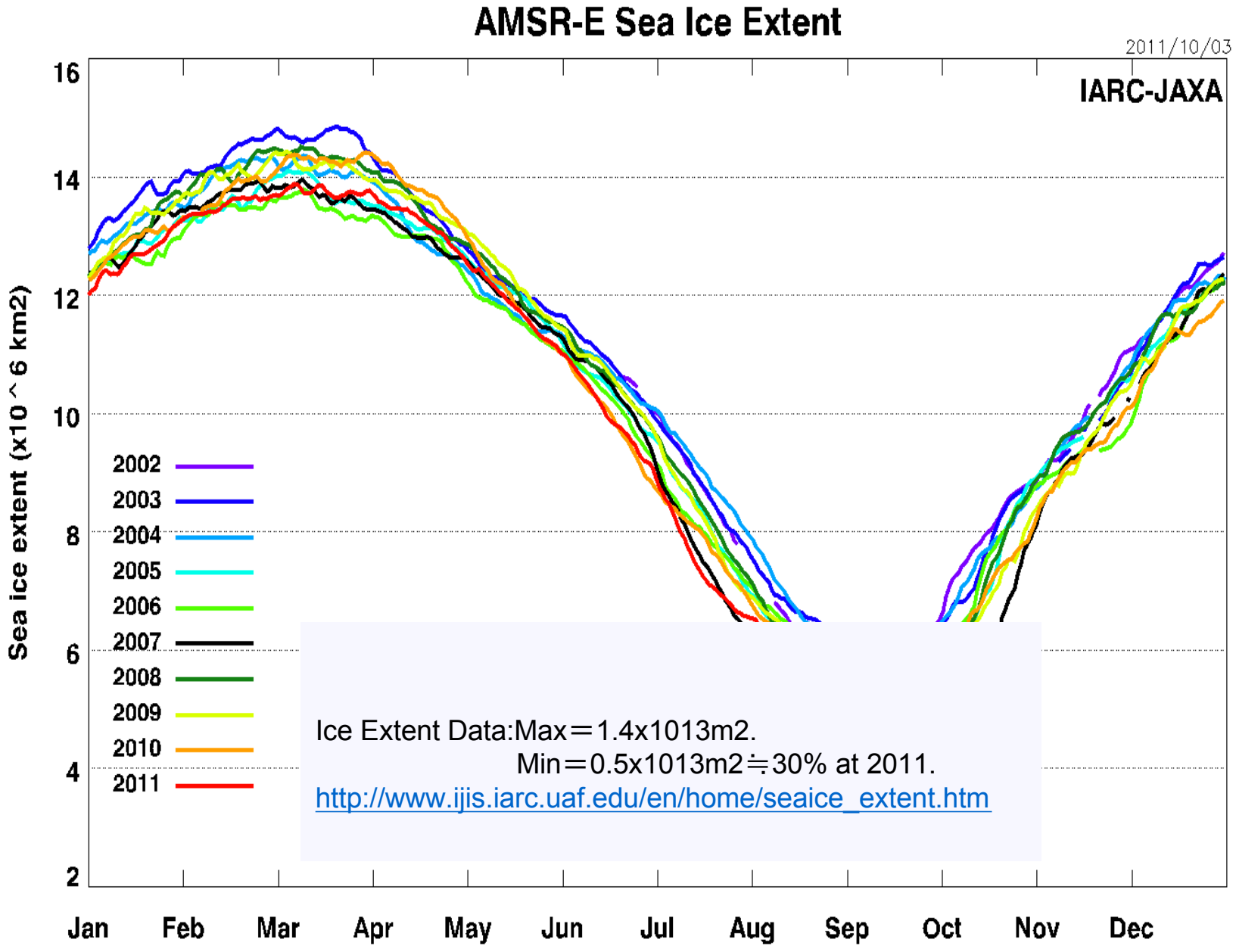
That is,heat input is also **exponential growing** with **the same time constant** $=\tau$.

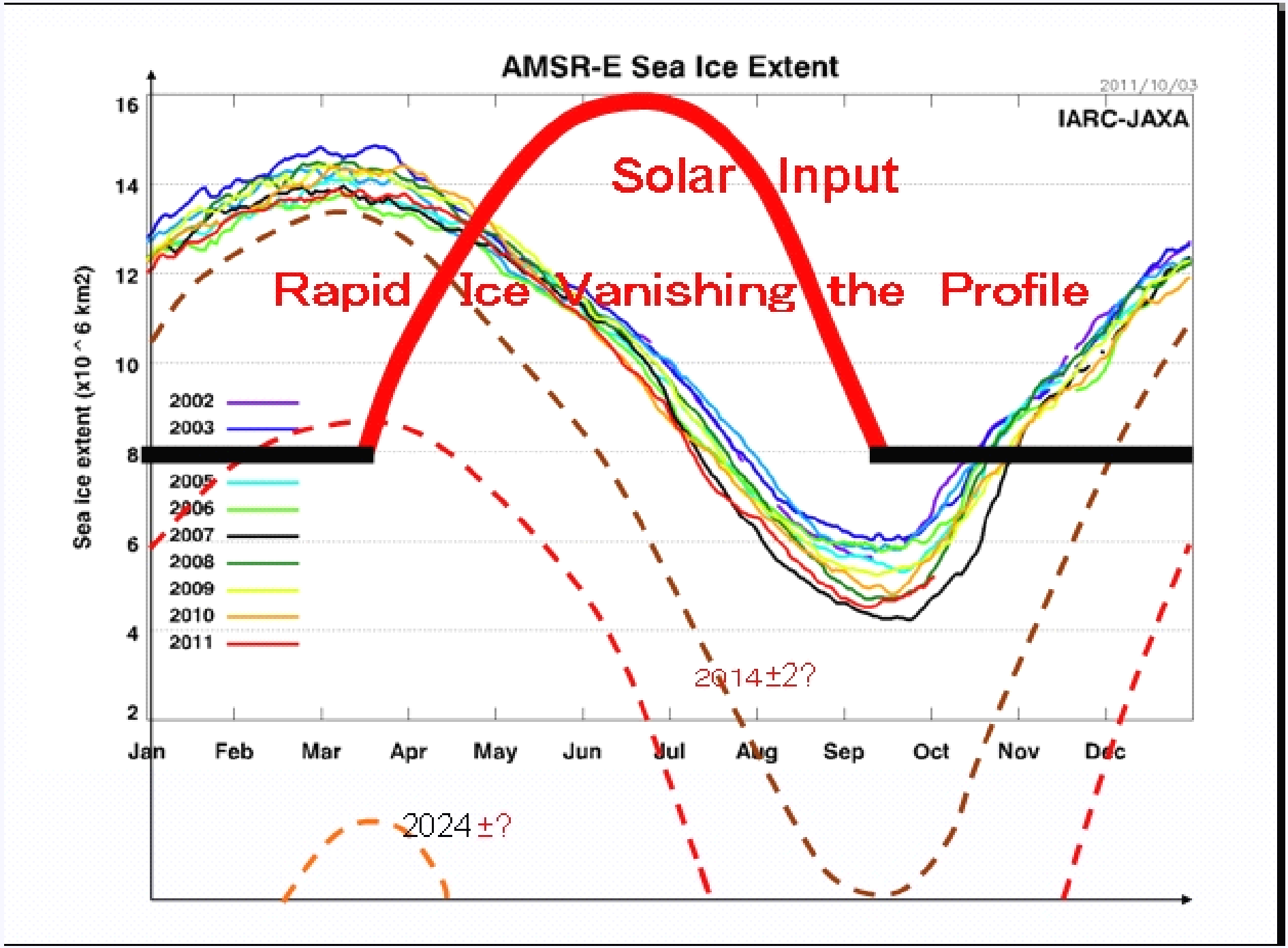
Becoming 20 times is take $3\tau=9$ **years** by exponential growth.

$P_m(\Delta m\fallingdotseq-0.023,2011)\fallingdotseq 3x10^{20}J/y$.(minus ocean heat = 1x10^20J/y)
$P_m(\Delta m\fallingdotseq-0.6,$max albedo$)\fallingdotseq 7.8x10^{21}J/y\equiv P_z$. .
Above data could be seen p17.

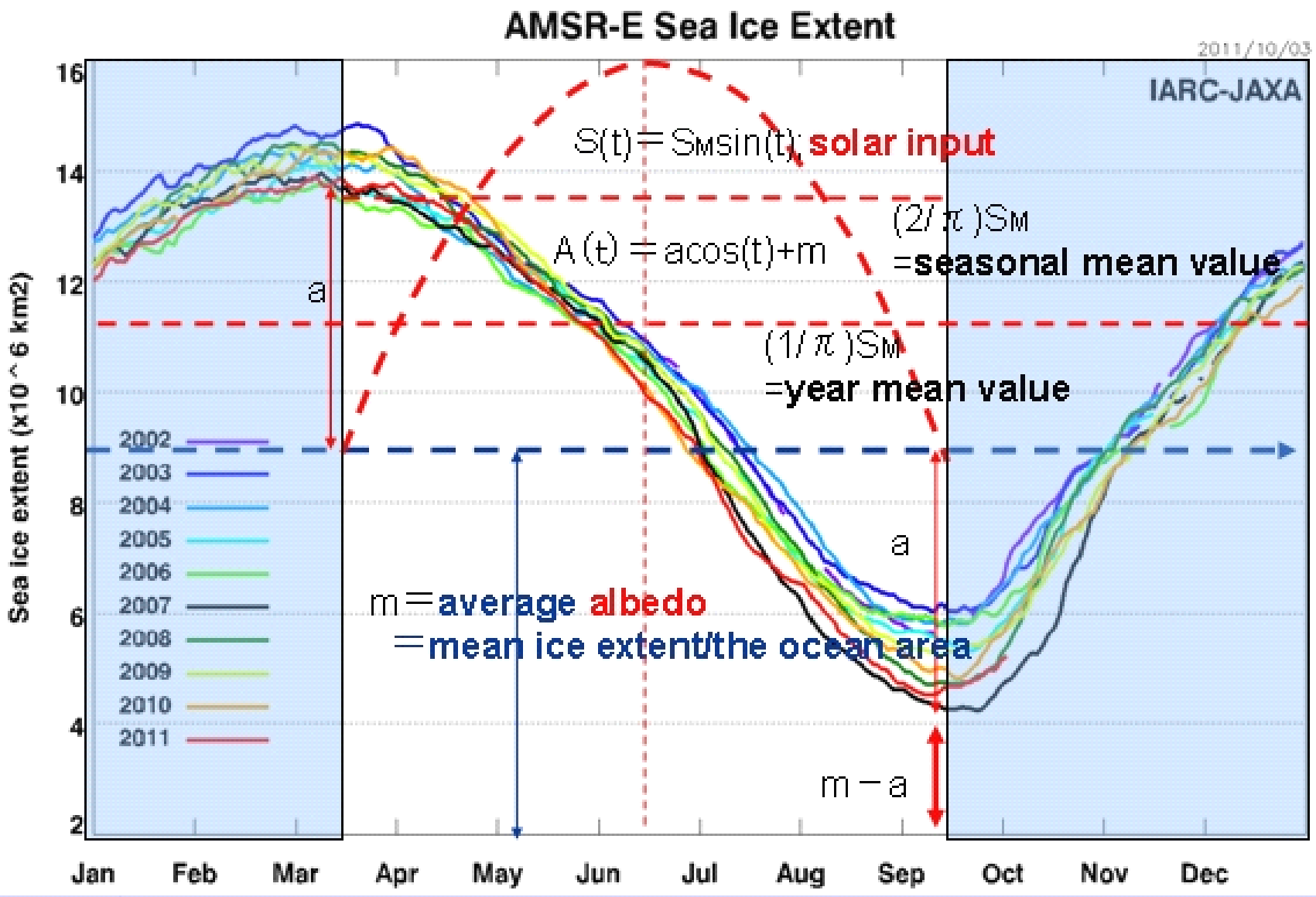
Time for (7.8x10^21/y/3x10^20J/y) $\fallingdotseq$ 26 times(**time for ice lid zero $\equiv t_z$**) is about

$t_z=10$ years ± "climate fluctuation width" ? in exponential growth.


AMSR-E Sea Ice Extent
2011/10/03
IARC-JAXA
Sea ice extent (x10 ^ 6 km2)
16
14
12
10
8
6
4
2
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
Ice Extent Data:Max＝1.4x1013m2.
Min＝0.5x1013m2≒30% at 2011.
http://www.ijis.iarc.uaf.edu/en/home/seaice_extent.htm


AMSR-E Sea Ice Extent
2011/10/03
IARC-JAXA
Solar Input
Rapid Ice Vanishing the Profile
Sea ice extent (x10^6 km2)
16
14
12
10
8
6
4
2
2002
2003
2005
2006
2007
2008
2009
2010
2011
2014±2?
2024±?
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

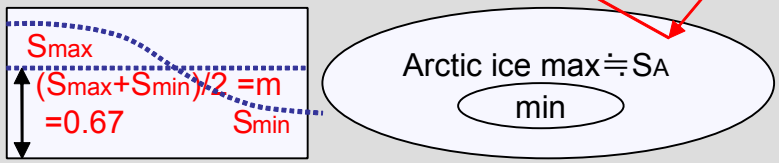
Seasonal Ice Extent Change with Solar Heat Input by Albedo=m.



Arctic Ice Lid Albedo Down would cause more than **20 times heat input rise !!**.

(1)year mean solar input into Arctic
=(342W/m^2×sin23.4°)×(2/π)×(1/2)
=43W/m^2≡F_A.

(2)Ice Surface Reflection Rate≡m(albedo)
S_A=9.5x10^12m=Arctic area.
U=3600sx24x365.



(3)**Solar Input into Arctic Ocean/year**=**F_A×(1-m)×S_A×U=1.3x10^22x(1−m)J/y**.
(4)Temperature of pool water with ice is fundamentaly =0℃.→heat input is ony being absorbed.
(5)**1% albedo**=m down causes heat input rise=**1.3x10^20J/y. (RF=0.43W/m^2)**
(6)Pm(2007～2011)≒**3.8x10^20J/y.**← Pm(1978～2006)≒**8.9x10^19J/y(ocean heat input).**
(7)Pm(2007～2011)−Pm(1978～2006)≒2.9x10^20J/y=**heat input by albedo down.**
(8)2.9x10^20J/y/1.3x10^20J/y.≒**2.2%** albedo down.
(9)**the remained albedo(2011)=0.95x(13.5+4.5)$_{10^12m^2}$/2x13.5x$_{10^12m^2}$=60%.**
(10)**10%**x1.3x10^20J/y=**1.3x10^21J**≡Pm(10); **60%**x1.3x10^20J/y=**7.8x10^21J**≡Pm(60).
(11)**Arctic ocean heat capacity**=**3.3x10^22J/K**≡C_A.
9.5x10^12mx1200mx1020kg/m^3x2.8kJ/kg=3.3x10^22J/K.
(12)Time for 1℃ Arctic ocean temperature rise. C_A/Pm(60,10)≒**4.2y～25y.**
(13)The temperature of **max weight density of sea water** is **not 0℃**,but **+4℃**.

downward heat transfer by heavyer Ts=**+4℃**

THE ANNUAL HEAT BUDGET the REEXAMINATION.

BAD DEBT HEAT/y(ice melt,sea T rise)≡Radiative Forcing

＝INPUT HEAT/y－OUTPUT HEAT/y≡change amount from balanced state.

.

(1)$C_A dT_A/dt = Pi(y) - Po(y) = P_{EO} + P_{EA} + S_A F_A(1-m) - S_A @ \sigma \langle T_A^4 \rangle$.

Heat capArctic×(ΔT rise/y)＝ocean heat input/y＋solar input/y－cooling radiatio/y.

(2)**Arctic parameters:**

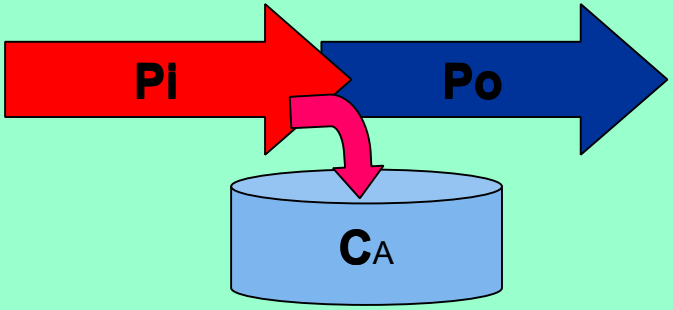
S_A＝9.5x10^12m^2.Arctic area.

F_A＝43W/m^2, solar ray input at Arctic.

m(2011)＝0.6; Arctic ice albedo

σ＝5.65x10^-8Wm^2/K^4.SB constant

@(2011)＝0.614; cooling radiation pass probability.



(3)**Heat Budget: ？？**

F(T=273)＝@σT_A^4＝193W/m^2.,,F(T=273-40)＝@σT_A^4＝103W/m^2.

<@σT_A^4>＝(193＋103)/2＝150W//m^2.

F_A(1－m)＝43(1－0.6)＝17W/m^2.

P_{EO}＋P_{EA}≒133W/m^2??.(P_{EA}＝air heat trasfer ？)

(4)**cooling radiation/y**(negative radiative forcing by T_A rise).

ΔF＝ΔT@σd<T_A^4>/dT＝4ΔT@σ<T_A^3>＝ΔT×2.8(T=273)W/m^2.

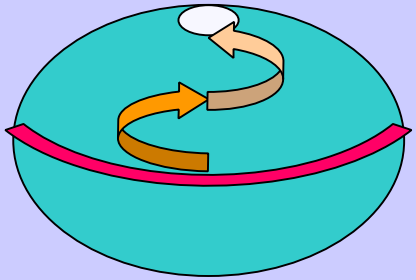
1℃/y global temperature rise ＝radiative forcing 1.6Wx(1/0.03)＝53W/m^2.

ΔF(288)＝(ΔT=1)×3.3(T=288)＝－3.3W/m^2.

(5)**Conclusion**:

Cooling radiation response could not be sufficient for stopping rapid heat rise.

- I **CONCLUSION:Decisive Evidences of The Arctic Catastrphe Possibility**-.



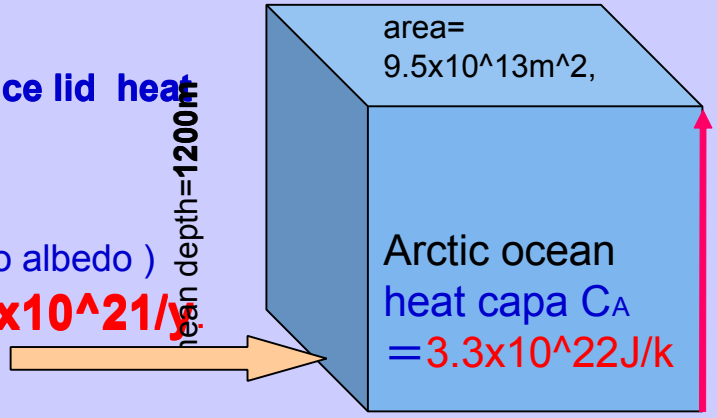
(1)A Heat flowes from higher temperature zone into lower one <**by thermodynamics 2nd low**>
Equator annual surplus heat flowes into Arctic, as is debt heat causing the crisis pre-stage(1978～2006).

(2)Note that Arctic summer heat input at the max is stronger than that of equator !!
The sudden ice lid decline for(2007*~2011)
≒290Km^3/yearx4times≒4x10^20J/y≡Pm.
This may be due to "**albedo feedback of Exponential Growing Heat Input** by ice cover decline in Arctic summer".

(3)An ocean temperature will not rapidly rise due to **its huge heat capacity**, though as that for Arctic≡C_A,*the Time for 1℃ up ≡C_A/P_z≒**4.2years !**.

zero ice lid heat ≡P_z.

P_z(zero albedo) ≒**7.8x10^21/y**.



1℃ up ≡C_A/P_z
≒(3.3x10^22)/(7.8x10^21/y)≒**4.2years!**

Ⅱ：Heat Invasion causing Methane Eruption,which is to cause RF feedback.

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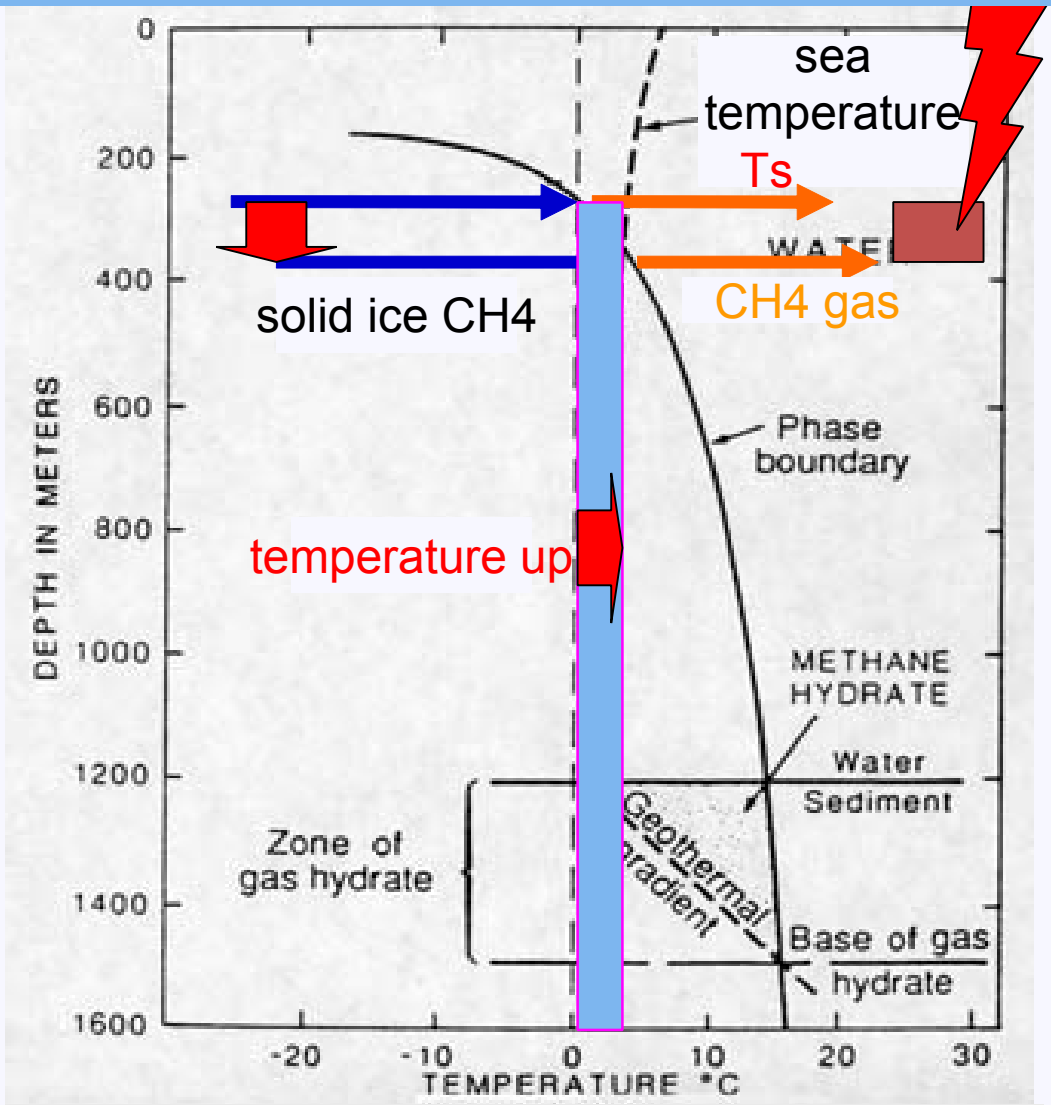


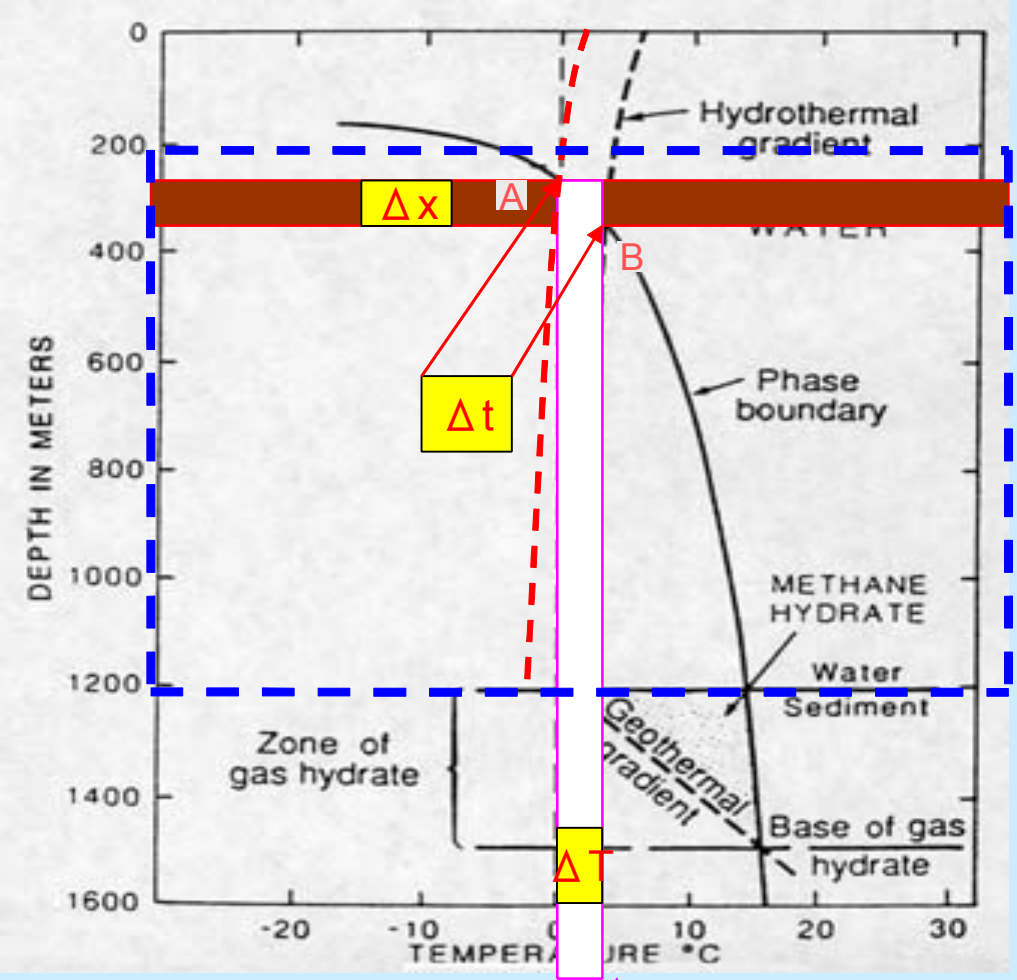
http://www.killerinourmidst.com/methane%20and%20MHs2.html

Phase boudary is where,
left is colder of ice CH4,
and
right is wamer gas CH4,

Deeper sea with higher pressure preserve solid CH4 in higher temperature

As the consequence, higher temperature invasion into deeper sea flor releases gas CH4.

By heat invasion length, we could estimate released Methan amount.



(1)Point **A** is melting top at time(year)=t. Then note depth=x,and melt temperature ＝Tm=Ts=sea temperature.

(2)As Δt time goes on, temperature invasion ΔT reaches poiint **B**.
Then depth increase is Δx.

(3)From Δx, MC melt amount ΔM coud be estimated. with "UNIFORM DISTRIBUTION" of 400～1000GtC.

(4)Hence we could derive MC eruption ΔM in time Δt.

(5)Example calculation is as following page.

Δx=1yearX(∂ Ts/ ∂ t)/(dT**m**/dx)

How much MC could be released
by sea temperature rise= ΔTs(depth=x,time=t).

Calclation Example of heat invasion estimation with MC eruption:

Next page is the most serious table for heat invasion estimation with MC eruption.
We estimate heat invasion depth /year as follows by $\Delta x/\Delta t \fallingdotseq (\partial Ts/\partial t)/(dTm/dx)$.

(1)For example,now in Arctic,8MtC/year Methane releasing is obsereved.
http://www.sciencedaily.com/releases/2010/03/100304142240.htm
(2)Assuming the sea flor depth at 300m. → dTm/dx≒70℃/1600m
(3)The average heat invasion depth per year $\Delta x = (8/400 \sim 8/1000) = 0.8 \sim 2$cm.

(4)The estimated temperature rise at 300m depth is
$\Delta x/\Delta t = (\partial Ts/\partial t)/(dTm/dx) \rightarrow (\partial Ts/\partial t) = (\Delta x/\Delta t)(dTm/dx) = (0.008 \sim 0.02)(70℃/1600m)$
$= 3.5\text{x}10\text{-}4 \sim 8.75\text{x}10\text{-}4℃/y = 0.00035 \sim 0.00085℃/y.$
.
(5)Note global temperature rise and global ocean one rise is the same as 0.03℃/y,
This is value of averaged depth 600m.
Therefore above value is far less(1/86～1/35) than that of general ocean.

(6)In other word,Arctic sea at now could be told very stable for the temperature invasion.
This is entirely due to being of sufficinet ice cover extent.
General ocean(without ice lid) is "far radical" than Arctic one.

(7)Therefore,once ice lid was taken off,the Satan(methane eruption)could appear at any time !!.

Note 1m depth length invasion could cause MC amount＝0.4G～1GtC releasing.

Tm 1m rise / Ts year rise	dTm/dx ≒70℃/1600m X=300m	dTm/dx ≒45℃/1600m X=400m	dTm/dx ≒30℃/1600m X=500m
∂Ts/∂t≒0.03℃/y this value is general ocean (except Arctic) in about 600m depth	0.7m/year 0.28～0.7G	1.07m/y 0.43～1.1G	1.6m/y 0.63～1.6G
∂Ts/∂t＝0.02℃/y	0.4m/y 0.16～0.4G	0.7m/y 0.28～0.7G	1.07m/y 0.43～1.1G
∂Ts/∂t＝0.01℃/y	0.2m/y 0.08～0.2G	0,4m/y 0.16～0.4G	0.53m/y 0.2～0.53G

Once such value(invasion lengh/year and MC eruption amount/year) had been realized,it is possible to establish **FEEDBACK** toward catastrophe,

Radiative Forcing of Methane. *now global RF＝**1.6W/m^2 with about 0.03℃/year up**			
M(GtC)	ppb	＋M0(700ppb)	RF(M)
0.01	5	706	0.0003
0.1	47	747	0.027
1.0	472	1172	0.24
10	4720	5420	1.45W/m^2
50	23600	24300	3.80
100	47200	47900	5.48
250	118000	118700	9.02
500	236000	236700	13.34
750	354000	354700	16.79
1000	472000	472700	19.75

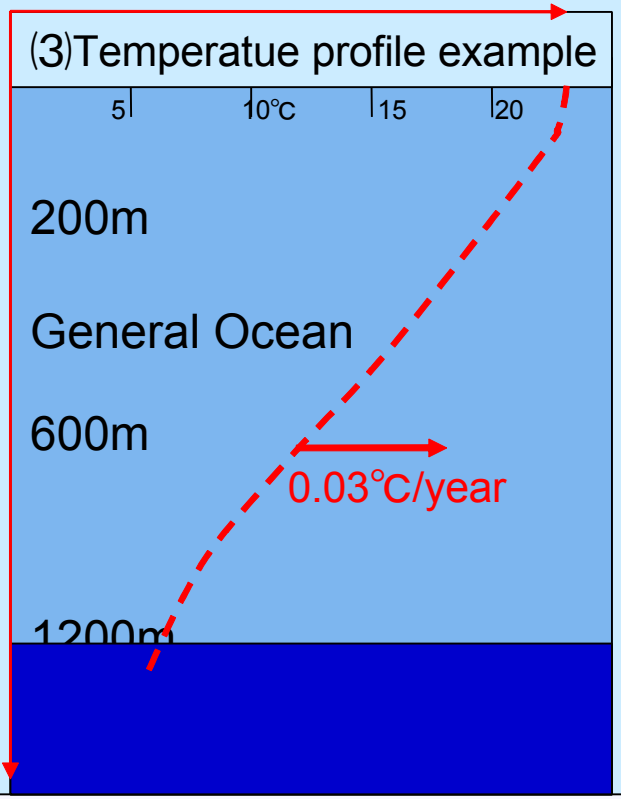
http://www.ja.wikipedia.org/wiki/放射強制力

Heat Invasion into deeper sea flor(the singular feature).

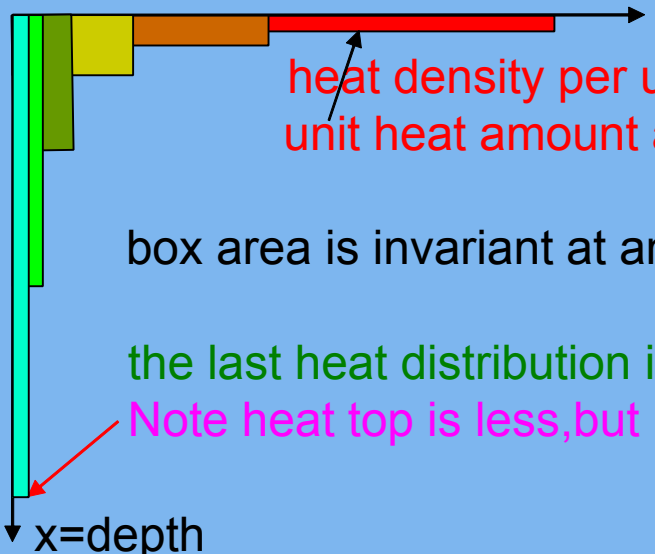
(1)Generally to tell heat downward transfer under sea is very slow except being turbulence. Molecular scopic heat diffusion is few meter/year. Hence deeper ocean flor temperature is about stable 2℃ or more.

* To tell from very beggining,a wamer water is lighter than colder water,therefore a warm water bulk never can drop down. Remind when you make hot bath water. You used to mix water(turbulence) to get uniform mild temperature by hands.

(2)However seasonal heat exchanging in general ocean is about 600m±400m depth?. Ofcourse those are caused by " randomness of turbulence" in general ocean.



(4)Heat Invasion by the most Ramdom Turbulence
"A very primitive heat transfer model"



$q(x;t) \equiv (1/\nu t)\exp(-x/\nu t)$. → $\langle x \rangle = 1/\lambda = (\nu t)$, ν =turbulence intensity.

http;//www.777true.net/mPSEUDO-DIFFUSION-BY-TURBULANCE.pdf

Sea Flor Heat Transfer by Turbulence and Sea Temparature Change:

⑴Heat input /year into Arctic sea mouse$(S_0-S(t))$ in summer time(U_A).

$dP/dt=U_A(S_0-S(t))F@(t)\equiv J(t)$.Heat flow at sea top.

⑵Heat Propagator Fundction:q(x,t)。

a Heat Propagator:$q(x;t)\equiv(1/\nu t)\exp(-x/\nu t)$.→ $<x>=1/\lambda=(\nu t)$, ν =turbulence intensity.

http;//www.777true.net/mPSEUDO-DIFFUSION-BY-TURBULANCE.pdf

⑶**Temperature profile in Arctic sea:**Ts(x(t),t)due to turbulence.

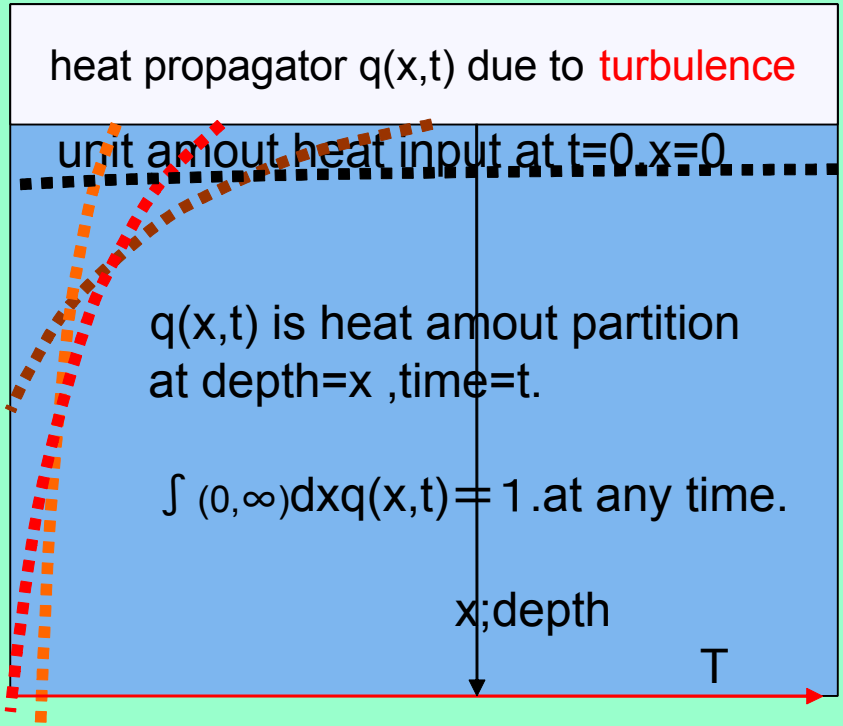
$Q(x,t)=CsTs(x,t)=\int(-\infty,t)duq(x,t-u)(dP(u)/du)$. heat amount at (x,t).

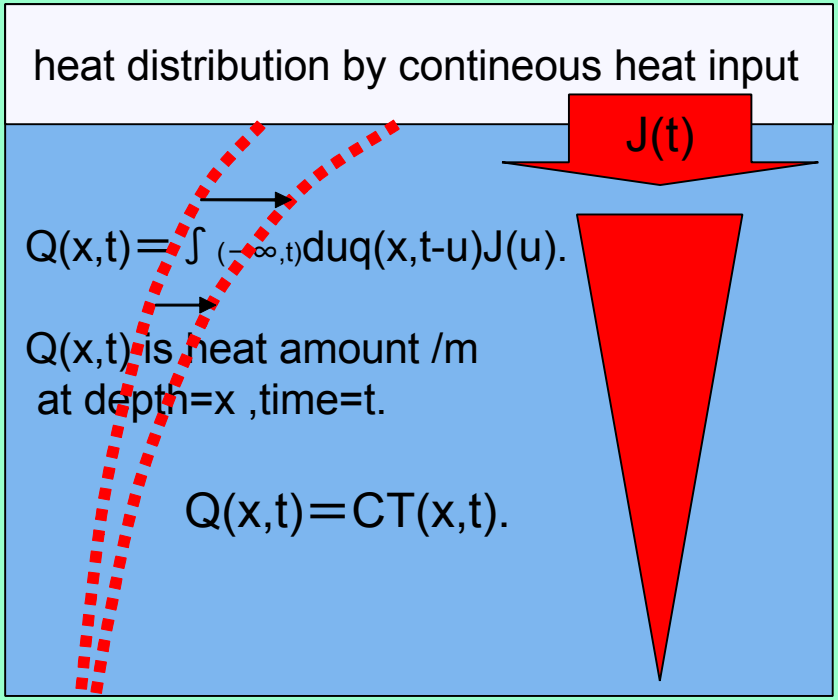
$dTs(x,t)/dt=(1/Cs)\int(t-v,t)du[\partial q(x,t-u)/\partial t)](dP(u)/du)$. v:intergral cutting off parameter.

$C(dT/dt)=dQ/dt=-div\mathbf{J}$.

⑷Physical meaning of heat propagator:

⑸Temperature profile by q(x,t),J(t)



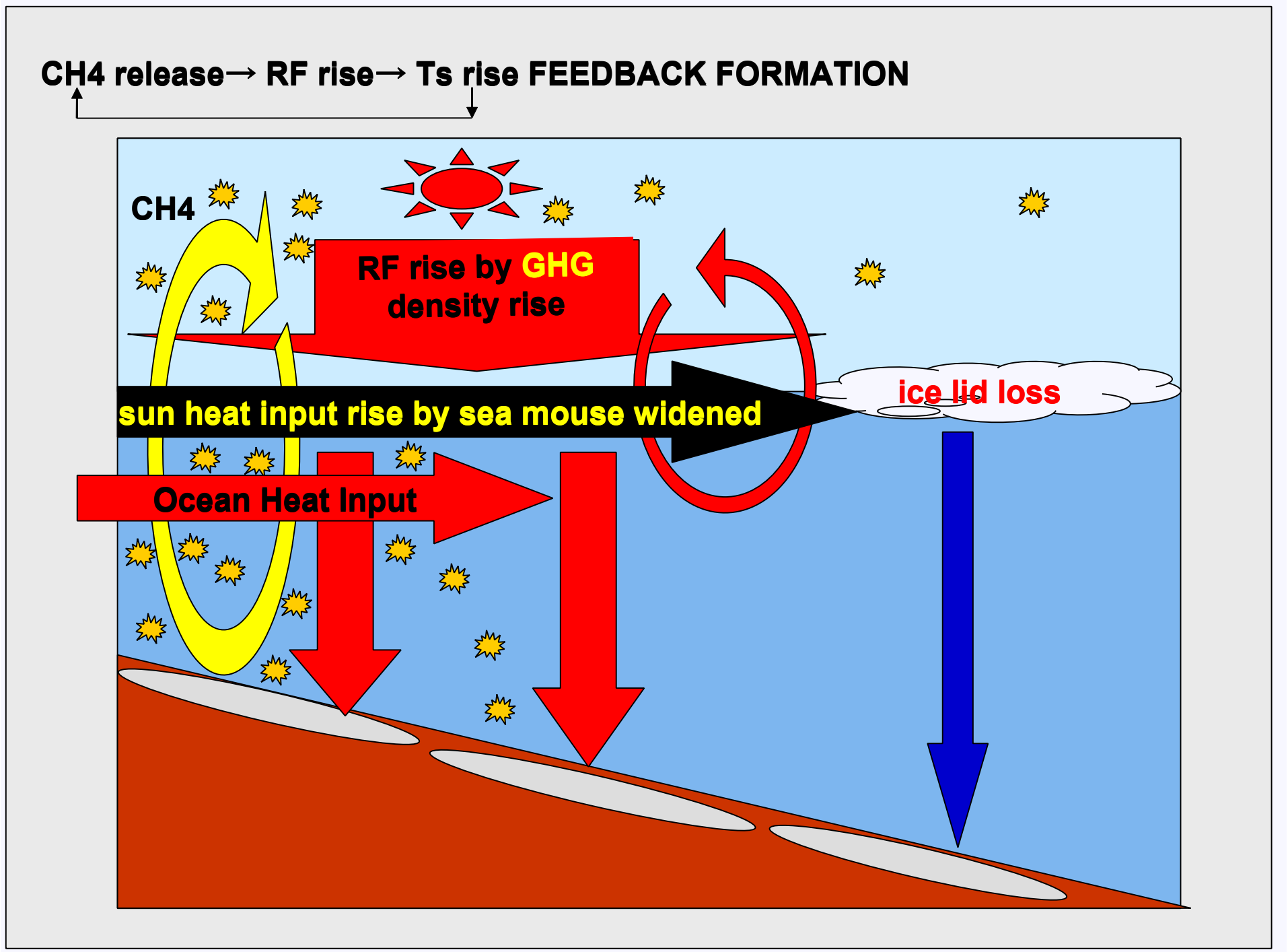


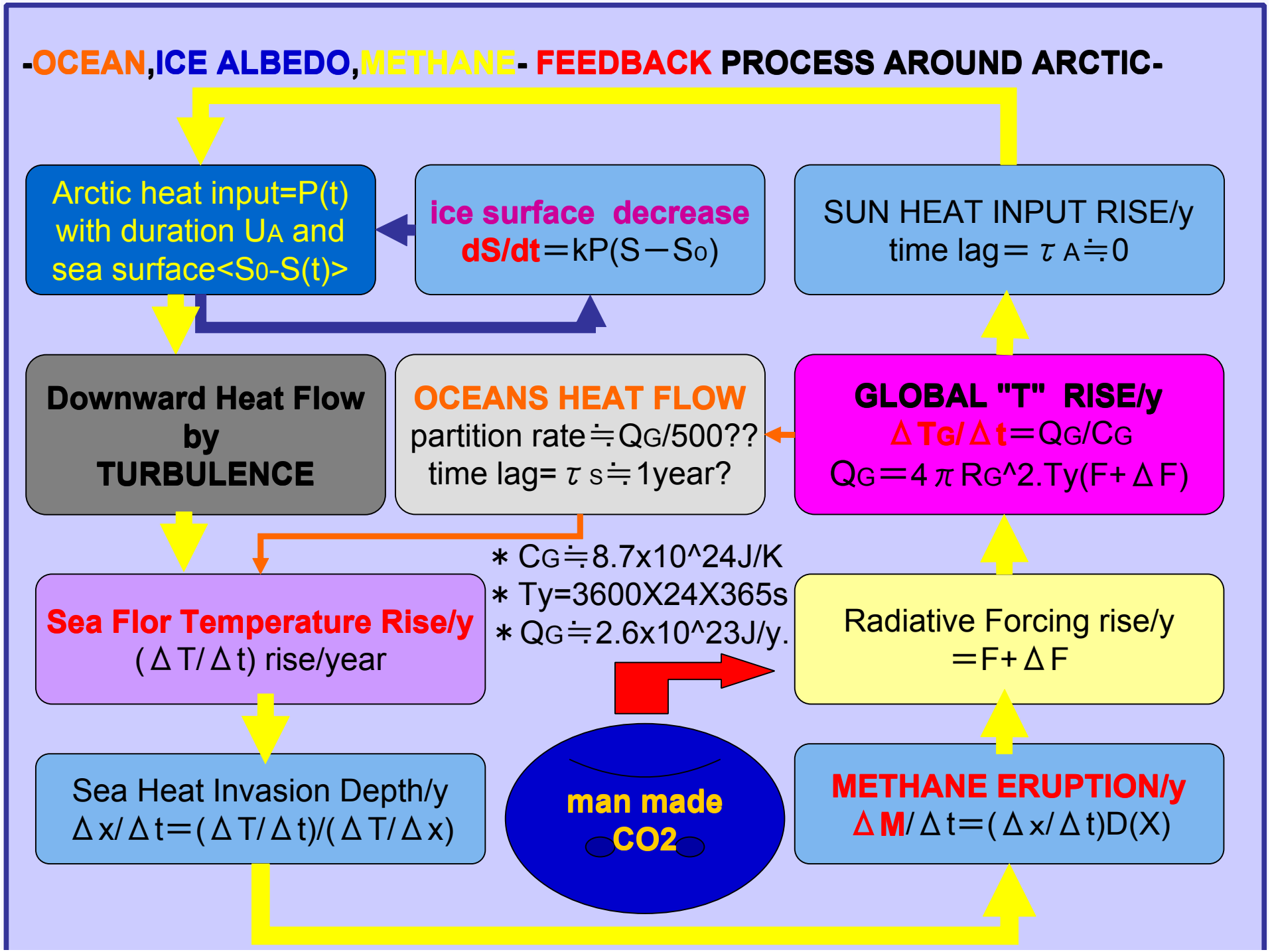
The Proof of Feedback Realization by methane eruption with RF rise and with Sea Temperature rise

The being of positive feedback is evident even for amateure That is,

* sea water temperature rise → methane eruption into atomosphere
  ← heat input rise onto sea ← GHG is to rise RF(**debt heat increase**) ←

The problem is estimating **looping amount** which determine **hazadous temperature rise degree**, which could not evade employing mathematical analysis. Amateure people remind that 10GtC eruption causes RF=1.5w of additional 0.03℃/y rise. 10 years 1GtC/y eruption would cause those. See the table of **P24**.


CH4 release→ RF rise→ Ts rise FEEDBACK FORMATION
CH4
RF rise by GHG density rise
sun heat input rise by sea mouse widened
ice lid loss
Ocean Heat Input


-OCEAN,ICE ALBEDO,METHANE- FEEDBACK PROCESS AROUND ARCTIC-
Arctic heat input=P(t) with duration UA and sea surface<S0-S(t)>
ice surface decrease dS/dt=kP(S−S0)
SUN HEAT INPUT RISE/y time lag= τA≒0
Downward Heat Flow by TURBULENCE
OCEANS HEAT FLOW partition rate≒QG/500?? time lag= τs≒1year?
GLOBAL "T" RISE/y ΔTG/Δt=QG/CG QG=4πRG^2.Ty(F+ΔF)
∗ CG≒8.7x10^24J/K
∗ Ty=3600X24X365s
∗ QG≒2.6x10^23J/y.
Sea Flor Temperature Rise/y (ΔT/Δt) rise/year
Radiative Forcing rise/y =F+ΔF
Sea Heat Invasion Depth/y Δx/Δt=(ΔT/Δt)/(ΔT/Δx)
man made CO2
METHANE ERUPTION/y ΔM/Δt=(Δx/Δt)D(X)

C:Model of Instantaneous Heat Transfer for opened sea mouth

⑴Melting Heat Invasion Depth≡x(t)/year:

dx(t)/dt＝(dTs(x,t)/dt)/(dTm(x)/dx).<<Ts＝Tm>>

⑵Methane Melting Amount/year in the one dimensional distribution＝D(x).

dM(t)/dt＝D(x)(dTs/dt)/(dTm/dx).<<dM(t)/dt＝D(x)<dx/dt>>>

＊D(x)≡Methane Clathrate Distribution Density at depth x＝0.4～1.0GtC/m.

⑶Arctic Sea Temperature Rise/year by Radiative Forcing by Ice Albedo(m) and Methane(@).

$C_A(dTs(t)/dt)＝(F_m(t)+\Theta F@(t))US.sin(\delta)/\pi$.

＊F@≡Radiative Forcing by CH4 and that by CO2.<<This is global>>

＊F_m≡Radiative Forcing by Arctic Ice Albedo(m=0) <This is local>

＊S≡Area of Arctic Ocean with Methane Clathrate Reservoir in the sea flor.

＊U≡3600x24x365s＝years time by second.

＊Θ≡<TA^4>/<TG^4>

＊Ts(x,t)≡sea flor temperature of melting point x≒Ts(t).

☞:Actual Ts is depth=x and time=t dependent complicated function with time delay of heat input at sea surface,however,we take a wild approximation of **depth uniform model without the time delay in long time constant view(10 years).**

＊C_A≡Dynamic Heat Capacity of Arctic Ocean with Methane Clathrate Reservoir.

⑷Methane Radiative Forcing<≡F@(t) >Evolution Equation.<<Γ(M)≡dF@/dM>>

dF@/dt≡Γ(M)dM/dt＝[Γ(M)D(x)/(dTm/dx)](dTs/dt)

$dF@/dt＝[\Gamma D/(dT_m/dx)]<USsin(\delta)/\pi C_A>(F_m+\Theta F@)≡(Fm+\Theta F@)/\tau$.

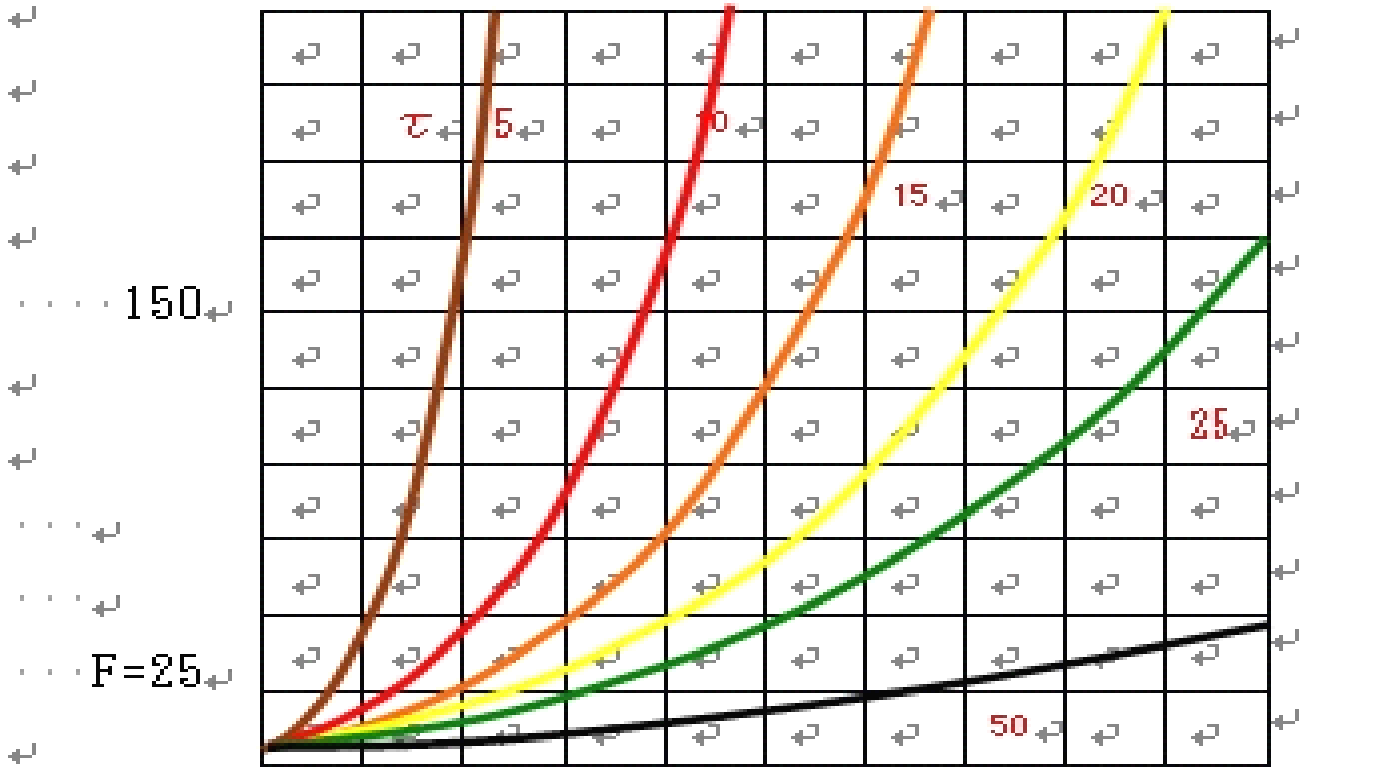
⑸dF@/dt＋fF@＝g.

⑹F@(t)＝∫(0,t)dug(u)exp(-∫(u,t)dvf(v))＋Cexp(-∫(0,t)tduf).

⑺f≡[Γ D/(dTm/dx)]<USsin(δ)/π C_A>≡Θ/τ .

⑻g≡[Γ D/(dTm/dx)]<USsin(δ)/π C_A>F_m≡F_m/τ .

A model analysis by elementary calculus could be seen in the below site.
Concllusion at there is that **there could be no salvation once ice lid full vanished,**
http://www.777true.net/Unless-Drastic-Counter-Measure_Arctic-Ice-Lid-Vanish-would-Become-Catastrophic.pdf



$$F_{@} = \int_0^t du\, g(u) \exp\left(-\int_u^t dv\, f(v)\right) + C \exp\left(-\int_0^t du\, f\right)$$

$$= Fm \cdot \exp(t/\tau)[1-\exp(-t/\tau)] + F_0 \exp(t/\tau).$$

Summry and the Conclusion

Summary1 **PART-C**：Methane Clathrate the Mass Destructive Thermal Bomb in Arctic.

key words: *Ocean heat input,→ *ICE Albedo feedback,→ *Ice cover diminishing,
→* Heat deep invasion by turbulence、→ Methane Eruption FEEDBACK.

A:Diminishing of Arctic "ICE COVER" for stabilizing thermal bomb MC

⑴400~1000GtC Arctic Methane Clathrate(MC) had been stable under the ice cover.
MC reservour is limited within 200m~1200m depth.

⑵Only 10GtC melting with RF＝1.6W/m^2 could be catastrophic !!.

＊**Global Heat Debt/year by RF**＝$4\pi r_G^2$×3600×24×365×1.6W/m^2＝2.58×10^22J/y.

This heat is to distribute to cause irreversible proces such as ice melt,ocean warming,.....

⑶**OCEAN HEAT INPUT**/year into Arctic sea is to decrease ice cover year by year 290Km^3/year.melting heat Pm＝**8.9x10^19J/y**(1980~2007*).

http://psc.apl.washington.edu/wordpress/research/projects/arctic-sea-ice-volume-anomaly/

⑷**The sudden ice lid decline** for(2007*~2011)：melting heat Pm≒**4x10^20J/y**
This is due to "**ICE ALBEDO FEEDBACK** by ice cover decline in Arctic summer".

⑸**ICE LID DIMINISHING** with radiative forcing P(m=0)＝**7.8x10^21**J/y
would be fatal, because,only by **lid=m**,heat invasion could be intercepted.
Now m=0.60(2011).Once ice lid was taken off(m=0.5→0),it is likely to run through land mine filed.

Summary2 **PART-C**：Methane Clathrate the Mass Destructive Thermal Bomb in Arctic.
key words:*Ocean heat input,→ *ICE Albedo feedback,→ *Ice cover diminishing,
→* Heat deep invasion by turbulence、→ Methane Eruption FEEDBACK.

B:"Heat Invasion" into deep zone especially in Arctic sea flor and zundra.
⑹**Arctic ocean heat capacity＝3.3x10^22J/K**≡C_A＝9.5x10^12mx1200mx1020kg/m^3x2.8kJ/kg.
⑺**Time 1℃ up Arctic ocean full temperature rise.**C_A/P(-0.23),P(-0.6)≒**4.2～11y!!.**

⑻Wide ICE LID intercepting solar heat and sea water turbulence
⑼The last stage would be Methane Eruption FEEDBACK causing radiative forcing rise by GHG, which turn to Arctic temperature rise to enhance more methane eruption.

C:Conclusion:How to intecept seeds of FEEDBACK ?!!.
Tackling **OCEAN HEAT INPUT** and **ICE ALBEDO FEEDBACK** !!.
→ more than 80% emergent cut and climate geo-engineerging possibility !!.
→setting surface sea water cooler by turbulence devices at "Bering strait".
→setting white foam polystyren carpets on methan bubbling coast.
→bubbling methane might be better to be burned to attenuate the radiative forcing.