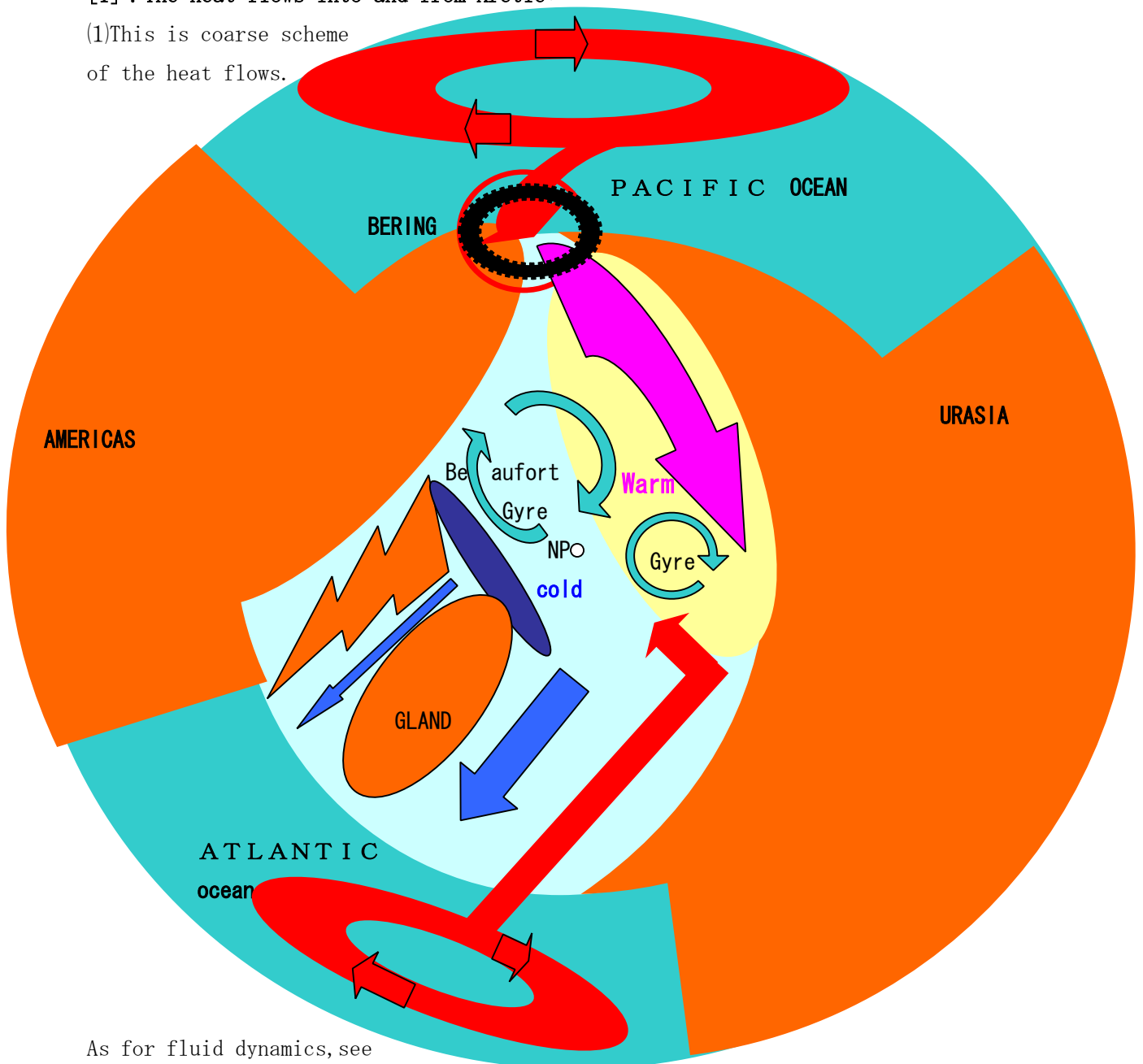


—Bering Strait the Gateway of Destiny(Arctic Catasrophe, Yes or No !!) —

Recent rapid ice melt in Arctic was caused by opening gate of hudge amount heat inflow from Pacific Ocean at Bering strait, researcher told. If you could shut down the gate, the serious situation would be dramatically changed ? !!! .But It's a means for the time being,.....' 09/7/18, 21

[1] : The heat flows into and from Arctic:

(1)This is coarse scheme of the heat flows.



As for fluid dynamics, see

<http://www.geocities.jp/sqkh5981g/easyFD.pdf>

(a) You could see wide and shallow continental shelves in Arctic in the below.

<http://www.jamstec.go.jp/arctic/mapsearch/locationdepth.htm>

(b) You could see **yellow area (Y)** is warmer than **dark blue area (B)** in the below.

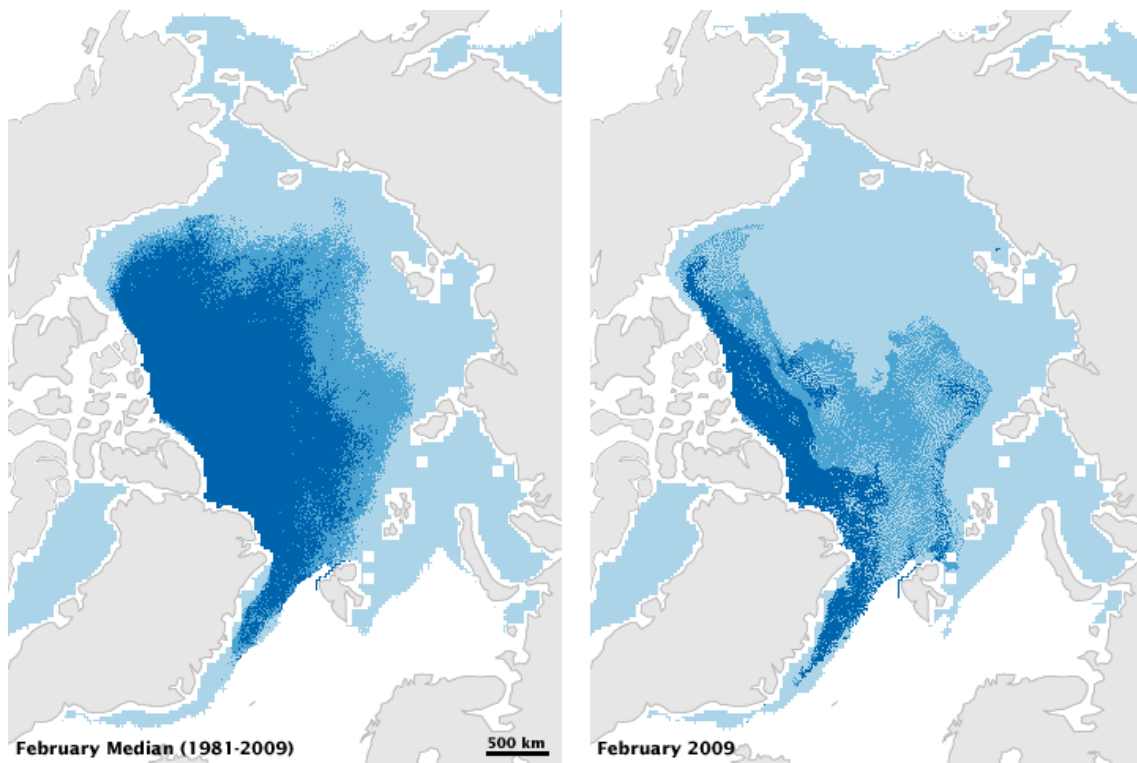
Perennial Arctic Ice Cover Diminishing, Officials Say.

<http://www.washingtonpost.com/wp-dyn/content/article/2008/03/18/AR2008031802903.Html>

Amount of Old Ice in Arctic Hits Record Low in February 2009

Posted April 10, 2009//NASA EARTH OBSERVATORY.

<http://earthobservatory.nasa.gov/10TD/view.php?id=37992>



It is evident that more heat flow input into Y and less heat flow into B. Then note that Y and B are almost the same latitude. Possible heat current ways are two, one is from (west) Greenland sea and the other is (east) Bering strait.

(2) The remarkable feature of **Bering strait** is its narrowness of 85km width with 30~50m depth. In the past, the strait had been freezing in winter, which had been shutting down the gate against heat inflow from **Pacific Ocean the biggest heat reservoir** in the world.

[2]:The sudden and abrupt **Turing Point** in 1997/1998.

*The kernell point of global warming : Arctic cross over irreversible point ?.

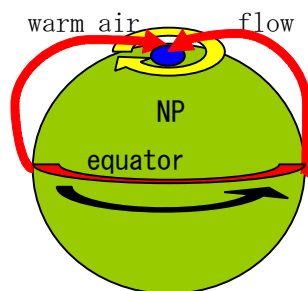
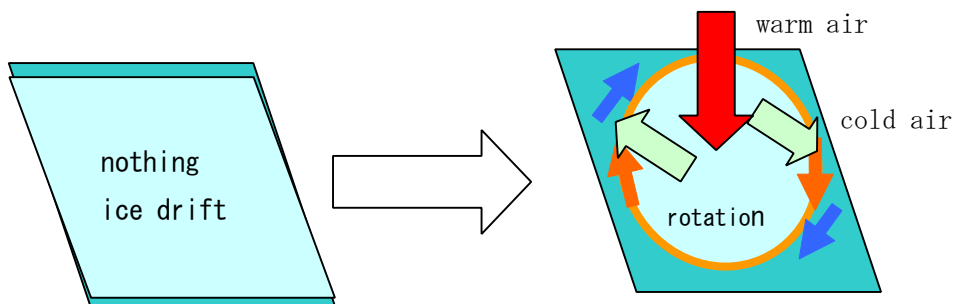
<http://www2.kaiyodai.ac.jp/~koji/BE.pdf>

* <http://www.jamstec.go.jp/iorgc/topics/20060607/index2.html>

Then the gate was broken to allow heat inflowing from Pacific ocean, which had caused sudden, abrupt and remarkable thermal state change in east Arctic such as rapid **ice melt of 0.6→25%/year with 1°C sea temperature rise in Northwind area** in Arctic ocean. Consequently following serious events occurred.

- (1)Increasing ice cover drift at sea coast-line without friction force between land. Those had been fixed with land by solid ice cover.
- (2)Also atmospheric heat input into Arctic accelate wind circulation around NP, which accelate also clock wise circulation of ocean current (**Beaufort Gyre**). The **turbulence** process by the ocean current accelate more ice melt.
- (3)Such gyre flow accelation induce also heat inflow from Bering strait.
- (4)Open sea surface absorbs more heat from **solar ray input into ocean** , which is reserved in winter season and enhance more ice melt in a year.
- (5)Above (1)(2)(3)(4)processes cause **positive feedback loop**.

Maybe closing the gate enhanced **ocean heat expansion in Pacific ocean** in long time. It may be a kind of gate broken down by excess hydro pressure. So researcher considered it irreversible. Also they predicted rapid ice melt in Arctic.



* **clock wise circulation** is due to Coriolis force in in northern latitude. As for fluid dynamics, see

<http://www.geocities.jp/sqkh5981g/easyFD.pdf>

[3]:Review more and what could we do ? !!!:

(1)Today's Geo-science world ???.

(2008/12/1,11):The Global Surplus Heat is entirely Flowing into Arctic (Part I).

<http://www.geocities.jp/sqkh5981g/2ndlow.pdf>.

It's authors terrible indulgence not to have noticed the serious role of Bering strait. One reason is due to the key word Bering strait, which has seldom been discussed in ordinary website concerning the problem of rapid ice melt in Arctic. Not only this problem, but also finding data of ice melting amount (not its extent) is very hard. It seems very hard to find data relating most serious and essential events (for calculating **the heat budge in Arctic**). However we should not blame them, but encourage more and more. Another idea is inviting young statistical physicists who are good at model building and calculating.

(2)The role of ocean current is far serious than that of atmosphere one in heat budget. $C_G/C_a \doteq 54$ times. The heat capa of atmosphere is 2% in the total.

Although, note that wind velocity is far rapid than that of ocean current.

NASA data: <http://www.ecd.bnl.gov/steve/pubs/HeatCapacity.pdf>

equivalent global heat capacity $\equiv C_G$ *NASA	$C_G = 2.7 \times 10^{23} \text{J/K}$.	global ocean heat capatity $C_o = 5.3 \times 10^{24} \text{J/K}$ $C_G \doteq$ ocean with 200m depth.
water specific heat	4.178KJ/Kg. K	
air specific heat	1.005KJ/Kg. K	global mass of air = $5.26 \times 10^{15} \text{t}$. global heat capacity of air $C_a = 5 \times 10^{21} \text{J/K}$.

A role of atmospthic current (wind) is a driving force for surface ocean current (with ice cover pieces). If warm wind caused ice melt, then unbalance of {Y and B} could not verify the cause.

(3)The researcher suggested the irreversibility of Arctic ice melt ?!

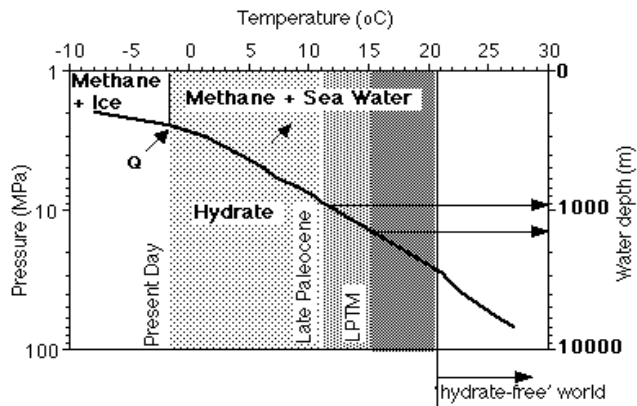
<http://www2.kaiyodai.ac.jp/~koji/BE.Pdf>

The broken gateway of Bering strait had allowed inflowing of hudge amount of heat from Pacific ocean, which had caused rapid ice melt in Russian coast line (area Yellow). They told abrupt change of rotational velocity of Beaufort Gyre which accelate heat inflowing from Bering strait. **One possible way is to shut down the gate in an emergency. It seems not impossible to construct big shutter, then what could you do ?!!!.**

[4]:The emergent catastrophe possibility of ice-methane in Arctic:

(1)Clathrates: little known components of the global carbon cycle

<http://ethomas.web.wesleyan.edu/ees123/clathrate.htm>



Note that Arctic wide continentall shellfles are very shallow as 200~300m, while the reserivior temperature must be lower than near 0°C for the stability. That is, reserivior in shallow sea flor lie in super-cooling water with top on ice cover. Unless the ice cover, we could not survibe anymore.

(2)Methan clathrate Reserivior size<http://en.wikipedia.org/wiki/Methane_clathrate>

global? : 500-2500GtC, is smaller than the 5000 GtC,

Arctic? 500~1400GtC, For comparison global carbon in atmosphere is around 700GtC.

(3)Full diminising of ice cover and the methane catastrophe :

Even conservative Wikipedia dealing only established knowlegdes, indicates the catastrophe problem.

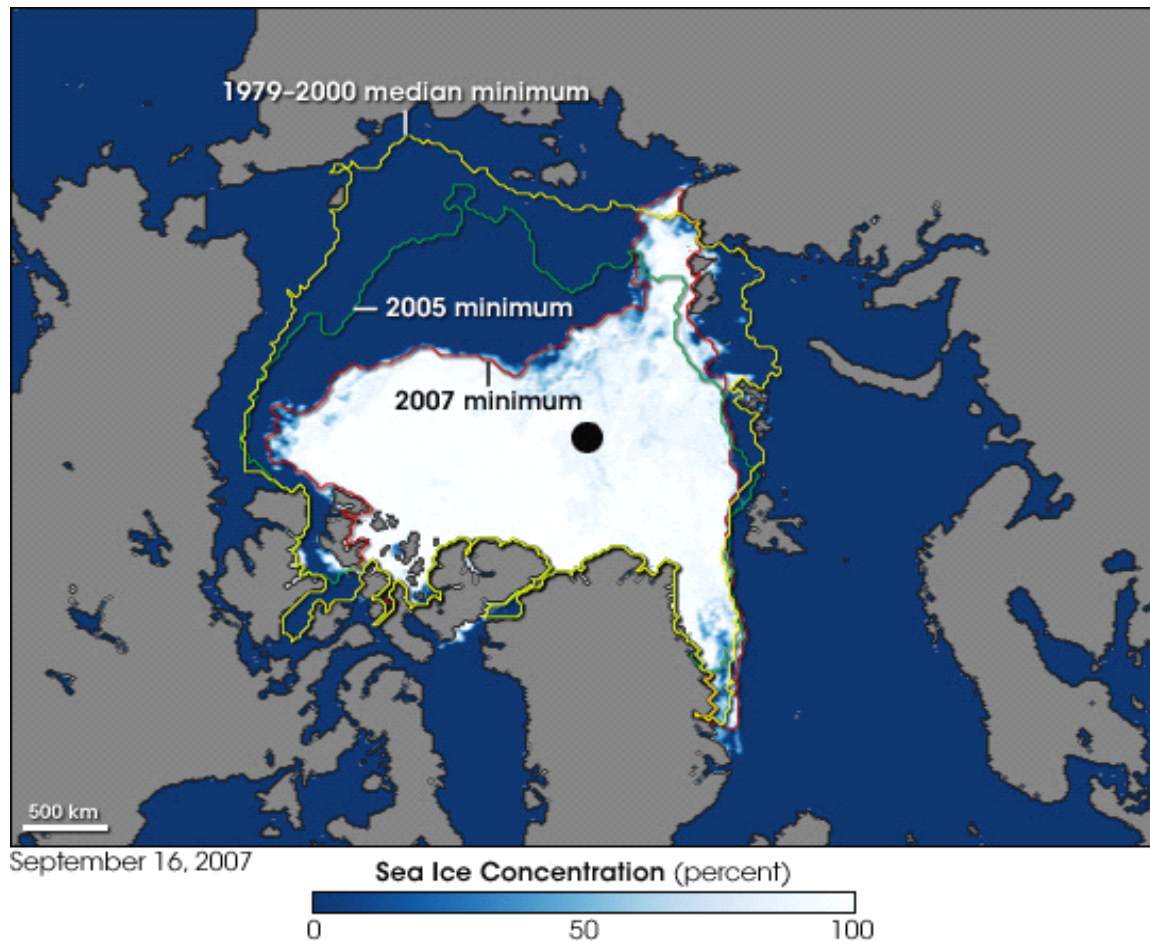
http://en.wikipedia.org/wiki/Arctic_shrinkage

http://en.wikipedia.org/wiki/Arctic_methane_release

(4)Google UK site:Predictions on full diminishing ice cover in 2013.

<http://www.google.co.uk/custom?q=ice+melt%2Carctic%2C2013&sa=Search&client=pub-5725171018504863&forid=1&ie=ISO-8859-1&oe=ISO-8859-1&safe=active&cof=GALT%3A%23008000%3BGL%3A1%3BDIV%3A%23336699%3BVLC%3A663399%3BAH%3Acenter%3BBGC%3AFFFFFF%3BLBGC%3A990000%3BALC%3A0000FF%3BLC%3A0000FF%3BT%3A000000%3BGFNT%3A0000FF%3BGIMP%3A0000FF%3BFORID%3A1%3B&hl=en>

(5)Dr. Wieslaw Maslowski predicted a 2013 Ice Free Summer Arctic five years ago - now he says that may have been too conservative. Mon, 2008-03-24 11:06-admin
<http://beyondzeroemissions.org/2008/03/24/Dr-Wieslaw-Maslowski-ice-free-summer-arctic-2013-or-sooner-loss-of-reflectivity-non-linear>



*post script:

This report was written by author an amateur in geo-science. There may be some mis-understanding interpretations. Although also you could see that it is Bering strait, but not Green land sea from where more heat flow into north Russian coast. The rapid ice melt in Arctic would determine our destiny not in far future, but near one. Planet economic prisoners should be awoken from fatal illusion of now world.

- 北極圈 & 地球熱量收支 (全体認識) - '09/6/24, 7/18

全球年間地上入射熱量	$1.7 \times 10^{22} \text{J/day} \times 365$	$4 \pi R^2 \sigma_0 T^4 \times 24 \times 3600 \times 365 \text{sec}; T=288\text{K}.$
全球等価熱容量 C_G	$2.7 \times 10^{23} \text{J/K}.$	全海洋熱容量 $C_O = 5.3 \times 10^{24} \text{J/K}$ $C_G \doteq$ 平均海洋水深 200 に相当
全球温度上昇率/年	0.05K/year	
全球熱流入量	$1.4 \times 10^{22} \text{J/y}.$	$\Delta Q = C_G \Delta T = 2.7 \times 10^{23} \text{J/K} \times 0.05 \text{K/y}$
通年氷層融解熱流量	(2/10) $4.5 \times 10^{19} \text{J/y} ?$	$1.376 \times 10^{17} \text{g/y} \times 334.7 \text{J/g} \cdot \text{K}$
季節氷層融解熱流量	(10) $6.1 \times 10^{21} \text{J} ?$	$2.3 \times 10^{21} \text{J} \doteq 4.5 \times 10^{19} \text{J/y} \times 50 \text{倍}$
氷融解熱	334.7KJ/Kg. K	
氷比熱	2.114KJ/Kg. K	
水比熱	4.178KJ/Kg. K	
空氣比熱	1.005KJ/Kg. K	$5.26 \times 10^{15} \text{t}$ (大氣熱容量 $5 \times 10^{21} \text{J/K}$)
氷密度	0.917g/cm ³	
年間北極海氷層減少量	$1.376 \times 10^{17} \text{g/y} ?$	<u>36 cubic miles of ice a year</u>
MC10GtC 放射強制力	\doteq 全球 1°C 上昇	$10 \text{GtC} \times (124/12) = 103 \text{Gt}$
MC10GtC 融解熱量	$4.5 \times 10^{19} \text{J}$	$Q = 440 \text{KJ/Kg} \times 103 \times 10^{12} \text{Kg}$
MC 融解熱	440. KJ/Kg. K	
MC Arctic reservoir	500~1400GtC	
Arctic Ocean m-depth	1038m (平均深度)	200~300m in continental shelves
AO area	1409,0000km ² .	2.8% of globe <66.6 度北極圈面積 4%>
AO heat capacity	4% in all of ocean	
*****	*****	*****
*AO insolation input	$1.0 \times 10^{23} \text{J/y} ?$	$1.0 \times 10^{23} = 6.28 \times 10^{24} \text{J} \times 0.016.$ 「1.6 % of all input」
*AO radiation output	$2.0 \times 10^{23} \text{J/y} (T=274). ?$	$= 5.14 \times 10^{24} \text{J} \times 0.04. (T=274)$
*Ocean flow input	$1.0 \times 10^{23} \text{J/y} ?$	$(2.0 - 1.0 - X) \times 10^{23} = 1.0 \times 10^{23}.$

北極海動熱容量： $C_A = 1409,0000 \times 10^6 \text{m}^2 \times 200 \text{m} \times 10^3 \text{kg/m}^3 \times 4.178 \text{KJ/Kg} = 1.18 \times 10^{22} \text{J/K}.$

$$C_A = C_G \times 0.04 = 2.7 \times 10^{23} \text{J/K} \times 0.04 = 1.0 \times 10^{22} \text{J/K}.$$

年量太陽入射：

$$\pi R^2 F_0 \times (3600 \times 24) \times \pi R^2 \times (3600 \times 24 \times 365) = 1.75 \times 10^{17} \times (3600 \times 24 \times 365) \\ = 5.52 \times 10^{24} \text{J.}$$

日量冷却放射＝日量地上入力。

$$(4 \pi R^2 \sigma_0) T^4 \times (3600 \times 24 \times 365) = 9.16 \times 10^{14} \times T^4 =$$

$$T=273. \quad = 5.07 \times 10^{24} \text{J.}$$

$$T=274. \quad = 5.14 \times 10^{24} \text{J.}$$

$$T=275. \quad = 5.18 \times 10^{24} \text{J.}$$

$$T=288. \quad = 6.28 \times 10^{24} \text{J.}$$

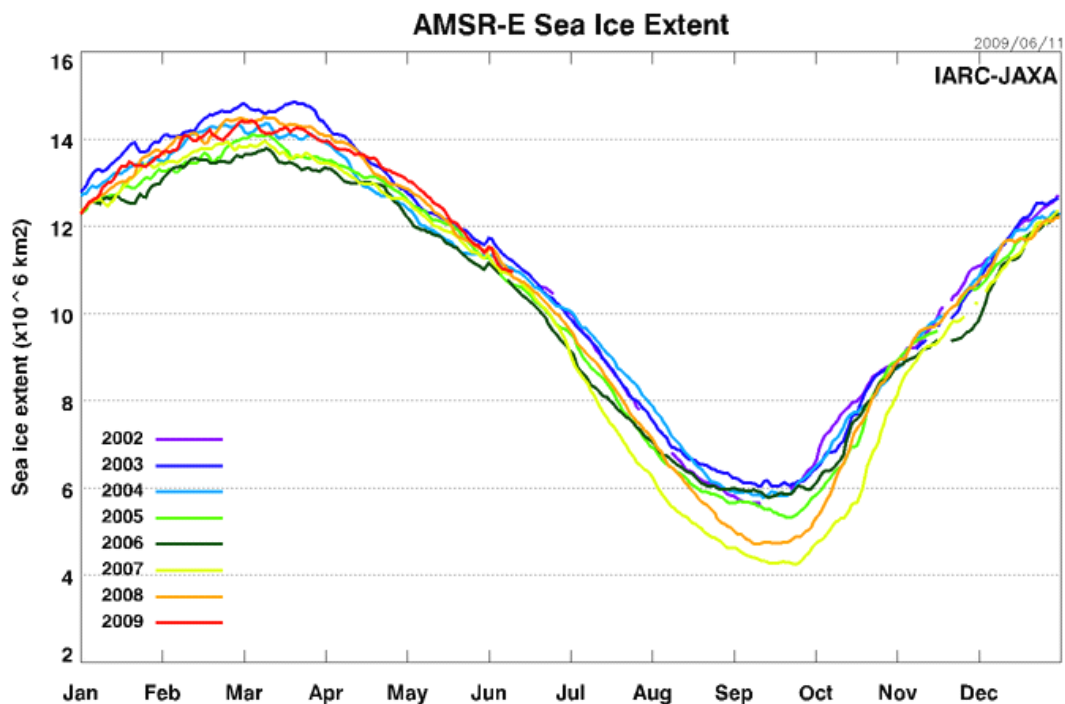
$$F_0 = 1366 \text{W/m}^2 ; R_E = 6.38 \times 10^6 \text{m} = \text{Earth radius} ; \sigma_0 = 5.67 \times 10^{-8} \text{Wm}^{-2}\text{K}^{-4}.$$

$$T(=273+15)^\circ\text{C} = \text{global mean temperature on the surface.}$$

(3)北極海表面積情報：

<http://www.ijis.iarc.uaf.edu/jp/seaice/extent.Htm>

北極熱流入 $J_A(t)$ を表現する典型は、氷層面積 $\Delta S(t)$ 融解-凍結の過程、
然るにそれは短期年間視点では日照直射周期(交流成分)に同期し、長期視点では地球温度
上昇水準(直流的な不可逆的上昇)に並行して総量融解が進行。



$$\text{季節氷層融解熱} = (15-5) 10^{12} \text{m}^2 \times 3 \text{m} \times (0.917 \times 10^3 \text{kg/m}^3) \times 334.7 \text{KJ/Kg. } K=9.2 \times 10^{21} \text{J.} \\ = (15-5) 10^{12} \text{m}^2 \times 2 \text{m} \times (0.917 \times 10^3 \text{kg/m}^3) \times 334.7 \text{KJ/Kg. } K=6.1 \times 10^{21} \text{J.}$$