

non-ipcc **Climatology toward Coming Climate Crisis(V2)**. '13/6/16,'14/6/8.

Coming climate change would rule the world,however **IPCC** the most responsible UN org will not work well !!! ,and **the fatal realities will not be disclosed !!!**.So,author strongly recommend **re-verification** on climate science superficially vague,but substantially decisive by **techno-science field people in general** the non-ipcc.In order to **quick learning**,,he present summary of the physical foundations and many concerned informations.

 **Notification on update Version 2(2014/6/8)**

“**PartIII**–chap1,chap2 [1][2][3][4]relating with “**radiative forcing**” was **vastly** revised.

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

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http://www.777true.net/Part_6_non-carbon-Energy-Engineering.pdf

On now situation and possible counter measure against climate corrupting

So far author has been investigated, climate debate on **the substantial scientific predictions** had already **ended**, but the overwhelming judgement and **the counter measure** have not yet realized to global public. The fatality is here and the aim of this report. "Also readers must confirm that climate science **predictions** had been **ended** !!!".

-the substantial scientific prediction -

(1) Conserving now emission would be about $0.5^{\circ}\text{C}/20\text{yr}$. This is **decisively nothing relief**.

Even **0-emission** would be about max $0.2^{\circ}\text{C}/20\text{yr}$, even which could not be told safe.

http://www.777true.net/This-is-the-most-emergent-problem-of-to-live_or-not-to-live.pdf

(2) **Arctic Methane Risk the most emergent, but most hidden problem at now.**

Arctic sea floor reserves mass destructive thermal bombs called **Methane Clathrate (MC)**.

Destiny of the world depends also on **ice lid extent in Arctic**. Already **albedo feedback** have begun! (ice extent retreat increases solar heat input, which accelerate more ice retreat)

Arctic ocean warming of 1°C would be fatal to trigger MC bomb into **fireball earth** (~ 2040).

Only by emergent geo-engineering of **Arctic Cooling** can stop the albedo feedback !!!.

(3) Coldest Arctic warming is to push outward more **cold waves**, while hottest equator push more **heat waves**, both are heat exchanging between both region and become alternatively **more hazardous** to be **stronger storms, floods, and droughts**. Collision of cold and hot air mass would cause climate more wild at anywhere.

(5) Livelihood become more and more difficult due to **foods crisis & climate disasters**,

-the possible global counter measure -

Following (1)(2) are **must** items

(1) **Revolutional change in energy from carbon to non-carbon to maximize CO2 sink and to stop global temperature rise** (more than 80% CO2 cutting).

(2) **Geo-engineering of Arctic Cooling** to stop ice lid retreat (albedo feedback).

Following are optional items in the strict restricting condition of (1)(2).

(3) **Oceans cooling to accomplish early realization of temperature stop and to prevent climate disasters worsen.**

(4) **Global forestation on land and marine to accelerate carbon sink.**

(5) **Design on global economy regime almost without carbon energy.**

(a) new energy development and foods saving tasks in climate becoming wild.

(b) design on new economy & administration regime with minimum carbon energy.

(c) Most of people become soldiers and work by national plan in **semi-wartime regime**.

Certainly those are outrageous, however without those operations, we would be extincted.

Opened Letter to global Climate Scientists from author(2013/7/11).

The Last Overwhelming Judgment of Science

Conclusionary to tell, it has been due to your **vague attitudes** that policy makers could not make decisive decisions to tackle against climate corrupting.

Time for climate debate may have already passed out !,

but you must accomplish emergent debate to concentrate to be **unique global action** against Arctic Methane Risk with more than 80% CO₂ global cutting(*0.3°C rise). It is **the last overwhelming judgment of science!!!**. Already, we have not sufficient time anymore<see climate time estimation table>.

<http://www.777true.net/Climate-Time-Estimation-Table.pdf>

*Even possible minimum 0.3°C rise could not be told safe as for Arctic and global.

Thereby, geo-engineering becomes necessary.

<http://arctic-news.blogspot.jp/p/the-need-for-geo-engineering.html>

http://www.777true.net/This-is-the-most-emergent-problem-of-to-live_or-not-to-live.pdf

(1) **Goedel's Completeness Theorem** proved unique being of truth in theory which could be either deterministic or probabilistic.

(2) **Warning by Arctic Methane Emergent Group**. Unless emergent drastic global counter measure, **2015 ± 2** would be tipping point toward fireball earth in **few decades** !!.

<http://www.ameg.me/>

<http://arctic-news.blogspot.jp/p/global-extinction-within-one-human.html>

<http://www.777true.net/Rapid-Temperature-Rise-in-Arctic-a-simple-verification.pdf>

Even as though, we could not be enough. The last possibility is

geo-engineering for Arctic cooling and Oceans cooling .

<http://arctic-news.blogspot.jp/p/how-to-cool-arctic.html>

<http://arctic-news.blogspot.jp/>

Certainly the scale of geo-engineering is outrageous !!!, however the scale of **coming hell** by climate disasters with ethical corruption in decades would be more outrageous !!!!!.

If people could have known the reality of the latter ,they would opt way with global geo-engineering !!! ..

(3) To tell from very origin of the cause, **the Global Capitalism Regime with OIL** by the minor noble elites has been ruling this world not to reveal the fatal reality. Thereby before taking those task, we have to accomplish **global revolution to turn upside down this world!!**

<http://www.777true.net/New-Regime-Design-to-Turn-the-Upside-Down-World-at-Now.pdf>

<http://www.777true.net/The-Upside-Down-World.pdf>

Even **such revolution** could be possible by your **the last overwhelming judgment of science !**

(4) From the Liberation(France), president Putin is told to delete the Russian Academy of Science ?, however I could not know the reason. In my view, also global climate researchers association should be deleted in order to accomplish **the last overwhelming judgment of science** and declare globally and loudly **Arctic Methane Catastrophe Warning** toward global people. Because, the Time for climate debate may have already passed out !! It is the last your duty (the sacred war). After all, you would be nothing, but become **hero !!!**. This is also no regret policy for climate scientists themselves.

(5) Also author wish to know your **plans** for **geo-engineering for Arctic cooling and for Oceans cooling** ,....., and for **how to live in tough global new regime against climate corrupting (politico-economy design)**. Another decisive task may be **revolution in non-carbon energy engineering**, as for it, see attached PDF, however it is incomplete note at now.

(6) Also president Obama once told , I will will will direct my Cabinet to come up with executive actions we can take, now and in the future,

<http://www.whitehouse.gov/state-of-the-union-2013>

Or we can choose to believe in the overwhelming judgment of science--and act before it's too late.

Truly yours, editor:motoji-SUZUKI.,

PS: Certainly last chapter of **the Bible** warned coming doomsday of mankind due to their sin. However the Bible's main mission is teach on mankind's repentance, which is nothing, but revolution.

The Bible, Ephesians. 6:12 For we wrestle not against flesh and blood, but against principalities, against powers, against the rulers of the darkness of this world, against spiritual wickedness in high places. Wherefore take unto you the whole armour of God, that ye maybe able to withstand in the evil day, and having done all, to stand. Stand therefore, having your loins girt about with truth, and having on the breastplate of righteousness; And your feet shod with the preparation of the gospel of peace; Above all, taking the shield of faith, wherewith ye shall be able to quench all the fiery darts of the wicked.

Part I :Physical Foundation of "Numerical Weather Prediction".

chp1:Atmospheric Fluid Dynamics with various climate components

Climate is phenomena of {sunny,rainy,snowy(cloud~humidity),temperature, and wind}which is ruled by **air mass flow(wind)** with **cloud(humidity~rain & snow fall)**and **temperature**.

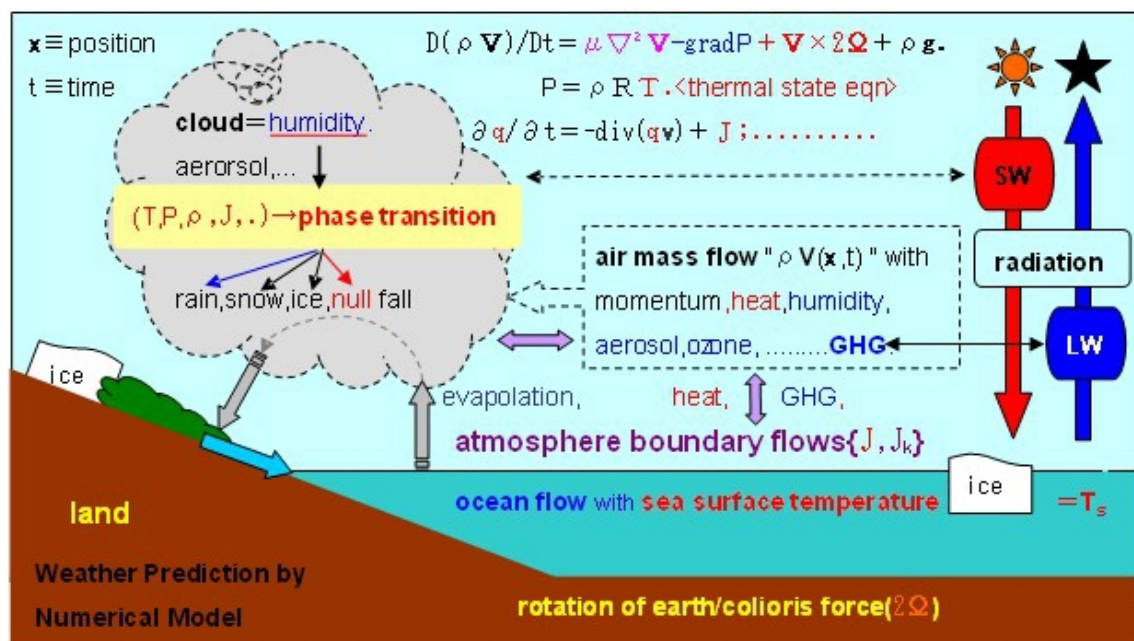
Main forces on global air mass flow are **Coriolis force** due to earth rotation and **gravity**. 2nd local force may be **pressure gradient force** due to **heat(SUN)**. Then air mass density $\rho = \rho(T, P)$ is ruled by temperature=T,and pressure=P, or $P = P(\rho, T)$..

Following fig is overall view on weather prediction components.The main stage of weather is **atmosphere**,however it is connected with the boundary surfaces of land,marine and sun.

<http://www.jma.go.jp/jma/kishou/known/whitep/1-3-1.html>

Similar picture could be seen in following site(in last page).

http://www.ecmwf.int/newsevents/training/rcourse_notes/GENERAL_CIRCULATION/CHAOS/Chaos4.html



- 1: Observed Weather Data input to initial condition($t=t_0$).
- 2: Solving Equations
- 3: Weather Prediction by NWP(Numerical Weather Prediction) $\{V(x,t), T(x,t), P(x,t), \rho(x,t), \dots\}$

Established primitive equations on weather forecasting by numerical modeling.

<http://homepagel.nifty.com/weather/yoho-note/yoho14.html>

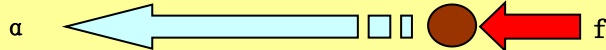
http://www.uibk.ac.at/mathematik/personal/csomos/weather_slides4.pdf

The basic equations on weather prediction calculation is **fluid dynamics equation**= (1) with **thermal state equation**=(6) and **conservation law**(\equiv CL)equations with external **current flows** $\{J, J_k\}$ on **climate matter components**{heat, mass density of air, humidity, various aerosol components}. All equations are direct conclusion due to **exact physical principle**. But exceptions are current flow models of $\{J, J_k\}$ which is **kernel in the model**.

(1) **air fluid dynamics equation**(exact physical principle \equiv epp; $\partial_t V \equiv \partial V / \partial t$):

(a) **What cause velocity acceleration** (Newton Dynamics). *"This is the first principle".*

$M\alpha = f$. <mass "M" gets acceleration α by force f by Newton dynamic equation>



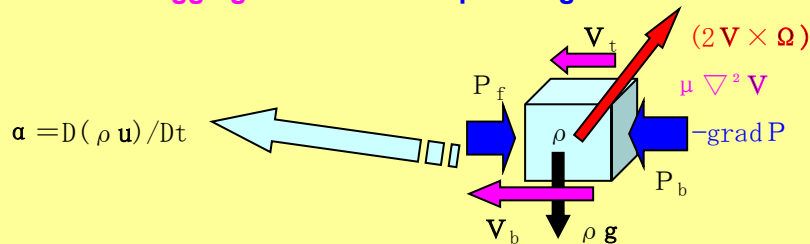
(b) **What cause atmospheric flow**(Fluid dynamics viewpoint)(epp).

<http://www.777true.net/easyFD.pdf>

$$D(\rho V)/Dt \equiv \rho(\partial_t V + \langle V \cdot \nabla V \rangle) + V(\partial_t \rho + \langle V \cdot \nabla \rho \rangle) = \mu \nabla^2 V - \text{grad} P + V \times 2\Omega + \rho g.$$

The mass(density) ρ acceleration=**forces**

=**surface dragging force**+**surface pressing one**+**Coriolis one**+**gravity one**.



(c) $V(x=\text{space}, t=\text{time})$, Ω =earth angular rotation velocity, $\rho(x, t)$ =air density, $p(x, t)$ =air pressure, g =gravity force, μ =friction coefficient, $T(x, t)$ =temperature, R =gas constant,

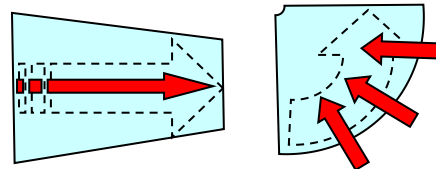
(d) $\langle a \cdot b \rangle \equiv a_1 b_1 + a_2 b_2 + a_3 b_3$. : see text book on vector analysis.

$$\langle V \cdot \nabla V \rangle \equiv (\langle V \cdot \text{grad} V_1 \rangle, \langle V \cdot \text{grad} V_2 \rangle, \langle V \cdot \text{grad} V_3 \rangle) = (\nabla V^2 / 2) - V \times \text{curl} V$$

=**pushing force** for toward larger V

+**centrifugal force** due to rotational fluid.

"this **non-linear term** is **stationary**, but force for fluid acceleration".



(e) It's not exact that **the non linear term** has been considered **the origin of solution**

chaos(difficulty of long term prediction), but which is due to frictional term " $\mu \nabla^2 V$ ".

A friction is due to collision of quantum particles, which is essentially probabilistical, but not causalistical. Then μ could be less effective by **large scale transformation** on $\{x, t\}$. Then the equation may become causalistical.

http://www.777true.net/Information-Loss-Process-in-NS-Equation_The-Cause-of-Chaos.pdf

(f) the equation does not trace each fluid motion, but look on **whole of velocity field at a time**. Even if the field is stationary and velocity has **space gradient** at somewhere, that is $(\mathbf{v} \cdot \nabla \mathbf{v}) \neq 0$, then some force could be at there. A simple example may be a stationary flow in winding pipe line, where wall pressure force of pipe line is not zero.

<http://www.777true.net/>

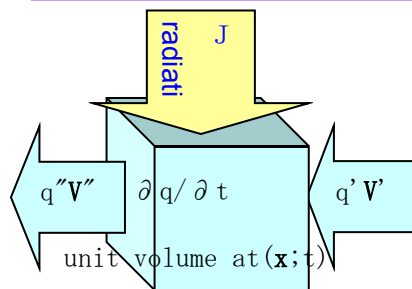
(2) $0 = -\partial p / \partial z - g \rho$. **vertical component on pressure gradient (epp?)**.

primitive equation method has nothing vertical component. **It is not 3 dimensional**.

(3) **CL = conservation law equation** at space-time = $(\mathbf{x}; t)$ in unit time.

density "q" change/unit time = -(outflow with \mathbf{V} - inflow with \mathbf{V}) + **external-flow** $\{J, J_k\}$.

$$\partial q / \partial t = -\text{div}(q\mathbf{v}) + J(\mathbf{v}, p, \rho, q, w_k, T).$$



This is evident a **budget equation** of

{income flow - outgo flow + external injection at boundary

$$-\text{div}(q\mathbf{v}) + J(\mathbf{x}; t; \mathbf{v}, p, \rho, q, w_k, T)$$

= stock heat amount change/unit time}.

$$\partial q / \partial t$$

(3) $\partial \rho / \partial t = -\text{div}(\rho \mathbf{V})$.

CL of air mass density (epp).

(4) $\partial q / \partial t = -\text{div}(q\mathbf{V}) + J(\mathbf{v}, p, \rho, q, w_k, T)$.

CL of heat with air (model).

J_k (external flow at boundary) = land and water surface boundary, cloud and rain fall volume.

(5) $\partial w_k / \partial t = -\text{div}(w_k \mathbf{V}) + J_k(\mathbf{V}, p, \rho, q, w_k, T)$.

CL of component with air (model).

* many climate matter components ($k=1, 2, 3, \dots, N$) with air flow = \mathbf{V} .

* H₂O (water) has various state such as invisible humidity, visible humidity (cloud) or rain & snow drop, which are to be determined ($T, P; w_k$ = aerosol components density).

(6) $p = \rho R T$.

thermal state equation ($PV = mRT$) (epp).

$$* q = T(p_0/p)^{R/C_p}$$

heat density equation? .

(7) **Completeness of the Algorithm.**

Prediction calculation become complete by following necessary condition.

(a) **number of independent equations** = $\{1(2\text{components}) + 5\}$

= **number of unknown variables** = $\{\mathbf{v}(2\text{component}), p, \rho, q, w_k, T\}$.

(b) $\{J, J_k\}$ are determined as function of $(\mathbf{v}, p, \rho, q, w_k, T)$.

(c) Performance of a model may be determined by good or bad of $\{J, J_k\}$.

(8)☞ ((1)(e)) : **Weather prediction become unstable in strong chaotic air mass flow !!!.**

Fluid equation has **unique weak point** called **chaos**, which causes prediction unreliable and is due to fluid surface friction(**stirring**)force($\mu \nabla^2 \nabla$). An example may be **cold and hot air mass radical collision**, which would be more frequent as global warming goes on.

http://www.777true.net/Information-Loss-Process-in-NS-Equation_The-Cause-of-Chaos.pdf

*Recent years weather prediction in Japan becomes gradually unstable in author's view.

Caution:

Author has no professional experience in Climate Science. However, he wrote chapters as expert did. Then note some portions may be incomplete or wrong, and some portion could not be written except by author. As for whole of the details, author wish reader would write own climatology from this incomplete report. **But whole of some decisive conclusions, author believe that all of the readers would agree those.**

-the substantial scientific prediction -

(1) Conserving now emission would be about **0.5°C/20yr**. This is **decisively nothing relief**.

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Arctic ocean warming of 1°C would be fatal to trigger MC bomb into **fireball earth**(~2040).

Only by emergent geo-engineering of Arctic Cooling can stop the albedo feedback !!!.

(3) Coldest Arctic warming is to push outward more **cold waves**, while hottest equator push more **heat waves**, both are heat exchanging between both region and become alternatively **more hazardous** to be **stronger storms, floods, and droughts**. Collision of cold and hot air mass would cause climate more wild at anywhere.

(5) Livelihood become more and more difficult due to **foods crisis & climate disasters**,

chp2:The actions of High and Low Pressure Air Mass(the basic flow mechanism).

Without cpu,we could not calculate fluid-dynamics,so we anticipate air mass behaviors(flow) by pressure distribution in concerned air mass.

* **High and Low Pressure Air Mass Structure**(Japanese) .

<http://www5b.biglobe.ne.jp/~take-t/tenki/high&low.html>

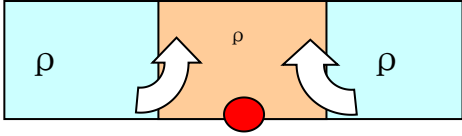
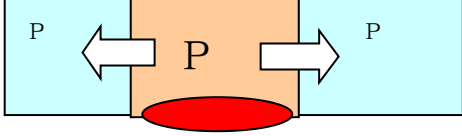
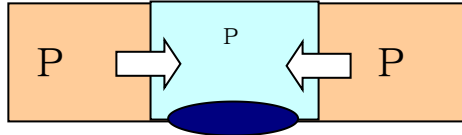
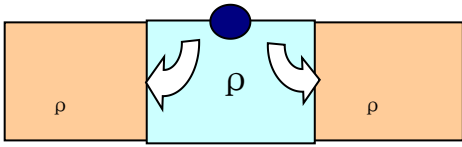
(1)**Air gas state equation**<pressure=constant×density×temperature>.

$$P = (R/M)\rho T.$$

Atmosphere pressure is about 1atm at anywhere,so temperature rise causes density lower and that of down causes density higher.This is fundamental rule.

(2)**Structure of High and Low Pressure**(warmer air and colder air are relative).

Comprehension on symmetric 4 type assists simple insight on climate dynamics

<p>LP by upwelling by heat(density grad) lower density ρ by heat is to unwell and to sink neighbour air mass.</p>  <p>eye of storm(warm sea surface) tornado by big fire hot spot with cupelling in summer land</p>	<p>HP by expanding by heat(pressure grad) balloon inflation by heat</p>  <p>oceanic HP(sea surface temperature) negative Arctic oscillation=weak westerly</p>
<p>LP by cold (pressure gradient type) balloon deflation by cold</p>  <p>small LP air mass in winter ocean Positive Arctic oscillation=strong westerly</p>	<p>HP by downwelling by cold(density grad) higher density ρ by cold is to downwell and to push out neighbour air mass.</p>  <p>cold and high density air mass from Arctic cold spot with downwelling in winter land</p>

Dominant factor is **insolation heat**(latent heat by rain drop),or **cold without insolation**(Arctic winter),which are to determine pressure force to cause air mass flow direction(indicating by arrows).

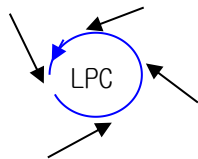
(3) **Coriolis force:** see [Appendix 1](#)

<http://www.777true.net/Frequent-Cold-Waves-from-Arctic-in-Global-Warming.pdf>

This force is very fundamental in climatology dynamics. Earth is not rest, but rotate with very high surface speed (a turn/24 hour), which is to **curve trajectory of inertial air mass flow**.

*typical example may be **westerly wind** in middle latitude, while equator has trade wind (easterly) caused by warm upwelling air mass flows.

(4) **Low Pressure eddy rotation by Coriolis force:**

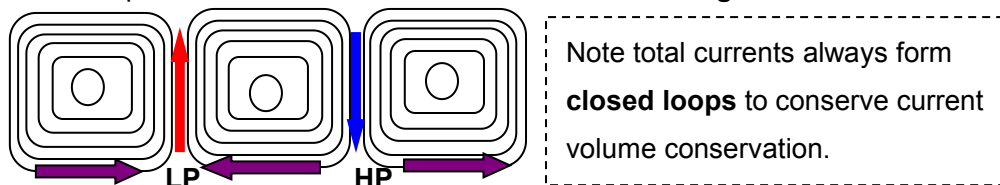


LP center has strong sinking for neighborhood air mass, which forms counter clock wise eddy in northern hemisphere, while in southern hemisphere is clockwise. As for HP, it becomes upside down. LP with upwelling tends to cause cloud v. rain v. or snow v. while HP become fine.

Upwelling flow sometimes becomes colder to cause humidity rain drops.

(5) **3 Dimensional Structure of HP & LP.**

To tell from very beginning, inner pressure of gas balloon may be monotonous at any position. Similarly, atmospheric pressure is about 1atm at anywhere. However, the pressure difference less than 10% could cause remarkable different climate phenomena in general. Fluid equation tells pressure is caused also from **momentum change**.



For example, **HP** is caused from **down-flow momentum** at ground (source), while **LP** become upside down of HP (sink by upwelling by heat).

(6) **air thermal state equation:** $p = \rho R T$.

(a) Near at ground, p is about 1atm, so higher T cause lower air density ρ (upwelling)

(b) so lower T cause higher air density ρ (down welling)

(c) As altitude becomes higher, T becomes lower as rate $0.6^\circ\text{C} / 100\text{m}$. P becomes lower as (1/10)/15km height (**troposphere**).

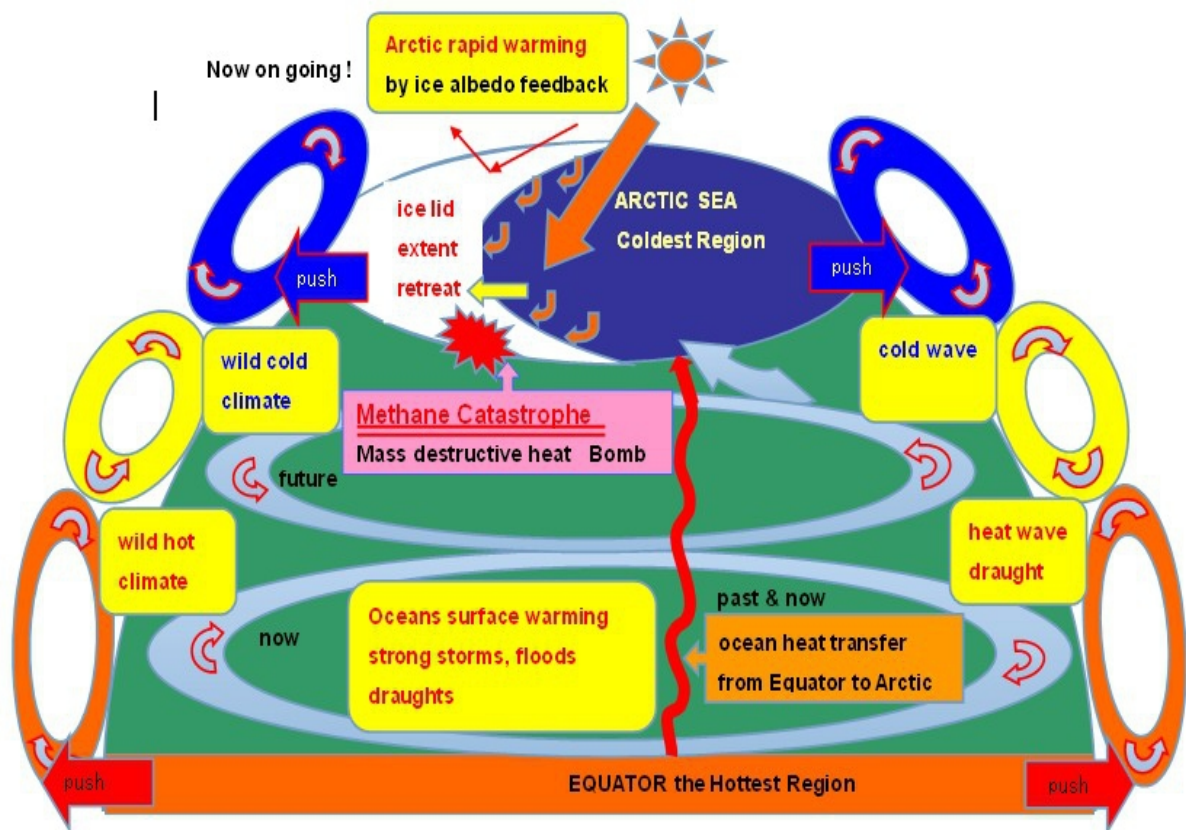
(7) Air density $= 1.2\text{kg/m}^3$. So wind V could get strong momentum $P = \rho V$ (**wind turbine energy sources:** $W(\text{watt/m}^3) = \rho V^3/2$).

(8) As author's experience, **global climate has been ruled by ocean surface temperature**. This is also teach by experts.

Part II :Climate Change Analysis= what's going on ?!!.

chp1:Qualitative Analysis on Climate Becoming Wild in 3 dim model.

In decadal years and global scale, climate is dominated by **ocean temperature** into which **debt heat** has been entirely increasing. Off course the hottest tropical region has been warming, while also **Arctic** the coldest region has been **most warming** due to ice albedo feedback (ice extent retreat accelerate heat input into black sea, which accelerate more ice extent retreat). Then what would happen in **atmosphere**? Arctic begin to push out **strong cold wave** toward northern hemisphere, while tropical region push out **heat wave**. Certainly global warming is to cause **strong** heat wave, hurricane, flood, and drought due to the excess heat. Also note strong cold wave simultaneously is to occur in winter. Moreover, **collision of heat and cold wave** could frequently cause **wild climate**, stronger tornade with hail, abrupt massive rain (snowfall, flood). Weather becomes more **chaotic** and **less predictable** due to radical heat exchanging between cold and hot air mass. Thus, basis of our life (foods, water, infrastructure) would become **more unstable as time goes on**.



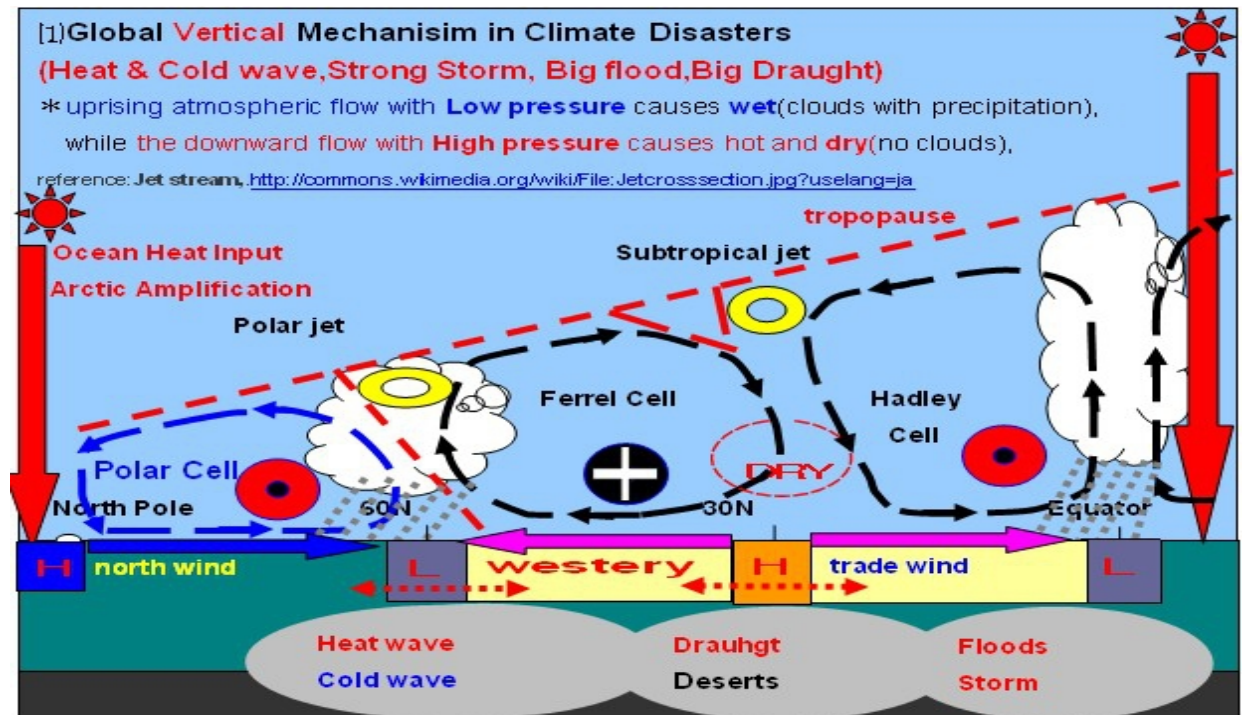
Global warming is all right, however, there is a paradox called **Arctic warming**, which is to push out **cold air mass** toward northern hemisphere to cause **strong cold wave in global warming**, and **wild climates** by collision with **hot air mass** from tropical region. Totally to tell, heat exchanging between Equator and Arctic has been accelerating.

(1) **3 dimensional global model(for qualitative interpretation on climate becoming wild)**

Insight on {heat and cold wave, typhoon-hurricane, floods, and drought}

<http://commons.wikimedia.org/wiki/File:Jetcrosssection.jpg?uselang=ja>

http://commons.wikimedia.org/wiki/File:Earth_Global_Circulation_-_en.svg?uselang=ja



(2) **Cause of uprising atmospheric flow.**

Part1(6) $p = \rho R T$. <pressure= P is a function fo temperature= T and air density= ρ >.

Then high temperature causes low ρ and low one causes high ρ .

(a) **surface heat of ocean(land) due to heat reserving by insolation(equator and etc).**

☞ **Insolation has been being intensified** by increasing radiative forcing(RF)

caused by Green House Gas(GHG) of **CO2**.

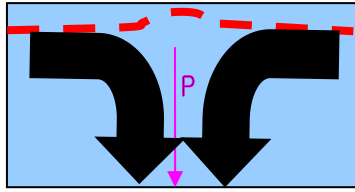
(b) collision by high density **cold** and low density **warm** air mass(winds) in low pressure zone(60N and etc). Both of those are driven by High pressure. Especially note that recent Arctic warming tend to be high pressure, which causes frequent cold downward wave into northern hemisphere.

<http://thinkprogress.org/climate/2013/03/15/1725461/how-arctic-ice-loss-amplified-superstorm-sandy-oceanography-journal/>

(c) mass atmosphere climbing **high mountain** is just uprising one. Which is to lost humidity and to get hot and dry atmosphere. **Most of deserts** lie over mountains.

(d) **uprising atmospheric flow become higher heat with low humidity(=dry) by rain fall in latent heat discharging(cause of storm and draught).**

(3) **Cause of downward atmospheric flow and high pressure near at 30N.**



Collision of two mass air(winds)of opposit direction at **top of tropopause** must go downward.Note then downward pressure **P** is generated at the collision zone,which is to **cause** westery subtropical **jet stream as warning marker.**

Subtropical jet ,high pressure mass and fine days without clouds are cobody,which is to cause **recent strong draughts at lands**.Note generation of jet stream is interaction consequence of global massive air flows,but not the essential cause of drought.The most original cause must be {**heat source of tropical zone** and **0 °C temperature of cold 90NS poles**,both of which establish a **global heat engine**}. .

*the detail of westery jet stream mechanism.

Part1(1) $\rho (\partial \mathbf{v} / \partial t + \mathbf{v} \cdot \nabla \mathbf{v}) = \mu \nabla^2 \mathbf{v} - 2 \rho \boldsymbol{\Omega} \times \mathbf{v} - \nabla p + \rho \mathbf{g}.$

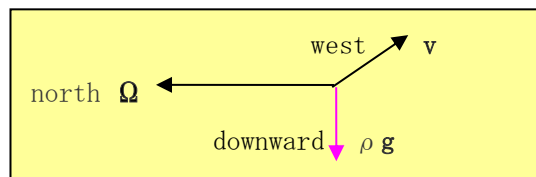
(a)In global scale model,frictional force term $\mu \nabla^2 \mathbf{v} = 0.$

proof)see appendix 2.

(b)nothing force approximation.

$$0 = -2 \rho \boldsymbol{\Omega} \times \mathbf{v} + \rho \mathbf{g}.$$

\mathbf{v} is westery jet stream by downward gravity force= $\rho \mathbf{g}.$



(c)**spiral westery flow in stationary equation solution.**

$$\rho (\mathbf{v} \cdot \nabla \mathbf{v}) = -2 \rho \boldsymbol{\Omega} \times \mathbf{v} - \nabla p + \rho \mathbf{g}.$$

Details could be seen in appendix 3.

(4)**trade wind and westery wind.**

Equator is the strongest sink of atmospheric flow(low pressure).30N is **high pressure zone** driving **westery** wind and **trade** one for each directions. 60N is low pressure zone due to uprising atmospheric flow by collision of cold and hot air mass.

(5)**The cause of strong storm with big flood.**

Global warming causes high sea surface temperature which causes more evaporation in uprising atmospheric flow in low pressure (sub)tropical zone.Those could be strong storm and big flood.See more details in **chp2.**

<http://www.777true.net/Appemdix1-2-3-4-5.pdf>

(6)The cause of strong drought.

chp3:Strong Drought the humidity non-conserving mechanism_2

(7)The cause of frequent strong heat wave and strong cold wave.

chp4:The cause of alternating strong heat wave and strong cold wave.

(8)Climate becoming wild due to global warming(the interpretation).

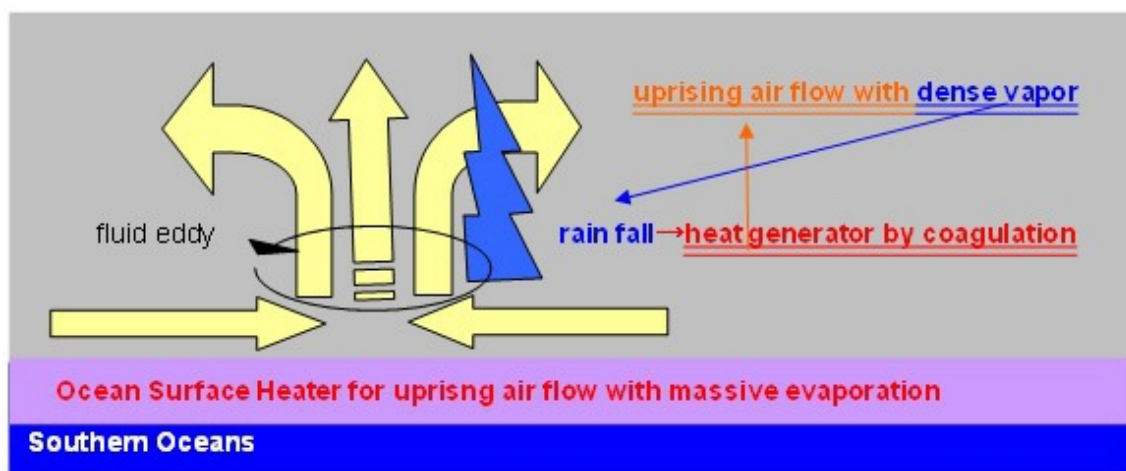
0. 1°C Global Temperature Rise $\doteq 8.6 \times 10^{22}$ Joule heat energy increase

How much energy for making a hurricane ? $\doteq 1.8 \times 10^{20}$ Joule.

<http://www.777true.net/0.1C-Temperature-Rise-could-cause-Climate-Wild.pdf>

chp2:Typhoon-Hurricane and Strong Rain Fall are co-body for heat engine.

(1)Typhoon-Hurricane and Strong Rain Fall are co-body for heat engine.



(a)Recent rise of atmospheric CO₂ has been causing rise of surplus heat into oceans,which is to cause more evaporation with uprising air flow(low pressure in mass air).

(b)This process could cause transition of vapor to massive rain fall,which discharge massive latent heat into uprising air,which accelerate more low pressure(heat engine).

This phenomenon becomes growing storm with strong rain.

(c)Energy of hurricane and typhoon is told almost total energy of evaporation.

<http://www.777true.net/0.1C-Temperature-Rise-could-cause-Climate-Wild.pdf>

(d)Extreme storm increasing by twice by 0.4°Crise,10times by 1°C rise.

<http://www.sciencedaily.com/releases/2013/03/130318151519.htm>

(e)As the consequence,we never could evade strong hurricane and floods disasters without cooling this planet.

chp3:Strong Drought the humidity non-conserving mechanism_2

<http://www.777true.net/Strong-Draught-Mechanism.pdf>

<http://www.777true.net/Cold-Sea-Water-Upwelling.pdf>

chp4:The cause of frequent strong heat wave and strong cold wave.

<http://www.777true.net/Frequent-Cold-Waves-from-Arctic-in-Global-Warming.pdf>

<http://www.777true.net/0.1C-Temperature-Rise-could-cause-Climate-Wild.pdf>

chp5:The cause of strong floods.

Now in summer 2013,Europe,India and Canada encountered unprecedented big floods.

At first,it is very evident that for causing big floods,it need **massive evaporation** from sea surface.That is,global warming is almost equivalent to **ocean surface temperature rise**, and tend to cause massive evaporation from sea surface.While also **Arctic warming** is to cause **cold air mass** going down deeply to northern hemisphere with **strong meander westerly wind**.Then what happen in collision between warmer high humidity air mass and cold air mas.If in winter,those become **strong snow fall**,and if in summer, **big floods**.

Over all to tell,global warming is to accelerate **heat exchanging between equator the hottest zone** and north and south pole **the coldest zone** to seek thermal equilibrium. Or in other exaggerate words,heating kettle's temperature now is accessing to boiling point,so **convection flow** becomes **wilder to stir all of water** in a kettle in order to seek thermal equilibrium. **Climate stirring** is nothing,but **sever disasters** for us mankind.

Part III: Global Temperature Operation by CO2 Emission Operation.

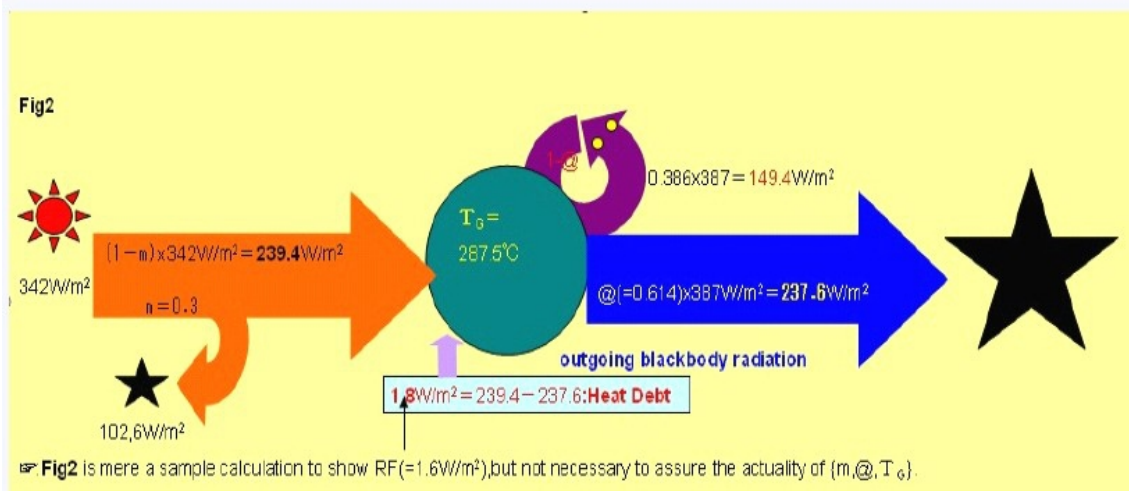
Global Temperature simulations are vastly updated (2014/6/8) and summarized at here.

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

Thereby, reader should read above page. So Part III is a kind of quick basic summary.

chp1: "0" Dimensional Global Heat Model < fate of globe could be analyzed >

(5) **Heat Debt = (Incoming Heat — Outgoing Heat)**
= the surplus heat causing global heat up.
 (heat imbalanced equation).



(1) change of global average temperature = $T(t)$,

$$4 \pi R_g^2 Y \cdot \{ (F_0/4) (1-a) - @ \sigma T^4 \} \equiv D \equiv 4 \pi R_g^2 Y \cdot \Delta F = C_g (dT/dt).$$

insolation input — Cooling radiation output = Heat Debt rise/year

≡ "effective radiative forcing" = (earth heat capacity × earth temperature rise/year).

a = albedo (solar ray F_0 reflection rate), $@$ = passing probability magnitude of cooling radiation σT^4 , (dT/dt) = annual temperature increment, heat input to ground = $(F_0/4) (1-a)$, cooling radiation from ground = $@ \sigma T^4$. global dynamic heat capacity = C , global area $S = 4 \pi R_g^2$, Y = year time in second, t = time (year), F_0 (solar constant) = 1366 W/m^2 . σ (Stefan-Boltzmann constant) = $5.67 \times 10^{-8} \text{ W/m}^2 \text{K}^4$. ΔF (radiative forcing) = 1.87 W/m^2 .

annual debt heat = global area × second/year {input heat — output one} on ground.

0 dimensional model employ simple heat budget equation (heat in-heat out), however is **exact relation** (note ground temperature and heat capacity are rather indefinite due to definition arbitrariness). See following fig2. Note global solar ray reflection rate $a(t)$, and passing probability magnitude = ppm due to GHG = $@(t)$ of cooling radiation from global surface are decisive element of which variation determines global average temperature.

That of $\alpha(t)$ has become civilization evil (massive CO₂ emission by global carbon fuel consumption in economy activity). Now local Arctic $\alpha(t)$ decreasing of **ice lid retreat** enhances more heat input the ocean with more local Arctic $\alpha(t)$ decreasing, which has become **vicious positive feedback**. This turns to trigger **methane eruption** by warming sea floor, which is fatal to be catastrophic. The counter measure of **Arctic Cooling** is the most emergent task at now world.

(2) **Before industrial revolution (1850), heat budget was balanced and stable by $D=0$.**

Variation factor α = reducing cooling radiation (σT^4) due to massive CO₂ emission.

(3) $C (dT/dt) = 4 \pi R^2 Y \cdot \Delta F$: **prediction T become possible by estimating RF variation.**

<global temperature rise rate is due to radiative forcing ΔF with global heat capacity C >

*** present value: $\Delta F \doteq 1.9 \text{ W/m}^2$. $\propto dT/dt \doteq 0.03^\circ\text{C/yr}$.**

radiative forcing is red debt heat !, of which increment increase temperature rise rate.

Thereby, we could determine future temperature by reading radiative forcing.

This is the validity for recommending NGO IPCC without supercomputer. **In other words,**

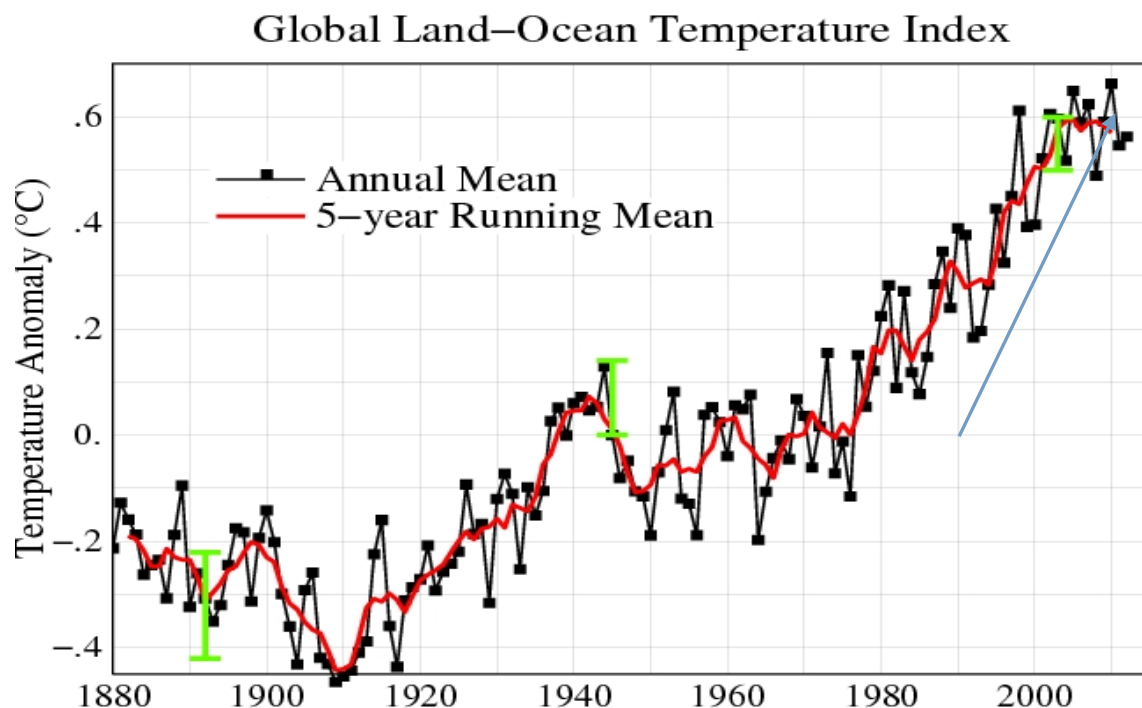
we could operate global temperature by operating radiative forcing ΔF by

geo-engineering.

This is the validity for recommending NGO IPCC in order to save this world.

(a) **Global Temperature Record Sources** (temperature rise rate observed $\doteq 0.03^\circ\text{C/y}$):

http://data.giss.nasa.gov/gistemp/graphs_v3/



http://www.env.go.jp/earth/ipcc/4th/syr_spm.pdf

<http://data.giss.nasa.gov/gistemp/graphs/>

<http://www.cru.uea.ac.uk/cru/info/warming/>

<http://www.sciencedaily.com/search/?keyword=global+temperature>

<http://www.sciencedaily.com/releases/2010/07/100718233311.htm>

<http://www.google.co.jp/search?q=global+temperature&hl=ja&client=firefox-a&rls=org.mozilla:en-US:official&channel=np&prmd=imvns&tbm=isch&tbo=u&source=univ&sa=X&ei=hswhUPCxMMvkmAX7q4CoAQ&ved=0CFwQsAQ&biw=1280&bih=825>

(b) **CO₂ observed data:**

<http://www.globalcarbonproject.org/carbonbudget/12/files/CarbonBudget2012.pdf>

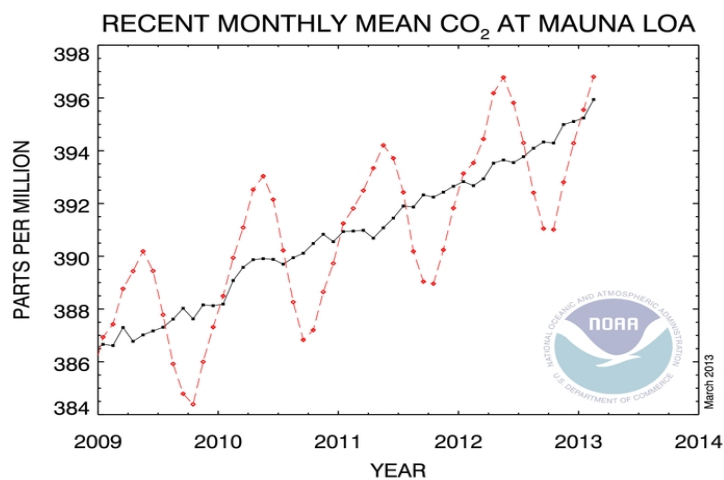
emission	absorption(sink)	accumulation in atmosphere
man-made= 8.3±0.4 PgC/yr 90%	land= 2.6±0.8 PgC/yr 28%	atmosphere= 4.3±0.1 PgC/yr 46%
natural= 1.0±0.5 PgC/yr 10%	marine= 2.5±0.5 PgC/yr 26%	2.1 ppm per year during the last 10 years

Total accumulation amount = $(8.3 \pm 0.4) + (1.0 \pm 0.5) = 9.3 \text{ GtC/yr}$

Emission amount = $4.3 \pm 0.1 \text{ GtC/yr}$

Absorption amount = $(2.6 \pm 0.8) + (2.5 \pm 0.5) = 5.1 \text{ GtC/yr}$

<http://www.esrl.noaa.gov/gmd/ccgg/trends/>



(c) **Global heat capacity and role of Oceans:** $C_G = SY \cdot \Delta F / (dT/dt) \doteq 1.02 \times 10^{24} \text{ J/K}$.

$C_{G\#} \equiv C_G / SY = \Delta F / (dT/dt) \doteq 62 \text{ W/m}^2 \text{ K}$.

* Normalization factor: $S = 4\pi R_G^2 = 4\pi (6.38 \times 10^6 \text{ m})^2 = 5.12 \times 10^{14} \text{ m}^2$, $Y = 3600 \times 24 \times 365 \text{ s}$.

The role of global ocean is dominant, because **oceans reserve most of the evil debt heat**.

Which is determine global climate, our livelihood and **our future destiny**.

* $(dT/dt) \doteq 0.03^\circ \text{C/yr}$. * **annual debt heat** $= 4\pi R^2 Y \cdot \Delta F (= 1.87 \text{ W/m}^2) \doteq 3.07 \times 10^{22} \text{ J/y}$.

* **Equivalent ocean depth of** C_G = the ocean volume/area of all oceans $\sim 690 \text{ m} \doteq 700 \text{ m}$.

"the debt heat is stored the big oceans//stable, but not likely to be warm, nor cold".

= **the validity of ruling climate by oceans**.

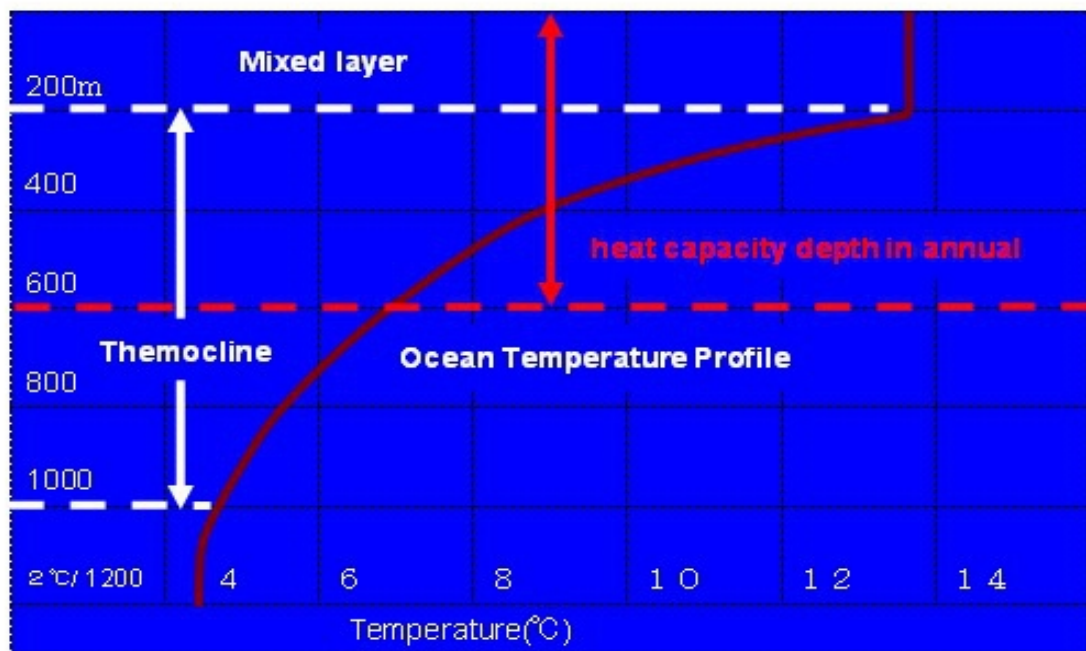
* sea water specific heat $= 4.02 \text{ KJ/KgK}$; * sea water density $= 1020 \text{ Kg/m}^3$.

* sea water heat capacity/ $\text{m}^3 = 4.1004 \times 10^6 \text{ J/m}^3$.

* **ocean volume of** C_G / all oceans area $= \langle (1.02 \times 10^{24} \text{ J/K}) / (4.1004 \times 10^6 \text{ J/m}^3) \rangle / 3.613 \times 10^{14} \text{ m}^2$
 $\sim 690 \text{ m} \doteq 700 \text{ m}$.

(d) **Thermal structure of Oceans ruling global climate:**

http://oceanservice.noaa.gov/education/yos/resource/JetStream/ocean/layers_ocean.htm



Ocean Size

<http://en.wikipedia.org/wiki/Ocean>

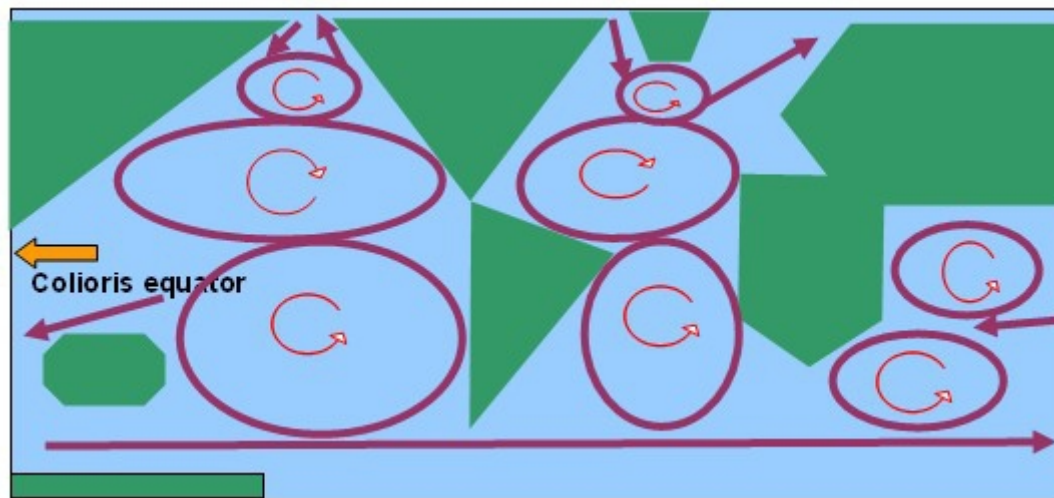
http://www.oceansatlas.com/unatlas/about/physicalandchemicalproperties/background/see_more1.html

THE AREAS AND DEPTHS OF OCEANS

Ocean and seas	Area in million km ²	% of the area of the World Ocean	Depth, m mean	Weight=area x mean dept x dens=1g	Effective heat capacity
Pacific	178.8	49.5	3 976	7.109-8(53)	35.76-6(49%)
Atlantic	91.7	25.4	3 597	3.298-8(25)	18.34-6(25%)
Indian	76.2	21.0	3 711	2.828-8(21)	15.24-6(21)
Arctic	14.7	4.1	1 225	0.184-8(1.4%)	2.94-6(4.0%)
World Ocean	361.3	100.0	3 711	13.40-8(100%)	72.26-6(100%)

(e) **Ocean Current as heat transporter from equator to pole zone.**

<http://www.onr.navy.mil/focus/ocean/motion/currents1.htm>



Main cause of **equator ocean current** is driving by **Colioris force** due to **high speed earth rotation**. Other ocean currents are consequences by those in fluid dynamics with coastal boundary condition. Ocean current acts to **partition massive heat** from equator the hottest zone to coldest zone of North and South pole zone. **Ocean surface temperature** rules global climate, evaporation-rain and snow fall, high and low pressure, and generation of storms. Cold sea water upwelling (returning currents from cold regions in deeper ocean, but not in deepest) at some coast acts to cause drought.

Cold Sea Water Upwelling (singular spot at **warming offshore**).

<http://www.777true.net/Cold-Sea-Water-Upwelling.pdf>

chap2:-Global Surface Temperature Trend operated by GHG concentration-

Global Temperature simulations are vastly updated(2014/6/8)and summarized at here.

You could notice the effectiveness of **zero dimensional model** of global temperature.

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

Thereby,reader should readt above page.So PartIII is a kind of quick basic summary.

<<EGT solution by "step by step integration with @ (t)">> 2013/6/11,

global annual debt heat(RF)=solar heat input—cooling radiation heat output .

Then output heat of cooling radiation($\equiv \mathbf{CR}$) depends on $@ \equiv \mathbf{CR}$ passing probability magnitude to space which is function of GHG concentrations.

$F_0 \equiv 1366 \text{ W/m}^2 = \text{solar heat per unit time unit area.}$

$a(t) \equiv \text{reflection rate of sun heat} = \text{albedo} = a(y=2013) \equiv 0.31? ,$

$@(t) \equiv \text{ppm}(\mathbf{CR} \text{ passing probability magnitude to space}) \text{ due to GHG concentrations.}$

$\sigma \equiv 5.67 \times 10^{-8} \text{ W/m}^2 \text{ K} = \text{Stefan Boltzmann constant for cooling radiation.}$

$T_G(t) \equiv \text{global averaged temperature as for CR(Cooling Radiation).}$

$\delta F_e(t) \equiv \text{effective Radiative Forcing to cause global temperature rise} = \text{annual heat debt.}$

$C_G \equiv \text{global heat capacity} \doteq \text{equivalent to global oceans with depth about } 700 \text{ m.}$

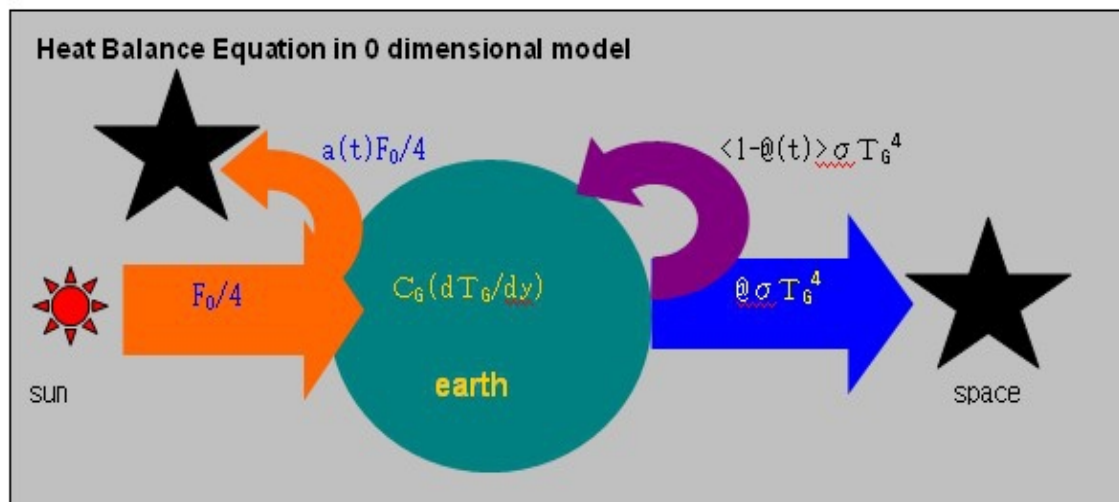
$Y \equiv \text{time in year} = 3600 \times 24 \times 365.$

$S = 4 \pi R_G^2 = 4 \pi (6.38 \times 10^6 \text{ m})^2 = 5.12 \times 10^{14} \text{ m}^2 = \text{earth surface extent.}$

— **Evolution Equation of Global Surface Temperature in 0 dimensional model** —.

$$C_G (dT_G(y)/dy) = Y 4 \pi R_E^2 \delta F_e = Y 4 \pi R_E^2 \{ (F_0/4) [1 - a(y)] - @(y) \sigma T_G(y)^4 \}. \dots 1$$

$$C_{G\#} (dT_G(y)/dy) = \delta F_e$$



[2]: **Climate Components as albedo $\equiv a(t)$ and ppm $\equiv @ (t)$.**

Thereby, global destiny has been entirely depending on {albedo $\equiv a(t)$ 、 ppm $\equiv @ (t)$ }.

(1) **solar constant** $= F_0 \equiv 1366 \text{ W/m}^2$ (exact).

<http://sohowwww.nascom.nasa.gov/gallery/Helioseismology/vir011.html>

http://sohowwww.nascom.nasa.gov/gallery/Helioseismology/large/vir011_prev.jpg

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

(2) **global absolute temperature at now** $= T_g = 15^\circ\text{C}$ (=288K exact information?).

<http://pielkeclimatesci.wordpress.com/2011/11/21/absolute-global-average-temperature-analysis-from-the-ipcc-models-from-lucia-at-the-weblog-blackboard/>

<http://www.carbonbrief.org/profiles/global-temperatures>

http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch3s3-2-2.html

Temperature change now from 1750 $= 0.85^\circ\text{C} \neq 1^\circ\text{C}$ (exact information?).

http://data.giss.nasa.gov/gistemp/graphs_v3/

(3) **Effective Radiative Forcing** $= \delta F_e \equiv 1.6 \text{ W/m}^2$. <this value should be revised 1.87 W/m^2 >

http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-9-2.html

http://www.grida.no/climate/ipcc_tar/wg1/pdf/TAR-06.pdf

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

$\delta F = 5.35 \times \ln \langle C(t) / C(t_0) \rangle$ <also this must be revised $\delta F = 12.95 \times \ln \langle C(t) / C(t_0) \rangle$ >

(4) **global albedo** $\equiv a(t) = 0.306; 0.31$, (almost 0.31 ?).

<http://nssdc.gsfc.nasa.gov/planetary/factsheet/earthfact.html>

<http://marine.rutgers.edu/mrs/education/class/yuri/erb.html>

<http://www.geography.hunter.cuny.edu/tbw/wc.notes/2.heating.earth.surface/images/albedo.table.jpg>

<http://geoeng.cypenv.eu/albedo.html>

<http://serdioclima.blogspot.jp/2010/06/balance-energetico-de-la-tierra-efecto.html>

[3]: **Radiative Forcing(RF) by GHG Concentrations Change.**

[4]: **Deriving approximated EGT solution by varying { @ (t) }.**

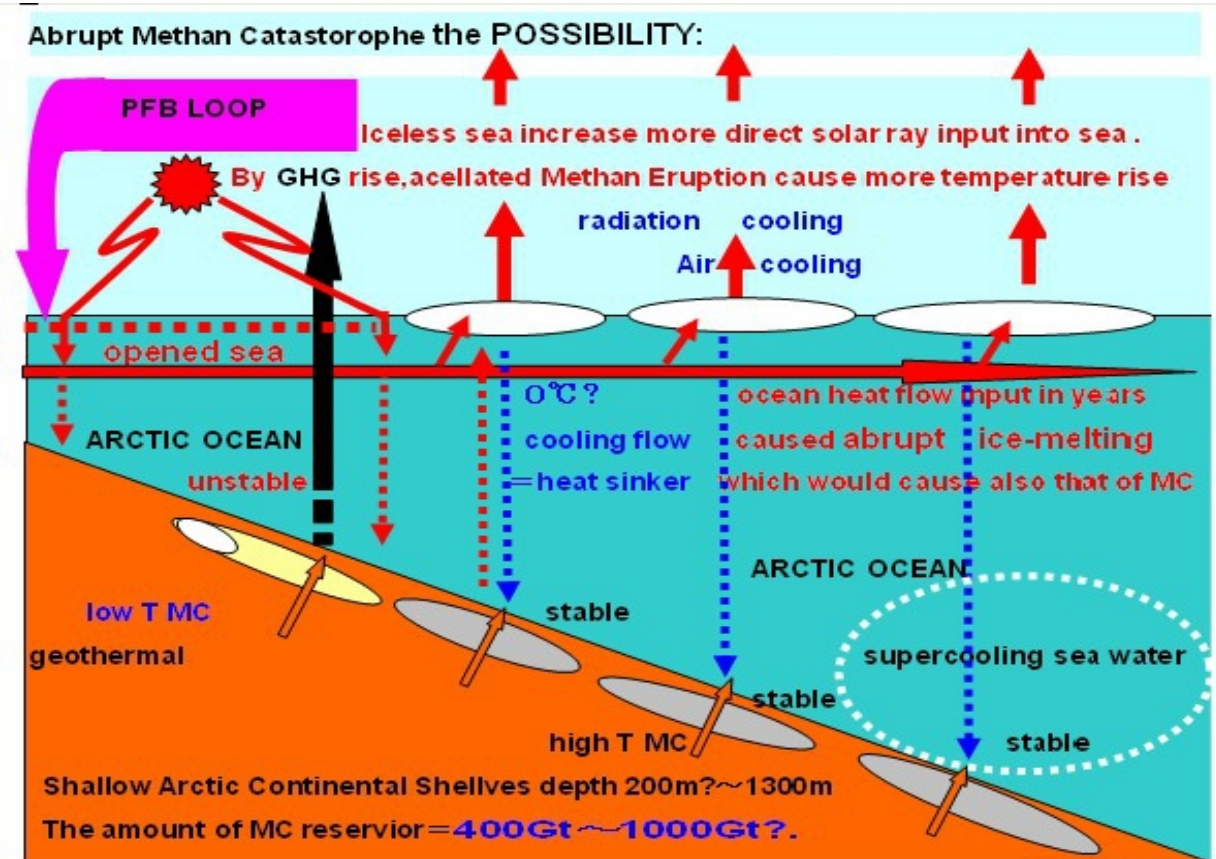
Above {[1], [2], [3], [4]} are vastly revised in following pages.

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

PartIV:Arctic Methane Catastrophe the Time Estimation.

<<Methane Clathrate the Mass Destructive Thermal Bomb in Arctic>>

(the highest priority problem at now). <http://www.realclimate.org/>



(1) Arctic sea floor reserve the amount of ice Methane reservoir = 400 Gt ~ 1000 Gt?

Once those had been stable due to stable ice cover, however, once heat transfer reached to those, MC (Methane Clathrate) is to be melted to release methane gas the strong GHG.

Then 10 GtC of those gas releasing is told **catastrophic** causing global surplus heat RF = 1.6W/m², which is twice current RF causing global temperature rise \approx **0.02~0.04°C/year**.

<http://www.777true.net/0.1C-Temperature-Rise-could-cause-Climate-Wild.pdf>

(2) For long years, global surplus heat had been flowing into Arctic by ocean and atmosphere

(3) **Now white ice lid retreat has been causing more solar heat input into the black ocean, which turn to cause more ice lid retreat(ice albedo positive feedback).**

<http://www.777true.net/Rapid-Temperature-Rise-in-Arctic-a-simple-verification.pdf>

(4) **The decisive our highest priority task at now is to stop ice albedo feedback !!!**

(5) **How to cool the Arctic**, John Nissen, December 2011:

<http://arcticclimateemergency.com/#/arctic-cooling/4559672848>

(6) People consider so called global warming is gradual process in coming decades and the crisis would be in future. However the fact is upside down. Now many scientists fear for huge amount of unstable MC = methane clathrate (ice, hydrate) melting in Arctic sea floor by rising sea temperature 1°C. The estimated amount of Arctic MC is 400~1000G ton in carbon standard, of which 10 GtC eruption is catastrophic. MC is more 70 times potent as GHG effect than CO₂. Once they emitted to atmosphere, temperature rising accelerate 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 recognized **mass extinction** of species by methane burps in **Permian** (251.4my) and **Paleocene–Eocene Thermal Maximum** (55.8my = million years ago). The final stage would be fire hell.

chp1: Arctic Methane Catastrophe the introductory.

http://www.777true.net/GLOBAL-DECLARATION-WAR-on-CARBON-with-Geo_Engineering_Part_C.pdf

<http://www.777true.net/FAQ-QL-MC-catastrophe.pdf>

chp2: Time Estimation on Arctic Methane Catastrophe

<http://www.777true.net/Rapid-Temperature-Rise-in-Arctic-a-simple-verification.pdf>

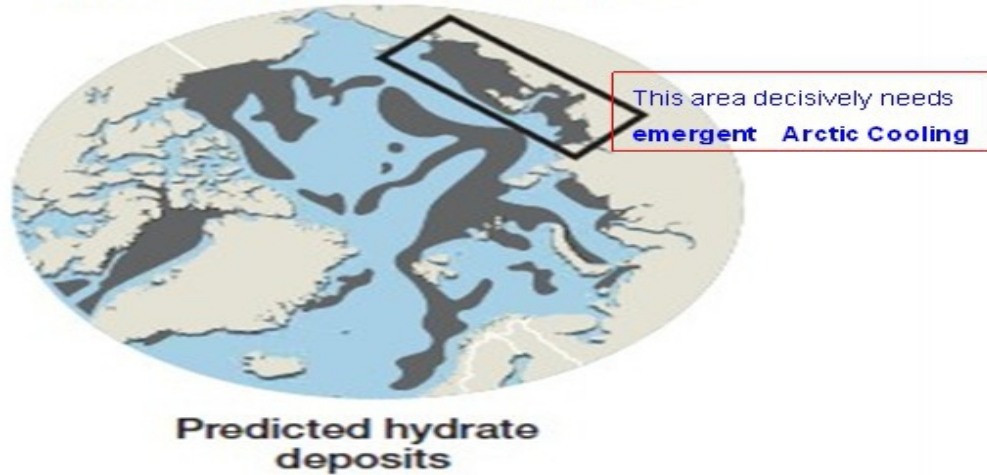
Chp3: The most vulnerable hydrates are on the East Siberian Shelf !!!

Arctic_Climate_Feedback (see p88/100)

http://climatecommunication.org/wp-content/uploads/2011/08/arctic_climate.pdf

This is a very long report, so quick reading are in the below.

**East Siberian Arctic Shelf
contains the shallowest hydrate deposits,
most vulnerable to release**



— The partial citations — .

The most vulnerable hydrates are on the East Siberian Shelf

* the “arctic super carbon pool” ² .

* Sub-sea permafrost is potentially much more vulnerable to thawing than land-based permafrost

* Terrestrial permafrost is estimated to contain **400 gigatonnes** of methane hydrates, while sub-sea continental shelf reservoirs are estimated to contain **10000 gigatonnes** of methane hydrates ³ .

* Thus, the entire amount of carbon stored in **the East Siberian Arctic Shelf (1750 gigatonns)** is equal to that held in the entire remaining area of the Arctic continental shelf as hydrate deposits’ carbon.

*** That means that very likely more than 5 to 10 per cent of the East Siberian Arctic Shelf area is already affected by sub-sea permafrost destabilisation.**

* Recent studies have examined two possible cases of how surface air temperature could respond to release of only 2 per cent (**50 gigatonnes**) of the total amount of methane preserved in arctic continental shelf hydrate deposits. if this amount is released in either of two ways: **slowly over 50 to 100 years**, or **quickly over approximately 5 to 10 years**. When methane is released quickly over the brief 5 to 10 year time period, the maximum temperature increase is higher by about a factor of three compared to the “slow” case. **This greater temperature response is more likely to produce irreversible consequences.**

— **Emergent Warning !!!** —

It never be **slowly over 50 to 100 years**, but **quickly over about less than 40 years**.

<http://arctic-news.blogspot.jp/p/global-extinction-within-one-human.html>

<http://www.777true.net/Rapid-Temperature-Rise-in-Arctic-a-simple-verification.pdf>

<http://arctic-news.blogspot.jp/p/how-to-cool-arctic.html>

Part V :Geo-Engineering on Arctic Cooling and Oceans Cooling.

<<Begin the OPERATION Quickly as possible !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!>>

This part V could not present a solution,but problems for all of you !!!

At first glance on geo-engineering figs,amateur people would be dissapointed and anxiety. Although,at now,we could have nothing,but those to evade future extinction event.

Why we need geo-engineering ?,The decisive answer is as follows.

A feedback having realized such as **ice albedo one in Arctic** never be halted without spontaneously,but by **man-made Operation** such as **Arctic Cooling**.

The need for geo-engineering

<http://arctic-news.blogspot.jp/p/the-need-for-geo-engineering.html>

chp0:Introduction to geo-engineering.

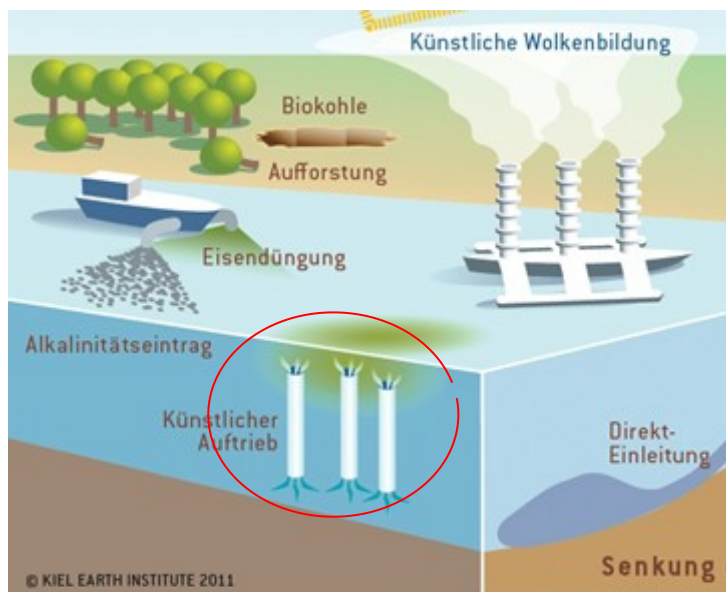
How Geoengineering Works: 5 Big Plans to Stop Global Warming

<http://www.popularmechanics.com/science/environment/4290084>

Launching massive humidity into sky to form **cloud brightening** is simple and safety.

"How do I repair a system that I do not quite understand?"

http://www.climate-service-center.de/012675/index_0012675.html.de



Look at red circle portion.

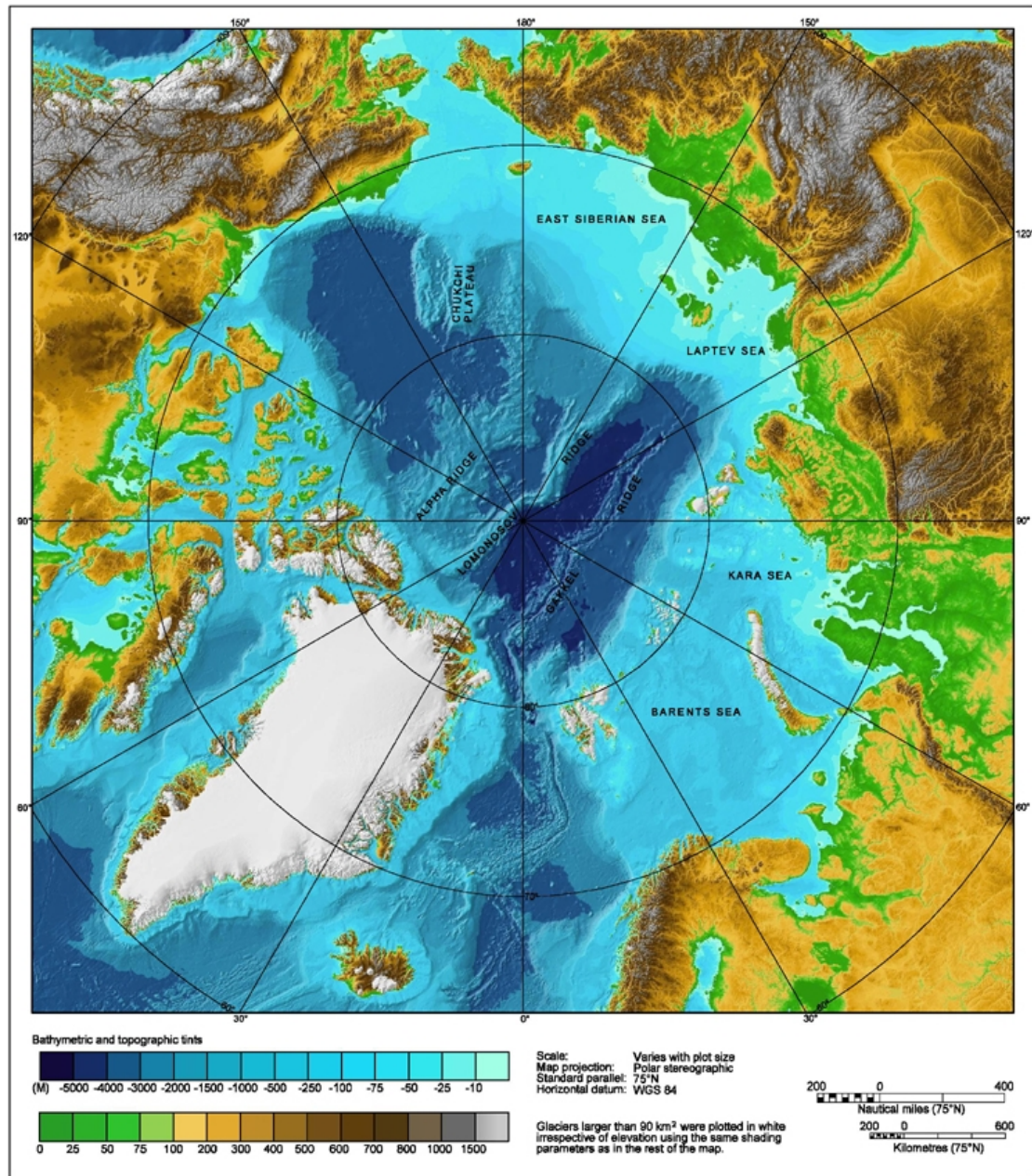
It is siphon to cool warm sea surface by pumping deep cool sea water. This could be instant effect to cool earth, however the scale of implementation become outrageous. In anyway, geo-engineering become outrageous scale. However without those, we would be extincted

In temporal conclusion, some geo-engineering seems rather junk science. Someone told it effective, while other told hazardous. However, without geo-engineering, we could not survive. Therefore it is absolutely necessary of global, emergent and massive recognition on **geo-engineering establishment**.

chp1:Arctic Cooling.

(1)Arctic Map.

http://www.ngdc.noaa.gov/mgg/image/IBCAO_betamap.jpg



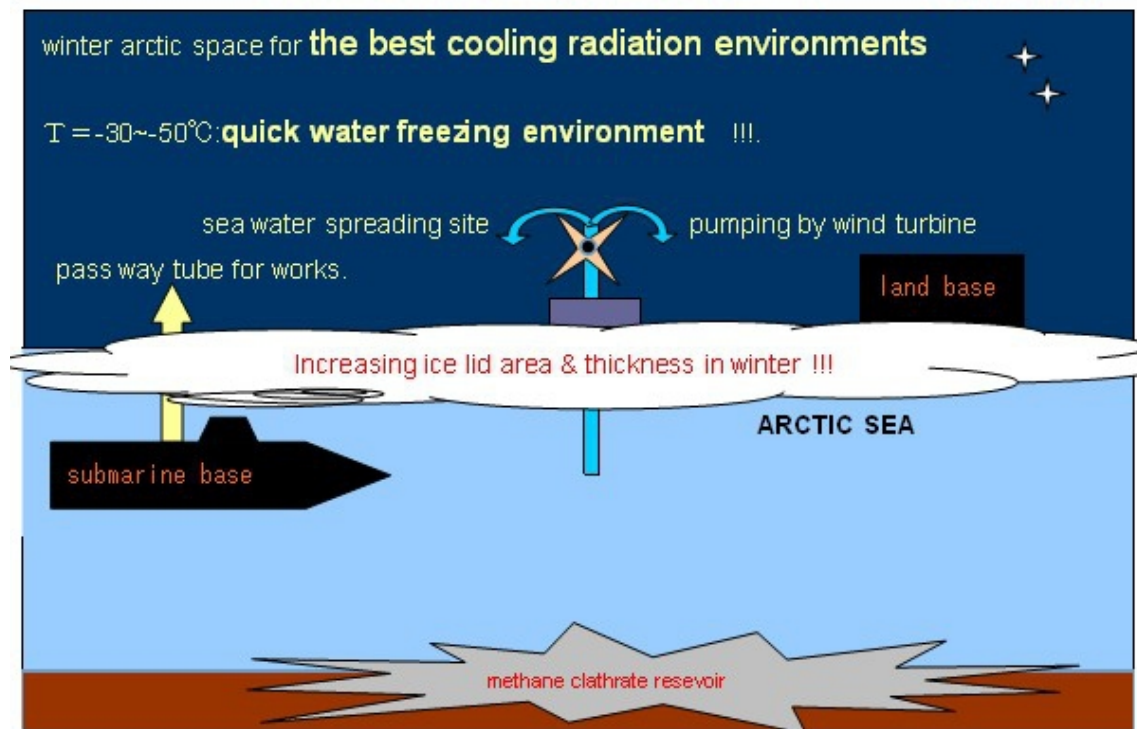
(2) **How to cool the Arctic** by John Nissen. December 2011.

<http://arctic-news.blogspot.jp/p/how-to-cool-arctic.html>

Which is the most viable method of emergency cooling of the Arctic to prevent runaway global heating? There are several approaches for cooling the Arctic and saving the sea ice, some involving the **reduction of heat flux into the Arctic** and others involving the **increase in heat flux out**.

(3) **Sea water spreading on ice lid in winter** to increase heat out going & ice thickness the double effect. **Water droplet spreading into sky in summer** could be **triple effect**.

Sea water spreading on ice lid in winter to increase heat out going & ice thickness the double effect. **Water droplet spreading into sky in summer** could be **triple effect**.



(4) **How much can we make ice(discharge heat)by sea water spreading in winter-**

(a) **Recent years trend of Arctic ice volume decline** $\doteq 1000\text{Km}^3/\text{year}$

Arctic Sea Ice Volume Anomaly(PIOMAS)

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

Now we **must emergently** compensate year's loss of **V** $\doteq 1000\text{Km}^3/\text{year}$.

If we fail, decline trend become more and more toward increasing difficulty of the operation.

(b) **mass of Arctic ice** with sea ice mass density = 917 Kg/m^3 ,

$$M = 1000 \text{ Km}^3 \times 917 \text{ Kg/m}^3 = 9.2 \times 10^{14} \text{ Kg} = 9.2 \times 10^{11} \text{ ton..}$$

(c) **m** = total mass by water pump: $10 \text{ ton}/60 \text{ sec} \times (3600 \times 24 \times 120 < \text{winter days} >)$

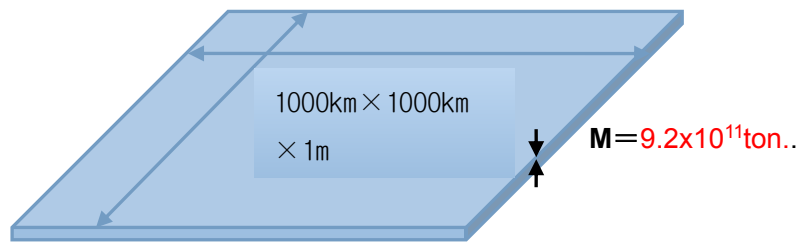
$$= 1.7 \times 10^6 \text{ ton}$$

* pumping power = $Mgh/T = 10,000 \text{ kg} \times 9.8 \text{ m/s}^2 \times 10 \text{ m}/60 \text{ s} = 16 \text{ KW} (?)$.

(d) **N (cooler units #)** = $M/m = 9.2 \times 10^{11} \text{ t} / 1.7 \times 10^6 \text{ t} = 540,000$. **N = 540,000**.

"N" is outrageous scale, however none could tell it impossible.

If unit cost of the implementation is 50000\$, the coarse estimated total cost is about **27T\$**.



(e) Dissipated Heat amount in freezing sea water (this is very little).

$Q = \text{melting heat of ice} \times \text{ice mass} + (0 \rightarrow -50^\circ \text{C})$

$$\doteq \{334.7 \text{ KJ/Kg. K} + 50 \times 2.114 \text{ KJ/Kg. K}\} \times 9.2 \times 10^{14} \text{ Kg} \doteq 4 \times 10^{20} \text{ J.}$$

(5) **By anyhow, unless winter enables increasing ice thickness by water spreading ?!!!**

Carbon sink operation must be parallel. Operation water spreading must be kept so long as temperature recovering. **Especially time during temperature rise may be severe (0.3°C)?**

Then in that time, can finite ice extent keeping be possible ?

From view of **ice albedo feedback**, by any temperature, **keeping fixed ice extent** is equivalent **to stop the feedback**. Thereby

Begin the operation Quickly as possible !!!

$$\text{* Arctic area} = 14.7 \times 100,000 \text{ km}^2 = 1.4 \times 10^{13} \text{ m}^2 = 1.4 \times 10^7 \text{ km}^2.$$

Full area is not necessary. However our ability is finite !!!

$$\text{* Possible water spreading area ?} = 1000 \text{ km} \times 1000 \text{ km} = 1 \times 10^6 \text{ km}^2.$$

chp2:Oceans Cooling.

Ocean cooling could be implemented by pumping deep cooler ocean water and pouring those to hot sea surface.

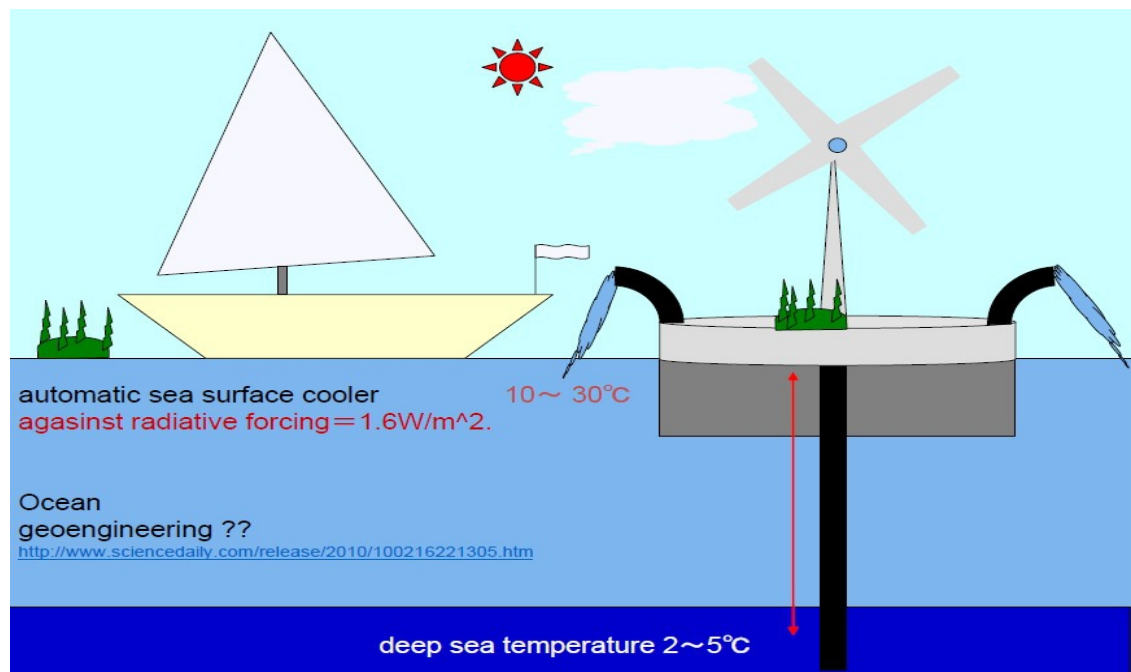
☞: Following discussion is very coarse estimation, but not exact one. However something essential may be told.

(1) ocean cooling example_1:

Can oceanic foams limit global warming?

<http://www.int-res.com/abstracts/cr/v42/n2/p155-160/>

(2) ocean cooling example_2:



☞: This fig is rather stupid not to employing siphon which need less energy.

(3) Global Climate is ruled by global ocean surface temperature, thereby cooling it become effective to prevent giantic disasters caused by temperature rise. Ocean cooling could be implemented by pumping deep cooler ocean water and pouring those to hot surface water. Then pumping energy must be non carbon, so **wind turbine** or **ocean current one** are favorable on oceans. Above all, a difficulty of this geo-engineering is its outrageous scale.

(4) How much cool water ,does the system need to cool ocean ?.

(a) 1ton water(1m³) of 5°C can cool 20°C water of "x=14ton" into 19°C.

$$1 \times 5^\circ\text{C} + x \times 20^\circ\text{C} = (1+x) 19^\circ\text{C}, \quad x=14\text{ton}. \rightarrow S = (0.374\text{m})^2 \times 100\text{m}(\text{depth})$$

(b) Time for pumping 1ton water $\equiv 60\text{sec}$ (an assumption of pumping)

$$W = 1 \text{ ton} \times 3600 \times 24 \times 365 \text{ s} \times 10\text{years} / 60\text{s} = 5256000\text{ton} \rightarrow S = 52560\text{m}^2 \dots \text{spreading area}$$

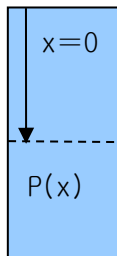
(c) example: $S_A = \text{Arctic ocean area} = 14.7\text{million.Km}^2 = 14.7 \times 10^6 (1000\text{m})^2 = 1.47 \times 10^{13}\text{m}^2$

(d) $N = S_A / S = 2.8 \times 10^8 \text{units}$. Partitioning to 100 nations, $\rightarrow N/100 = 280,00000$.

Certainly it is **outrageous amount number**,.....

(e) Another option may be **orbital oceans at equator zone**,

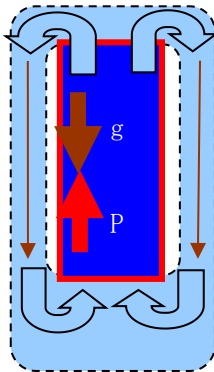
(5) Pumping could be **siphon** which need no energy, but except **loss one** and **initial starting**.



$$P(x, T) = \int_0^x dy \cdot g \cdot \rho(y, T).$$

$$\partial P(x, T) / \partial x = g \cdot \rho(y, T).$$

$W_{up} = \int_0^x dy \cdot y \cdot g \cdot \rho(y, T) \doteq g \rho x^2 / 2 \dots \dots$ pure lifting energy from depth x , but siphon in down-flow could get energy $W_{down} = W_{up}$. The necessary condition is complete closed looping to get W by down flow.



However $W_{up} - W_{down} > 0$, because up is **cold heavy water** while down in rather hot, but **not heavy water**.

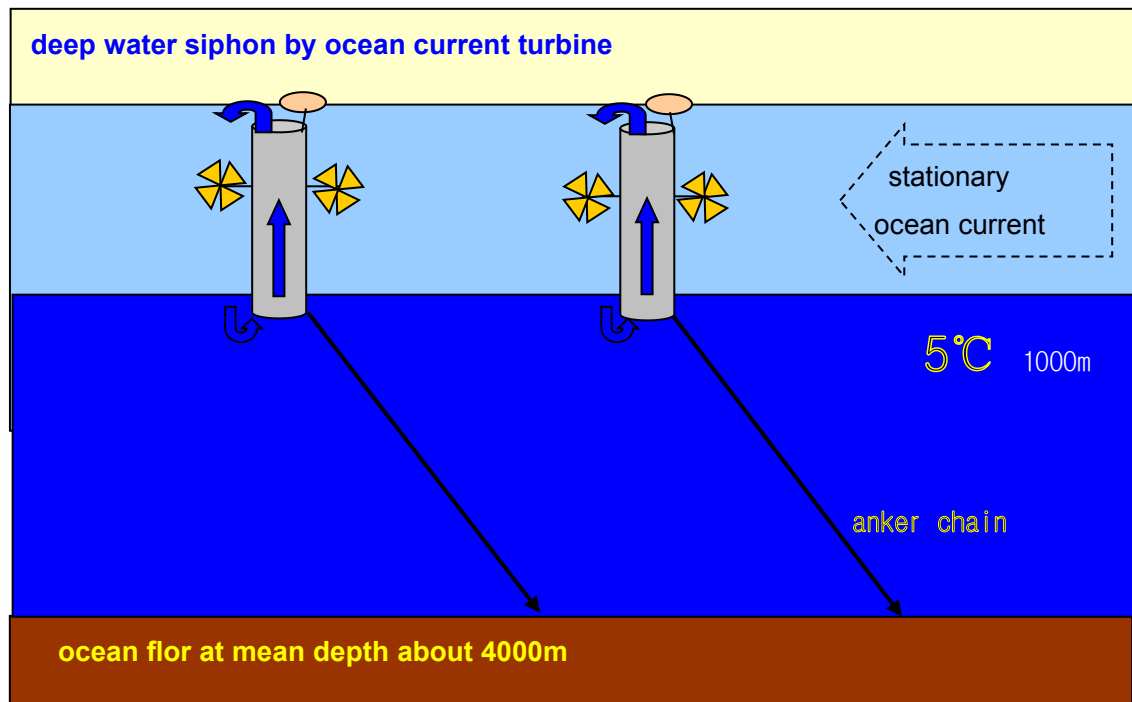
$$\Delta W = W_{up} - W_{down} = \int_0^x dy \cdot y \cdot g \cdot \langle \rho_{up}(y, T) - \rho_{down}(y, T) \rangle$$

$$\doteq \langle \Delta \rho(y, T) \rangle g x^2 / 2 > 0.$$

Depth x is about 1000m, which is not small.

(6) **ocean cooling example_3:**

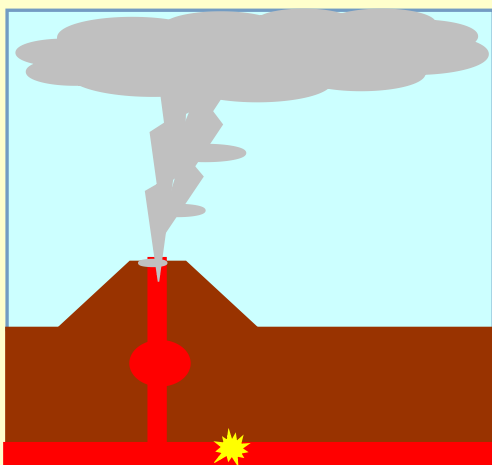
http://www.climate-service-center.de/012675/index_0012675.html.de



ocean current method are due to a website in UK, whose name was forgotten. Pardon !!

These are instant examples by amateur, we should be held **global design competition** to get most simple and most effective pumping unit.

(7) **In case of becoming risky situation, something dangerous, but emergent operation might be necessary ?.**



A possible(?) method is **artificial volcano strong explosion with massive dust emission** toward emergent cooling earth. It might be possible by **artificial earthquake technology (HARRP) ?**. Chemical component spreading is non favorable for the damages.

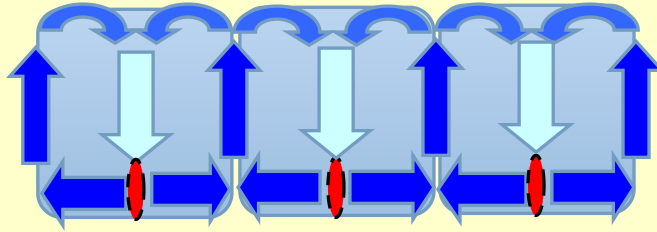
Then people are to face global agriculture devastating. **Foods saving is decisive !!**

So increasing foods production and long time reserving is decisive.


Digging underground to make basement living and store room is best in climate war era.

(8) **Another emergent earth cooling technology might be cold sea water upwelling**

As is evident and usual, a geo-engineering requires **outrageous scale** implementation.



This method may be **massively hazardous** to sea animals and their environment !!! Something previous warning is necessary.

 This is something **horizontal explosive power generator at sea floor** in order to cause massive cold upwelling and warm down one to cause sea surface temperature down. Small, but successive explosions could cause water circulation ?. Then how to calculate **the optimization** by fluid dynamics?.