Warming of the Earth

A. de Callataÿ, PhD.

(Translated from "Réchauffement de la Terre", 12/1/09)

Summary. To understand the dissenting opinions on the *anthropogenic global warming* (AGW), this paper presents the essential principles of climatology. Basic concepts are used to calculate the temperatures on the surface of planets then more detailed concepts explain how the effect of an increase of CO_2 is computed and how to examine whether the AGW is real.

The sections are:

1) **Earth without atmosphere.** The presentation assumes first a land without atmosphere, warmed by the Sun and that dissipate its heat by infrared radiation. The temperature changes resulting from changes in solar radiation and albedo are then estimated.

2) **Forcing and feedback**. A few basic regulation concepts explain how the Earth maintains its temperature in a changing environment.

3) **Roles of water in the atmosphere**. One examines first an Earth surrounded only by gases (oxygen and nitrogen) without greenhouse effect except the water vapour.

4) **Temperature gradients**. Physical phenomena in the layers of the atmosphere explain the thermal profiles in function of altitude.

5) **Water cycles**. Water has multiple roles, as a controlled amount of greenhouse gases (GHG), as thermal engine, as a carrier of latent heat and as generator of clouds and rain.

6) **Distribution of state variables**. Physical principles explain the heat transmission through atmospheric layers. The distribution maximizes the energy transferred and determines the soil temperature and the energy exchanges between layers.

7) **Added CO_2**. To predict the effect of CO_2 added, the presentation adds gases such as CO_2 to an Earth regulated by the water cycles. This allows computing how a doubling of CO_2 would modify the regulations.

8) **Classic explanations of the AGW**. The IPCC publications have distorted some basic concepts, bringing misinterpretations in climate functioning.

9) **Information campaigns on the AGW**. Modern communication methods have distorted the AGW perception by the public and many scientists.

(1) Earth without atmosphere

The sun radiations are computed by the Planck theory of the black body. These radiations depend on the external temperature of the Sun (5783°K). The radiations by wavelength are given by the curve in red in figure 1.

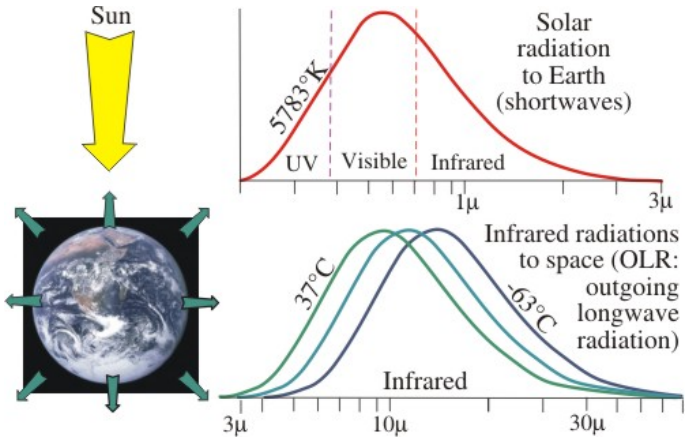


Fig. 1

The sum of radiations of a black body is given by the Stephan formula: $F=\sigma T^4$. An Excel table [W9] explains the computations and gives the units: watts and degrees Kelvin and Celsius (273°K = 0°C). The constant of Stephan-Boltzmann σ is $5.67E^{-8}$. The heat flow is therefore $6.34E^7$. As the Sun has a diameter of $6.96E^8$ m and that its distance to the Earth is on average $1.4975E^{11}$ m, the tangent of the angle under which it is seen is $4.73E^{-3}$, determining a solid angle (squared) of $2.24E^{-5}$. The flow/m^2 on Earth is therefore 1370 W/m^2.

The Earth is surrounded by clouds, aerosols and other clear reflective surfaces that return a part of solar radiation (with a 30% albedo). The Earth must evacuate 70% of the received heat, i.e. 959 W/m^2 (70% of 1370). The surface of the Earth that sends out the infrared rays is four times larger than the apparent surface that receives the solar radiation (The surface of a sphere is 4 times that of a circle). Therefore, the infrared (IR) radiation emitted per m^2 must be divided by 4, i.e. [959/4 =] 240 W/m^2. The surface temperature of the Earth is -18°C (255°K) since $\sigma\ 255^4 = 240$ W/m2.

The Earth with an atmosphere emits infrared radiations as a black body at 15°C (Tg). It emits σT^4 per m^2, i.e. for T = 15°C, $5.67E^{-8} * (273 + 15)^4 = 390$ W/m2. If the planet has an atmosphere that contains greenhouse gases (GHG), there is a difference between the flow received from the Sun (240) and the flow emitted by the Earth ground (390). This is explained in a simplified way by an emitted radiation back towards the Earth from the GHG in the atmosphere.

Variable flows on a day

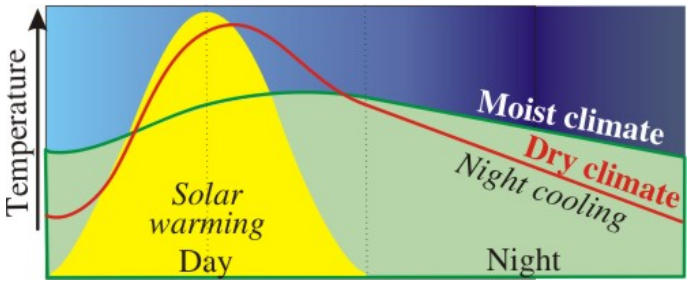


Fig. 2

The previous computation of the temperature of the Earth assumes a uniform temperature but this is only an

approximation. Only one half the Earth is heated by the Sun. Figure 2 shows the evolution of temperatures during 24 hours. A temperature reduction takes place at night. The greenhouse effect is explained later. The temperature differences at night are stronger for dry climates and clear skies than for wet climates (green curve).

As changes in temperatures are not proportional to energy flows, one needs computer models for many zones to calculate a weighted average of the daily differences for each climate.

Orbital eccentricity influence

The distance from the Earth to the Sun varies annually from 147 to 152 Gm in the periods when the Earth's orbit is very elliptical (That is repeated every 100,000 years and sometimes coincides with glaciations). A calculation in [W9] shows that the solar constant varies then from 1416 to 1325 W/m^2 between summer and winter. Necessary temperatures to evacuate this heat on a naked Earth varies from -16°C to 20.27°C, i.e. a difference of 4.27°C, a significant seasonal difference able to modify the global climate if other circumstances should contribute.

The influence of the albedo

When the albedo varies between 0.31 and 0.29, the temperature varies from -19.07 to -17.24°C, a difference of 1.83°C, or 0.9°C for a percent of albedo (to compare with the current warming of 0.7°C by century). The ocean covers 71% of the globe and has a 7 % albedo. When the forests are replaced by grasslands, the local albedo is increased from 10% to20 %. Cloud albedo is 90%. The summer melting of the ice reduces the albedo. The reduction in the surface of the snow-covered regions during a warming period reduces the overall albedo and causes a positive feedback that would have been important to cause glaciations. Anthropogenic climate change would be caused by changing the albedo of forests replaced by crops and pastures rather than by the GHG effect of fossil CO_2.

If a phenomenon (such as the deviation of cosmic rays by the magnetic activity of the Sun) reduces the number of ionised particles in the air and therefore the condensation of water around these kernels, the cloud cover could fall by 5% from 20% to 19%. This would reduce the albedo by 1% and cool the Earth by 1°C.

Aerosols thrown in the atmosphere (such as volcanic dust and SO_2 transformed in sulphuric acid) increases the albedo while the black soot decreases it. The difficulty to predict the effect of an eruption on climate is related to the difficulty of estimating the amount, the size, the composition and the altitude of the dust emitted. After the Pinatubo eruption (1991), the NASA had satellites to measure these data and had predicted the duration and the magnitude of cooling, a success which has used to claim that the NASA had reliable climate models (but climate forecasts must take also into account many other phenomena).

(2) Forcing and feedback

Set points and feedback

Before studying the climate, it is useful to explain the essentials of regulation because, in the literature of the IPCC, these concepts are used to confuse the whole with the parts and an overall effect with the addition of its parts.

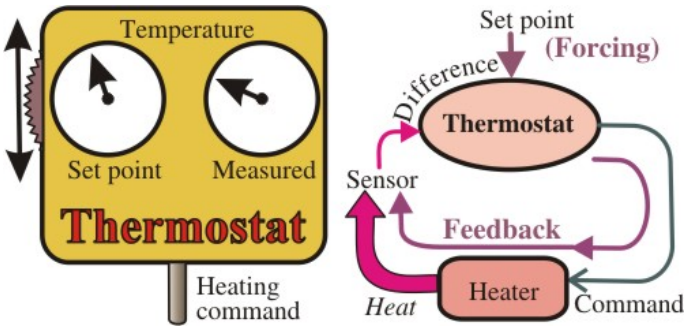


Fig. 3

Figure 3 shows a thermostat and its regulation schema. A thermostat measures the current temperature of the room and has a manually controlled adjustment of the desired temperature (here a rotating knob with a temperature dial). A device into the thermostat computes the difference between the temperature wished and the temperature of the room. This correction, result of the subtraction of the current and wished temperature, is used to start or stop the heater. This value is part of a feedback loop that provides a variable correction which tends toward zero at equilibrium.

In theory, one can split this feedback into its positive and negative elements but that leads to confusion. An acrobat on a wire is subject to a positive feedback when he falls to the left or to the right. He adds a negative feedback by applying a couple to a transverse stick, a long curved perch held in hands. In acquiring skilful reflexes by trials and errors, he can learn to ensure a dynamically variable feedback while slowly bringing the stick to the horizontal.

The conservation of the temperature of a planet

If a planet emits more heat than it receives, it cools and emits less infrared radiation (IR) as it has a lower temperature (or vice versa). The temperature of a planet is therefore self-regulated. The feedback is the difference between warming caused by the Sun and cooling from IR emitted by the planet in space. This feedback reduces the overall temperature when it is negative and it increases it when it is positive but this feedback tends toward zero.

The daily solar radiation (less reflection) is equivalent to the wished temperature of a thermostat, taking into account a proportionality factor (The IPCC sometimes calls this factor an ‘amplification’). -18°C matches 240 W/m^2 for the naked globe considered above. The thermostat of this planet without atmosphere would be calibrated as follows:

T setting (°C)	W/m ^{2}
-20 ° C	233
-10 ° C	272
0 ° C	316
10 ° C	364

The IPCC has invented a new word to refer to the 'set point': a 'forcing'. Then the IPCC calls anything that change the temperature a 'forcing', including a change in the concentration of greenhouse gases. In other places, the IPCC confuses what it calls a 'forcing' with a 'feedback', which causes misunderstandings or, worse, flawed explanations.

In some feedback systems, one can isolate loops that, in the ranges provided for operating, restore the balance (called 'negative feedback') and others that cause divergence, as in nuclear explosions (called 'positive feedback').

The regulation theory studies the feedback properties (shown here for a thermostat), allowing to design effective and safe systems. This theory can be used for analogies but is not applicable without risk to circuits defined otherwise. For example, the feedback signals cannot take a significant energy from the system it controls if one wants to remain in the theoretical framework for using the Laplace transform.

Some adaptive regulators can calculate automatically an optimum set point depending on the situation but this regulation is not a feedback when it has not all its properties. 'Feedback' is not 'set point'. If a comparison is used, it must remain an analogy, not a conclusive logical operation.

The changes in set-points do not amplify perturbations as by a positive feedback. Manipulations of the set point do not produce uncontrolled excursions.

(3) Roles of water in the atmosphere

It is assumed in this section that the Earth is surrounded by gases (oxygen and nitrogen) that are neutral as GHG. Water vapour is the only GHG in the Earth's atmosphere at this stage of the study. This gas is always available because the Earth is covered with water. The regulation of the Earth temperature depends mainly on the cycle of water in the atmosphere.

The atmospheric engine

Since Lavoisier (1777), we know that energy is conserved. To extract useful energy, it is known since Sadi Carnot (1824) that an engine operates from a difference between a hot and a cold source. A steam engine consists of a source of heat, of a fluid that is dilated with heat and of a cold source to which the fluid is attracted. This causes a fluid motion that can be used.

The most effective cold sources are water that evaporates or water from a river or a sea that can be warmed up. To operate solar power stations in the Sahara, one should replace the cold source by exchangers cooled by ambient air but the yield is lower when the temperature difference between the hot source and the cold source is lower.

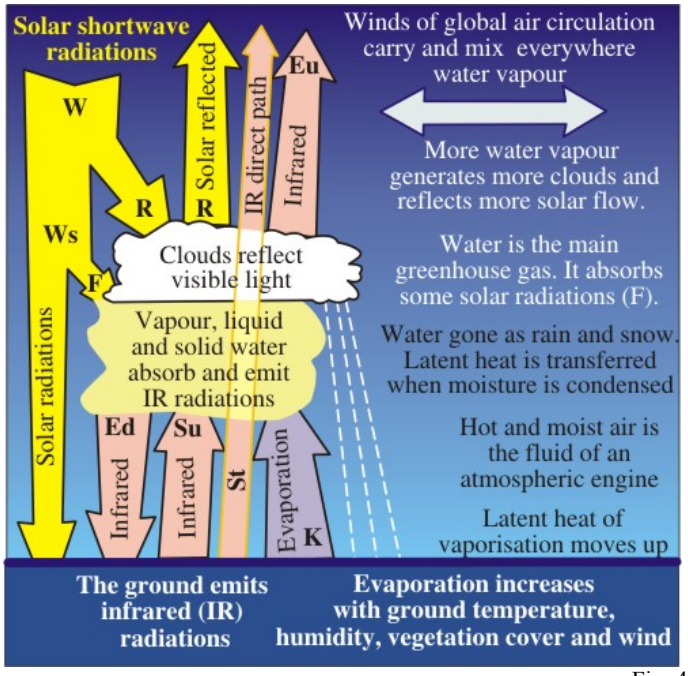


Fig. 4

Figure 4 shows the main qualitative functions of water but one has to know some thermodynamics to study quantitatively the role of the vertical movements of moist air.

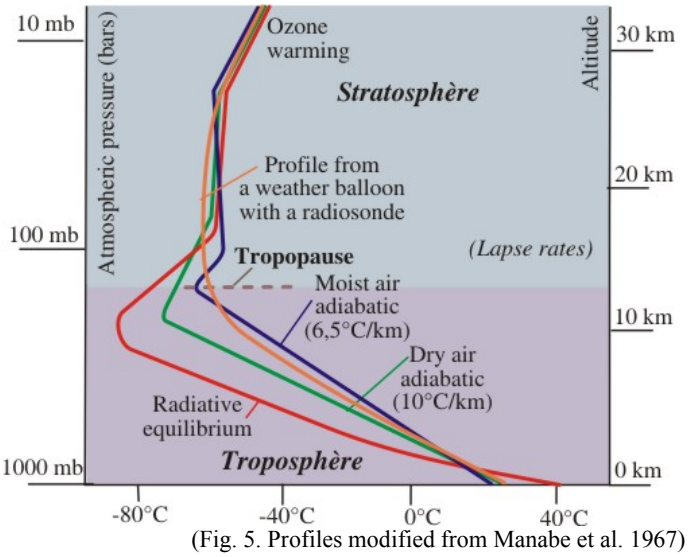
The atmosphere is in contact with the ground or the ocean whose surfaces are heated by the Sun. The air on the ground is thus put into motion because this system works as a motor. Cold sources are GHG at high altitudes which are cooled by emitting infrared radiation to the outside space. The air is cooled also by thermodynamic effect when going up (developed at section 5). The additional roles of water are to provide at request a variable amount of greenhouse gas from the ground and to be a reservoir of latent heat.

(4) Temperature gradients (lapse rate)

The atmospheric pressure is determined at each altitude by the weight of the gases that are above. Chart 5 shows the pressure on the scale at left and the altitudes on the other side. In thermodynamics, one uses charts to see the changes of temperatures. Diagrams use altitude as a linear scale because the air masses that travel vertically have regular gradients giving thermal profiles close to straight lines.

If a packet or a bubble of air moves from the ground up to the stratosphere, the pressure changes will change the characteristics of temperature and humidity according to the formula of Clausius-Clapeyron (Legendre, 2009). This transformation is called adiabatic when there is no transfer of heat through the bubble.

Distribution in the layers of the atmosphere



(Fig. 5. Profiles modified from Manabe et al. 1967)

The temperatures evolution with altitude depends on the quantity of water in circulating air masses. The temperature gradient (lapse rate) with the altitude determines a *thermal profile*. Its troposphere part is about 10°C/km for dry air and 6.5°C/km for air moisture close to saturation. The gradient observed (called environmental) is often about 5.5°C/km.

The tropopause is defined by an inflexion in the lapse rate with altitude. Around the tropopause, there is equilibrium between the radiation going to space and the one that is sent inside. Warming comes from upside radiation and from convection, while the **OLR** radiation (*Outgoing long wave radiation*) emitted to the space causes cooling. The resulting effect in the lower stratosphere is often a relatively constant temperature.

In practice, it is difficult to define the tropopause. There are direct radiations from the ground through the atmosphere (**St**) and the convection **K** occurs. This equilibrium level is determined here by the cancellation an operator (defined as in physics) at an altitude that cannot be located in advance. This theoretical tropopause is called **Tt** and its temperature is **Te** in what follows. **Te** is associated with a defined **OLR** energy flow.

Flow and thermal conductivity

Earth energy comes mainly from the Sun. A fraction of Sun energy is returned by reflection. It remains a flux **Ws** heating the ground. The soil at temperature **Tg** emits a flux **Su** up.

The atmosphere is a thin layer of air measuring approximately 2 thousandths of the radius of the Earth. One of its roles is to carry energy that the Sun has radiated on the ground to the higher layers of GHG which then evacuate this energy. In each atmospheric column (delimited by the vertical motion of air masses), the laws of thermodynamics distribute the temperature and humidity of the air following a thermal profile characterized by a lapse rate.

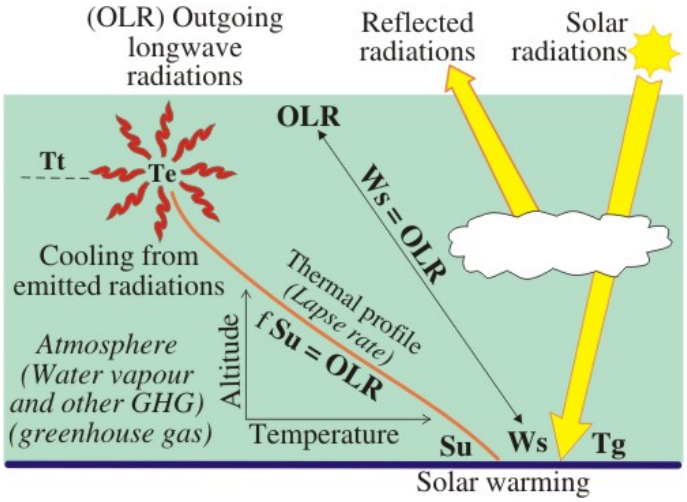


Fig. 6

The temperature **Tg** at the ground is the starting point of a thermal conduction that warms the GHG above, which one sends a flux **OLR** into space. This flux is equal to the flux received from the Sun, as explained above (Ws = OLR).

The tropopause (**Te**) emits an OLR flow to the outer space while being cooled. The thermal conductivity of the atmosphere transfers heat from the ground to **Tt.** The ground temperature (**Tg**) is higher than it would be if there were no GHG. This conductivity increases if more GHG are present.

Between **Tt** and **Su**, there are radiation exchanges in both directions. According to the second principle of thermodynamics, the total flow is a heat transfer from the hot area (ground) to the cold area (the tropopause). The greenhouse effect can be explained as a property of the thermal conductivity of the atmosphere, which determines the difference of temperature between soil and tropopause. The measure of global warming is the average of the ground temperatures on Earth.

Thermal profiles of the atmosphere

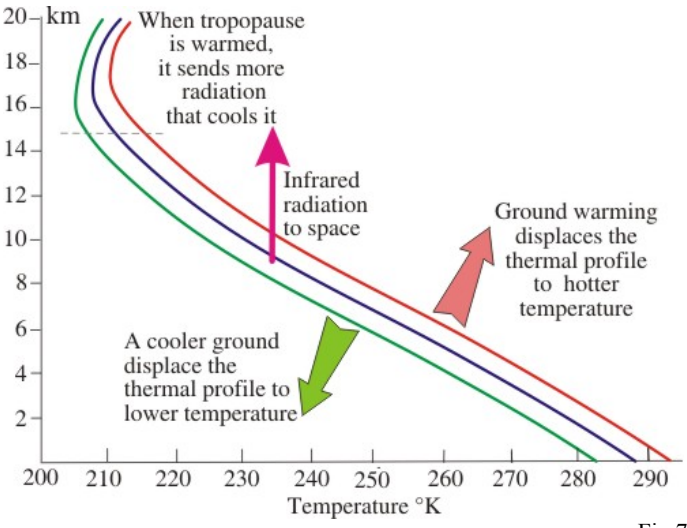


Fig.7

Diagram 7 shows the current profiles (in blue) and two hypothetical profiles. If the ground temperature increases (red profile), the heat transmission to the GHG

layers (source of the OLR) increases. A higher temperature **Te** increases the heat losses to space. This shift of the profile to higher temperatures would be a mechanism to respond to an increase in solar radiation. By contrast, if the soil temperature decreases, the characteristic profile would shift to lower temperatures (in green in diagram 7).

Does this parallel displacement of profiles occur in reality? How does the atmosphere respond to other disturbances? If the tropopause temperature increases while the solar flux received does not change, how would the return to equilibrium occur? For an automatic restoration of the balance between the heat received and emitted by the Earth, how would the profiles change in response to a warming of soil?

An automatic restoration of the balance between the heat received and emitted would lead to a reduction in the tropopause temperature in response to a warming of the ground. Should the profiles become crossed (diagram 8) instead of parallel (diagram 7)? The discussion at section 6 shows that crossed profiles are the normal ones.

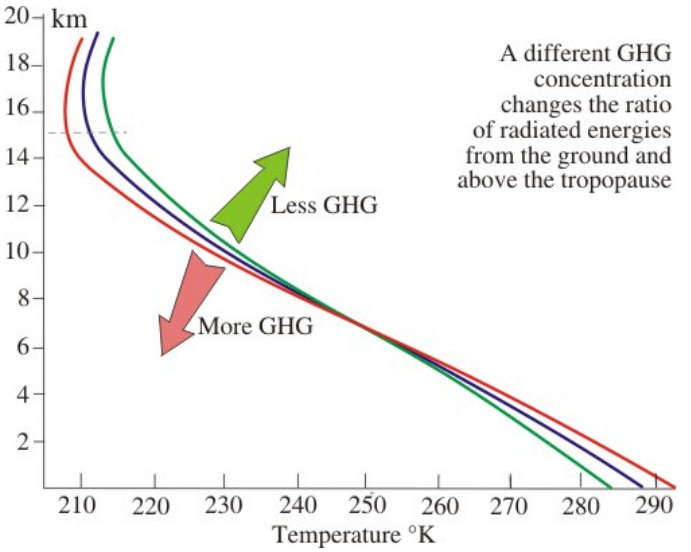


Fig. 8

(5) The wind and water cycles

Diagram of the atmosphere

In diagram 9, "altitude, temperature", an air packet is transported from the ground at 20°C (red lines) along an adiabatic. The moisture in the air packet is condensed and releases the latent heat it had borrowed to evaporate the water at low altitude. In the example (path ABCA), air cools according thermodynamic rules and condenses gradually (AB). On the path BC at 6 km altitude, the air cools up to –30°C, exchanging slowly heat with the surrounding air. In the remainder of this example, the rainfall takes the humidity out of the packet. Then the dry air (path CA) returns to the point of departure along a dry air adiabatic. In point A, the Sun must heat the ground to evaporate water to continue the cycle on a moist adiabatic. The moist adiabatic profiles have more curved shapes in the area where the condensation is more important (lower-right part of diagram 9).

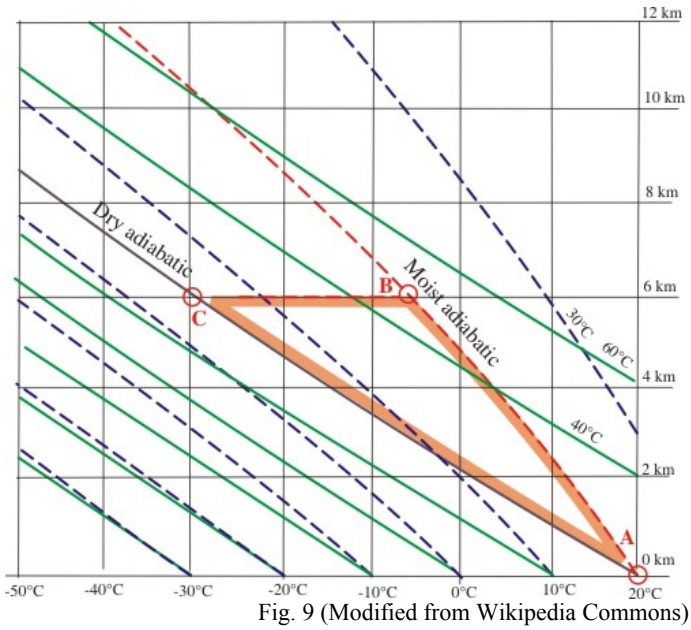


Fig. 9 (Modified from Wikipedia Commons)

Radiosondes attached to weather balloons measure the environmental lapse rate, the relations "temperature/pressure" while they are going up. These curves are called thermal profiles. The balloon profile might be very irregular due to air movements in the troposphere. The profiles are specific to a local weather. So far as one can determine an average, the profiles show a relatively linear thermal curve according to a lapse rate around 5.5°C/km. The AIRS satellite should provide more profiles and more accurate data than radiosondes.

The sensitive heat contained in the hot air and the latent heat in the water vapour carry up an amount of heat (but this capacity is very low and has no more effect after an half day). At night, the radiation from the ground continues, so that this ground (land, sea or vegetation) cools, gradually reducing evaporation and radiation, It might cause condensation or frost. The more the air is wet or cloudy, the slower is cooling (figure 2). The cooling is faster into deserts and slower into wet areas.

Water vapour cycle

The physical states of an air packet have been shown on a chart with altitude on the y-axis (fig. 9). They are also represented on chart 10 with the y-axis showing: “weight of water on weight of air in grams/kilos (g/kg).” Starting from the point A at ground level (temperature 25°C and 1% water, or 50% relative humidity), the air bubble cools by going up (path AB on ABCD) and begins to condense, starting at 13°C (point B). The air moisture is then 100% but the absolute humidity decreases because liquid or solid water are eliminated as rain or snow while air cools. Suppose that this air goes down after having reached 20°C (point C). This air packet contains then 1 g/kg while it is going down and warms up to 25°C (point D).

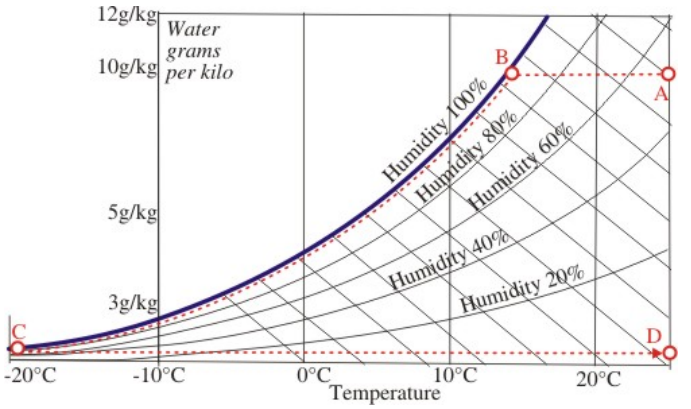


Fig. 10 (modified from Wikipedia Commons).

The main air uplift is around the equator. Clouds can reach 17 km, and cause heavy rain. A section of Earth (drawing 11) shows that the climbing air moves away from the Equator and goes down to the subtropical zone, bringing dry air to Sahara (or other deserts), forming a circular flow called Hadley cell. The tropopause is higher at the equator than on the poles. Other cells are Ferrel cell and polar cell.

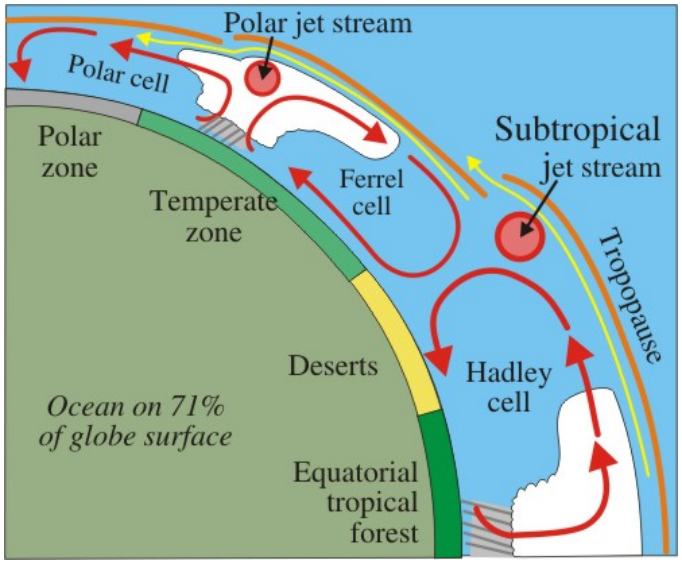


Fig. 11 (Atmosphere is not shown to scale).

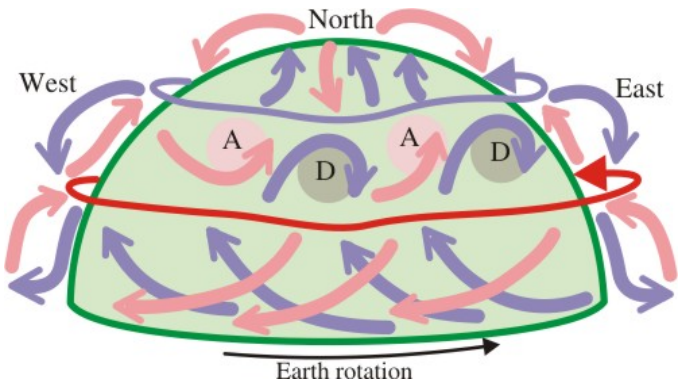


Fig. 12 (Winds relative to a motionless Earth).

Air masses are dragged by the rotation of the Earth. Figure 12 shows circulation on the northern hemisphere. The winds are indicated relatively to a stationary Earth but the wind absolute speed goes in the direction of rotation because wind is partly produced by this movement. This is combined with the movements along latitudes shown on the previous drawing.

In the temperate zone, Coriolis force diverts the winds clockwise around depressions D and anticlockwise around high pressures anticyclones A. Into the discontinuities, jet streams are created (a subtropical jet moves often at speed from 150 km/h to 400 km/h to the East, dragged by the rotation of Earth).

The atmospheric engine raises equatorial air to very high altitudes and then let it move to the poles. The dominant winds are westerly in the temperate zone and Easterly in the equatorial zone.

As the temperature is lowered with altitude, the dew point (where the water vapour condenses) is reached quickly in the climbing air and rainfalls occur. Latent heat heats up the air. Subsequently, air becomes colder and drier and goes down. The atmosphere runs as an engine and maintains a global circulation. If winds at high altitude are about 50 km/h and if the water stays 9 days in the atmosphere, air and its water vapour is carried along 10,000 km.

Meteorological models

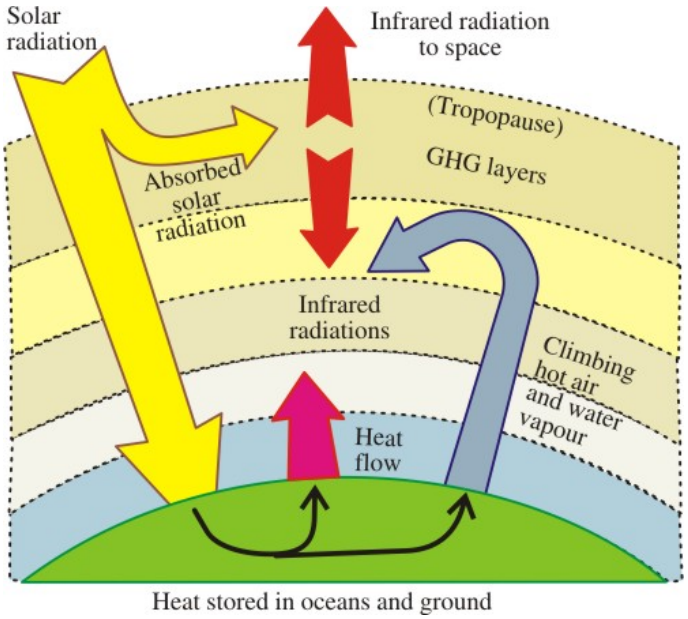


Fig. 13.

The IPCC has funded the development of many models of the global circulation around the globe (GCM: *Global circulation model*). In these models (diagram 13), the atmosphere is divided into layers and each layer is split into cells. The physical evolution of each cell is computed from the physical state of its neighbours as in weather models. An average temperature of the Earth is produced.

The atmospheric layers are energized by hot air and water vapour lifts and by infrared radiation from ground. The exchanges between neighbouring layers should maximize the entropy. Physical laws allow to compute the "temperature-altitude" distribution and to quantify the

energy exchanges between the ground and the tropopause by IR radiations and convection. To compute a Boltzmann distribution, one needs an equation of the exchanges between layers to compute its derivatives. The solution is stable when these derivatives are null.

(6) Radiation and optical depth

Energy balance

Figure 14 (according to Kiehl *et al.*, 1997) illustrates a simplified assessment of the energy flows between the ground layer, the atmosphere and the outside space. The numbers in circles indicate in what order the computations are done. The diagram shows the heat transfers from hot areas to cold areas (sometimes resulting from a balance between radiations in both directions, for instance for a 46 W/m^2 flow remaining between steps 10 and 13). The percentages show how absorptions, reflections and convections are computed [W9]. The local budgets are shown in green.

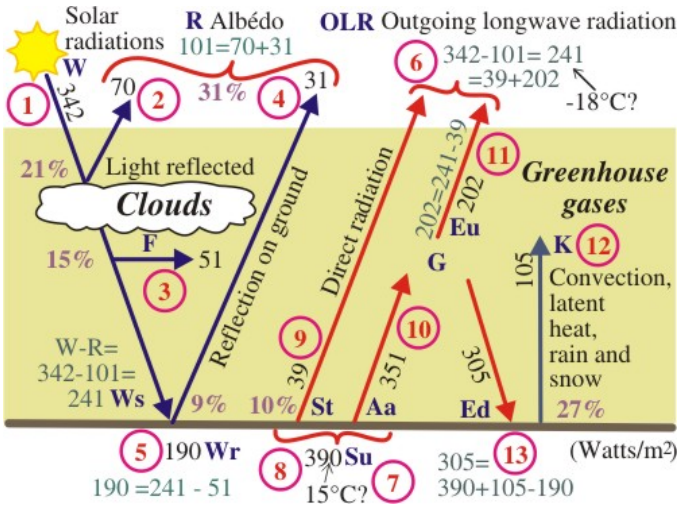


Fig. 14 (modified from Kiehl et al. 1997)

The only non-computed item is introduced at the step 7. Here a temperature is guessed (15°C is usual for current observations). That determines the radiated energy (390 W/m^2 here) and the convection. Then, one checks whether the thermal profile is compatible with the measures and the theory. On restarts the computation loop until the lapse rate is realistic. In the reality, a correct gradient is automatically established and the ground warms or cools as in normal regulation.

The transmittance

Tyndall (1861) had measured with a spectrometer the IR absorption of some greenhouse gases including water vapour. This absorption depends on the wavelength. Discontinuous diagrams "absorption / wavelength" show the transmittance (transmitted energy / sent energy). Transmittance is called transparency for visible radiation.

Since there are very few radiated energies in the gap between the incoming solar radiation and the outgoing infrared radiation, these two cases are shown here on different diagrams (fig. 15 and 16). The infrared absorption is stronger in the lower troposphere where water vapour is quite opaque to almost all IR.

The percentage of water vapour in the air decreases with altitude, in part because rain might have send water to the ground. Very little water vapour is left above 5 km altitude. The absorption depends on the mass of GHG that the radiation has to cross. Where the atmospheric pressure is reduced to 20%, it must support only 20% of the initial mass. The GHG in this mass absorb approximately 20% of the radiation, relatively to the entire mass.

Ozone and ultra (UV) violets

Most gases are transparent to wavelengths below 3 micrometers. Solar radiation passes through the atmosphere with a low absorption by water vapour (15 %) in the near IR (0.9 to 3 µ). The case for ultraviolet is different. UV are destroyed, either by transforming oxygen O_2 in ozone O_3, either by being absorbed by ozone. This operation is essential because UV is harmful to life by destroying DNA, which may cause chromosome mutations. Ozone heats up the stratosphere but only 1% of the air density is left at this altitude. The Sun emits mainly within the hydrogen bands in yellow, blue and red light.

The grey body radiation

Real radiation (gas or grey body) are a little different from those of the black body. Each molecule has its own frequencies of vibration. Unlike the black body that absorbs and emits in all wavelengths, the gases are mainly active in their own wavelengths. Air (oxygen and nitrogen) transfers heat by shocks between molecules. The wavelengths are displaced by this process that can activate GHG with neighbouring wavelengths. The effect is reduced in the stratosphere because of air depletion.

Shortwaves and IR transmittance

Absorption (the complement of atmospheric transmittance) is shown on charts having wavelength on the x-axis. There are two charts, one for down waves for Sun (fig. 15) and one for upward waves for IR radiations (fig. 16).

These diagrams show the wavelengths in which water, ozone, CO_2 and methane capture or emit. They are established at ground level and at 11 km altitude. The curve of the black body radiation is added to the diagram for information. The flow that goes through the atmosphere is roughly the product the blackbody curve and the absorption.

The water absorbs some solar radiations in the near-infrared. It absorbs strongly upwards IR radiations in almost the whole spectrum (from 3 to 40 microns), except within a window around 10 microns. Some IR radiations escape directly to the space through this window between 8 µ and 12 µ. At the other wavelengths, water vapour makes the lower troposphere almost opaque.

An absorption band of CO_2 is very active around 15 μ, in which the water vapour has a low absorption. This band becomes significant above 5 km altitude.

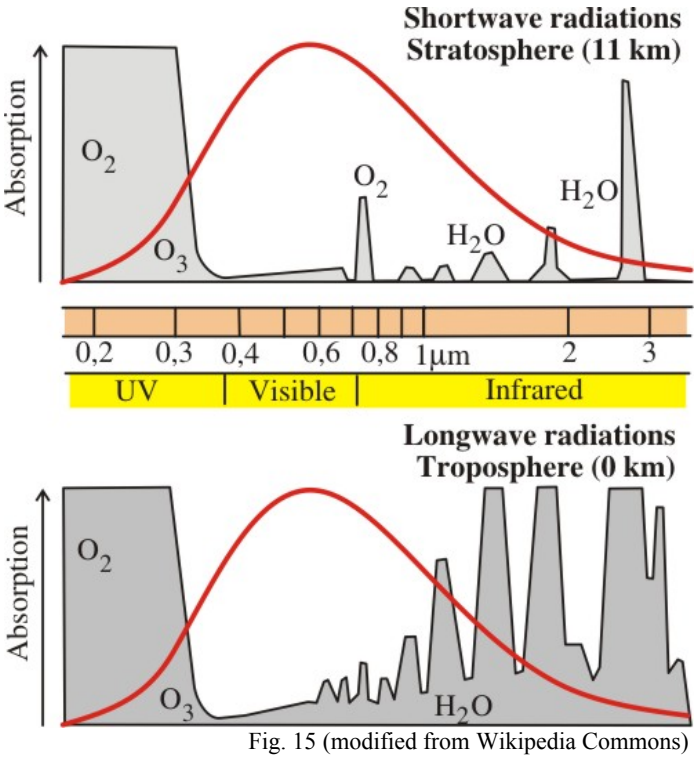


Fig. 15 (modified from Wikipedia Commons)

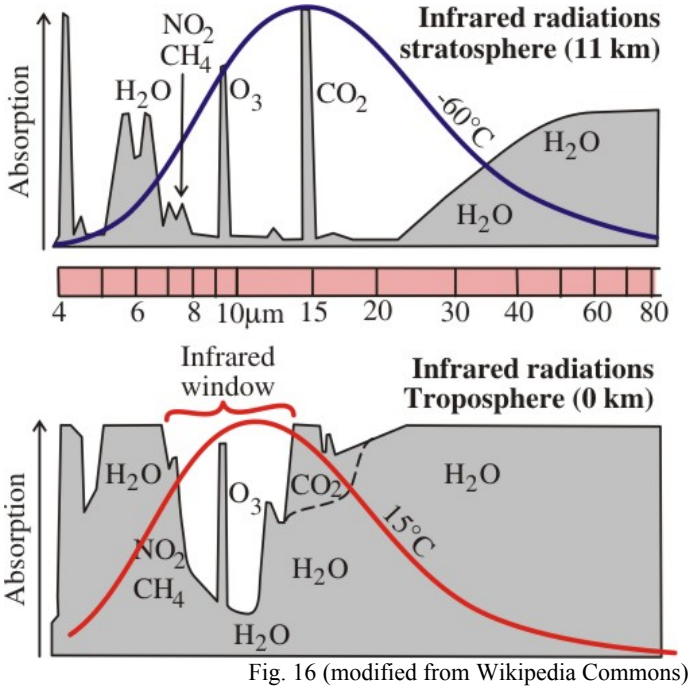


Fig. 16 (modified from Wikipedia Commons)

Between the ground and the tropopause, one should take a weighted average between the chart at ground level and the chart at 11 km but the data charts of transmittance do not specify the absorption at each altitude. This can be better inferred in optical depth tables (see later).

Averaging

Atmospheric profiles of the Earth are very varied. Depending daytime, place and season, the flow emitted by the ground varies from one to two (from 200 to 400 W/m^2). Instead of computing averages with the cells of meteorological models, another method calculates the averages from tables of optical depths for all vertical columns.

Optical depth

For a given wavelength 'n', the proportion of energy going through the atmosphere is called 'transmittance' **Ta**(n). (or 'transparency' for visible light). When the radiation must pass through two types of greenhouse gases or through an increased concentration of a greenhouse gas, what passes trough is equal to the product of the optical transparencies.

One can also work with the *optical depth* (or optical thickness) defined as follows: $\tau = -\ln(Ta)$. The data are variables depending on two parameters: the wavelength **n** and the altitude **z**. The sign minus is useful because the logarithms of numbers smaller than the unit are negative. To find back the transparency, the formula is: $Ta(n)=e^{-\tau(n)}$.

Instead of multiplications, one uses logarithms to express formulas with additions.

$\ln(x) + \ln(y) = \ln(x+y)$.

$e^{x+y} = e^x e^y$

$e^{\ln(x)} = x = \ln(e^x)$

Lets assume that the gas concentrations are such that the atmospheric water vapour has a transmittance of 20% of the IR level on ground and that the CO_2 transmittance is 70%. The mixture of the two gases has then a transmittance of 14%. Transmittances are combined with multiplication: 0.2*0.7=0.14. Optical depths are combined with additions:

	Water vapour	CO_2	Mixture
Ta	0.2	0.7	Product = 0.14
τa	-ln 0.2 = 1,609	-ln 0.7 = 0.3567	Sum = 1.9661
	$e^{-1.609} = 0.2$	$e^{-0.3567} = 0.7$	$e^{-1,966} = 0.14$

Spectrum of atmospheric flows

Some satellites measure the infrared radiation leaving the planet (**OLR**: Outgoing long wave radiation) for any wavelength, any place and any season. The downwards IR radiations are measured on the ground. These data indicate the ratios between **OLR** and **Su** flows.

Miskolczi *et al* (2004) have built tables of optical depths for various wavelengths and altitudes. Radiosonde profiles taken around the globe are used to establish the optical depth per wavelength, i.e. the spectra relative to each climate area. The balance of energy flows should be detailed for each wavelength.

For gas, the power absorbed or emitted in each wavelength band is very discontinuous. Elaborated methods exist to measure and integrate the energy absorbed in a narrow band of wavelengths. Averaging has not always a physical meaning. Figure 17 show such

simplified averages (detailed explanations in Miskolczi *et al.*, 2004).

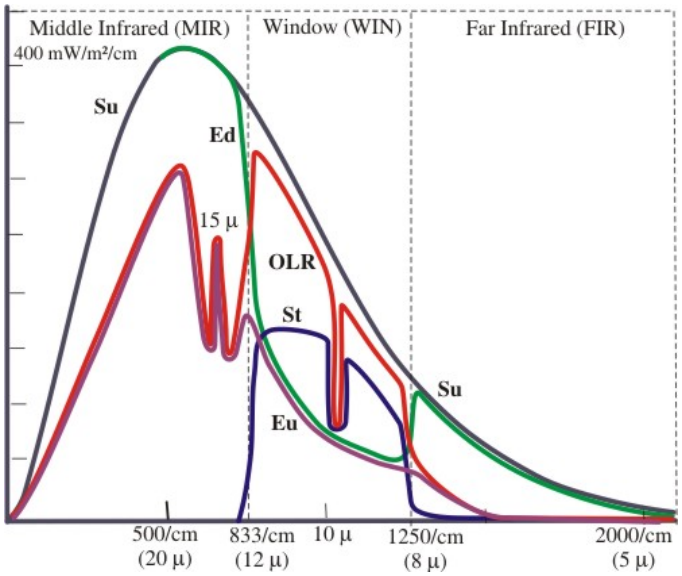


Fig. 17 (Modified from Miskolczi, 2004)

Energy conservation

Meteorological models (which cannot forecast weather beyond one or a few weeks) use approximate computations of exchanges between neighbouring cells. Therefore the rule of energy conservation does not need to be precisely enforced. The computer global circulation models (GCM) are not based on hard physical laws (despite the claims of IPCC).

Averages, optical depths functions

Models are quite simplified when all the absorptions are expressed as a function of the optical depth as the main state variable. Then the average value preserves the energy conservation. If **f** is the ratio of the flux **Su** which produces the flow **OLR**, one can write f * Su = OLR (Miskolczi, 2004) (2007).

From many observed profiles, Miskolczi had suggested an empirical formula for **f** whose match to reality is good:

$f=2/(1+\tau a+Ta)$ or $f=2/(1+\tau a+e^{-\tau a})$.

The value of f is near 0.67 (average measurement). Then, $\tau a=1.841$ and $Ta=0.1587$ = are the solutions of the equation $(1+\tau a+e^{-\tau a}) = 3$.

Miskolczi (2007) had also deduced this formula from works on astrophysics studied for the atmosphere of the stars by Eddington in 1920. Miskolczi has modified (or corrected?) this formula to avoid discontinuities. (I am not competent to judge whether this theory is well founded).

The theory gives a total flow of energy which is a function of τa. This formula generates a curve showing a maximum of energy flow. The optical depth is then 1.87 (fig. 3 in Miskolczi, 2007).

The precipitable water **prcm** is the quantity of water in cm that could be obtained if the entire water vapour in a column of air was condensed and precipitated. Knowing the value ***τa*** for a given rate of CO_2 and other greenhouse, gases, one can deduce the amount of water vapour in the atmosphere, about 2.6 prcm.

f varies to compensate an imbalance

f depends on the optical depth, which does not change quickly. For a prolonged disturbance changing the balance of incoming and outgoing energy, do the profiles move parallel to themselves or intersect? (as in Fig. 7 or Fig. 8?). In figure 18, the dotted curve shows ΔOLR/OLR according to profiles observed by radiosondes. The dashed line shows ΔSu/Su. The ΔOLR/OLR is equal but opposite to ΔSu/Su. These two values spontaneously change for mutual compensation. These measures are taken by clear sky. The influence of the cloud has not been studied but could change the results in the equatorial zone.

For different climates of the Earth (dependent themselves of latitude), some observations of radiosondes are indicated by points on figure 18. If **f** increases, **Su** increases and **OLR** decreases, as if there was compensation. These observations show that the Earth's atmosphere changes spontaneously its rate of GHG (and thus its value **f**) to adapt to the imbalances.

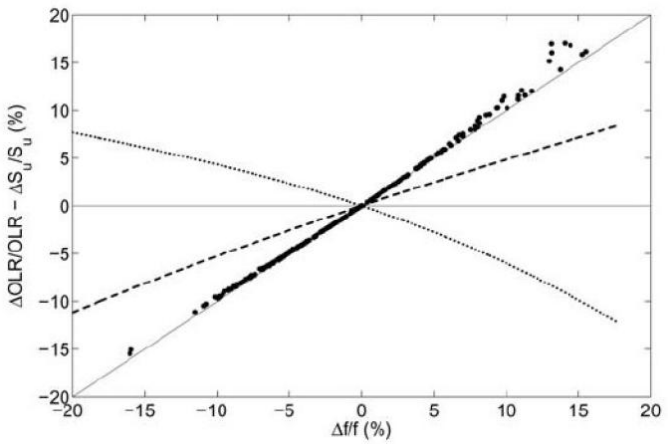


Fig. 18 (Figure 8 in Miskolczi, 2007).

How do the thermal profiles change with upper temperatures on the ground? The optical depth increases. The lapse rate changes, becoming more horizontal as in the crossed profiles in fig. 8. This can be done by the reactions of the water cycle to disturbances (figure 19). The water concentration increases in the atmosphere when the ground temperatures are higher and when the lower temperatures in altitude let the warmer air moves up.

The system maintains an amount of water in the atmosphere such that the difference between the incoming and outgoing heat is cancelled and that the heat transferred through the atmosphere matches the needed flow. The variation of Δf/f is linear for 10% perturbations. In a linear system, the global averages are the average of local averages. So a balance tends to be established on

average over the whole planet. But one must sometimes wait a year, for example when a warming of the sea by the El Nino effect has to dissipate.

From radiosonde measurements, one observes that the physical properties of the atmosphere depend on latitude (figures10, 11 and 12 in Miskolczi, 2007). The optical depth ranges from 1.2 (Ta = 30 %) to 2.5 (Ta = 8%) with an average of 1,87 (Ta = 15 %). The minimum of the **Ta** transmittance is four times smaller than the maximum. **OLR** varies from 190 to 280 (average 250). **Su** varies from 250 to 460 (average 385). The cycle of water allows important and fast local variations of the quantity of water vapour.

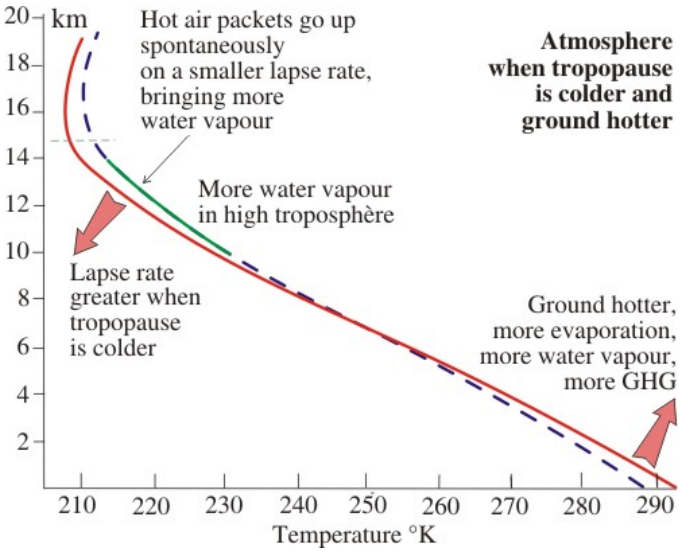


Fig. 19

Miskolczi's theory is far from having a clear and accepted description and is far from being proven but the results are consistent with observations, unlike the CGM simulations (which exaggerate warming under the tropopause). However, it is neither replicated nor studied by the IPCC, a fact which might be surprising for those who do not know that he purpose written in the IPCC statutes is to show the effect humans have on climate while Miskolczi shows that the effect of GHG additions is negligible.

(7) Added CO_2 greenhouse effect

Arrhenius (1824) had calculated the warming of the Earth for a doubling of the concentration of CO_2. Its calculation was false, but gave the same results as those from the methods chosen today by the IPCC.

Water vapour replaced by CO_2

An increase in greenhouse gas does not change significantly the physical properties of atmosphere as GES are trace gas, even water vapour. The concentration of CO_2 is 100 times lower than the one of water vapour. Indeed, 400 ppmv (parts per million in volume) corresponds to 0.4 per thousand compared to up to 4 % for water vapour. The molecules of H_2O have absorption and emission effects weaker and more distributed than those of CO_2. The computations take account of these parameters.

The concentration of water vapour decreases with altitude. It remains very little water above 5 to 10 km altitude. The distribution of CO_2 in the atmosphere is more homogeneous than that of water vapour. There are only little variations in CO_2 concentration, more in the northern hemisphere.

How much does a doubling of CO_2 concentration increase the absorption? As the GHG absorption by the lower stratosphere is almost saturated with the water effect, the CO_2 greenhouse effect is important only in the stratosphere and high troposphere.

The greenhouse effect of CO_2 must not be added to the one of water CO_2. The water greenhouse effect does not combine linearly. CO_2 has a significant greenhouse effect but its presence remove first a part of the water vapour, so the resulting change is minimal. Recent measures show that, due to the increase in CO_2, there is less water in the high troposphere [W11].

The partial pressure of water vapour is slightly decreased when there are more CO_2. For a given ground temperature, water evaporation from the soil or from the sea is little changed by the concentration of CO_2. As a doubling of CO_2 replaces a portion of the water vapour with CO_2, not much happens to the resulting greenhouse effect. In the calculation of the optical depth τa, the ratio Su/OLR is a little increased. The resulting increase of the ground temperature has been calculated by Miskolczi et al (2004), table 6, page 242:

Increase of CO_2	0.5	2	10
Temperature change in °C	-0.396	0.48	2.29

Instead of doubling the CO_2, on gets the same temperature rise (0.48°C) by increasing air humidity by 0.08 prcm, i.e. increasing it from 2.6 prcm to 2,68 prcm. The increase in the rate of CO_2 has therefore no significant effect on the temperature.

An unfinished science

Thus the AGW alarmism is not supported by settled science, contrary to the IPCC declarations relayed by the AGW supporters and the medias. The main demand of AGW, to reduce the GHG emissions, is a political demand without scientific justification.

The presentation of global warming in this paper is not the official presentation. In its papers, IPCC refuse to include the arguments of the sceptics (those who put in question the dogmatic AGW). That does not give a serious image of the current climatology.

Can we really change the climate? The changes in atmospheric CO_2 emissions by fossil fuels are the most cited form of geo engineering but this method would not protect us if an ice age should occurred. An artificial modification of the albedo would be more promising.

The politically correct in ecology was engineered by communication agencies having a particular agenda. Some options of the political parties which proclaim being ecological are rather inefficient and economically destructive. They do not preserve or improve most of our natural environment. Now that the AGW errors have been revealed, it is urgent that the dogmatic policies be replaced by science-based policies and not by the special interests of those who manipulate the ecological activists.

(8) Has IPCC tricked its reports?

It is quite complex to understand how the climate functions. Instead of diffusing robust scientific concepts to address this problem, the IPCC has published working methods and climate data that have distorted the approach. This policy is now acting against them.

Few scientists thought that the long term evolution of the climate was really predictable. Nobody could therefore strongly believe that man was responsible for global warming (AGW) or the contrary. Now the known history of the manipulations by some officials of the AGW lobbies (collectively called the **IPCC** in this text) has convinced many scientists of the following: some groups having an agenda have used non-scientific methods to make believe that the AGW was important and to get thus an advantage, political, economic or other.

The IPCC has prevented the discussion of the views of the sceptics in the scientific arena. This has upset the scientific community and made difficult any discussions.

Anomalies in the chapter 4 of the IPCC TAR

Circumstances have brought me to study first, among the extensive documentation of the IPCC, reviewed by 2500 experts, the chapter 4 of the third report (TAR, 2001). Much of this information comes from the International Energy Agency (IEA) and complies with the high standard of statistics produced by this organization. As an engineer judging the sections on the production of energy, it became clear that the sensible sections were written by the lobbies of energy which, as all lobbies, should distort the facts and the trends to support their industrial views. The industrial lobbies (for instance, of energies and of wind power) had succeeded to write or to influence the chapter 4 of TAR [W7].

I therefore had an unfavourable opinion on the IPCC but I thought that the work on climate would be more scientific as it seemed less influenced by industrial interests. The next sections explain how scientific data are manipulated to alarm on anthropogenic global warming.

Anthropogenic global warming (AGW)

To understand how alarmist groups have proceeded to convince of the AGW, a similar story deserves to be studied in the first place. Who had organized the gigantic global administration to take care of environment? This story, which is grossly simplified as a conspiracy theory, is described in [W6].

Make believe that warming is not natural

Since almost all scientists are honest, the manipulations could only involve very few areas that are reviewed and known only by very few experts. On this reduced domain, it is possible to select experts who believe in deep ecology, requiring the primacy of AGW over science requirements. The following shows that a few domains are sufficient to distort the conclusions.

As the climate is a complex area requiring expertise in many areas and as modern scientists are deeply specialised, it was possible to isolate a few areas verified only by rare experts. The AGW policy was therefore to modify information in the four following areas.

1) Distort temperature measurements

One has distorted a few data that are quite difficult to verify by others than those who had made the measurements: the current and past temperatures are thus transformed.

2) Invent the forcing

To be able to evaluate the works of many groups, the IPCC organization requires that the experts and the researchers seeking credits use a common vocabulary and common methods. Those are partially new and explained in books and reports for experts. This vocabulary and these methods convey the official method which includes confusing concepts, for instance an analogy to the feedback.

3) Evacuate the energy conservation

The atmosphere is a thermodynamic system whose physical laws involve energy conservation and maximization of entropy. These laws are not necessary in meteorology but must be scrupulously enforced to predict future temperatures.

The essential task of the climatology departments is to forecast the weather. This can only be done today with the aid of powerful computers. The IPCC gives its huge grants only for methods inherited from meteorology. In these, the Earth is divided into cells whose interactions are approximate and where the conservation of energy is not fully enforced.

4) Impose unrealistic moisture

As the IPCC must compare climate models on similar conditions, it requires that, in order to be taken into consideration, a model should work with a typical atmosphere where the quantity of water is twice too low, 1.2 prcm instead of 2.6 prcm (such as *United States Standard Atmosphere 1976, USST-76*). The computer models are adjusted on flawed historical data and thus produce altered models, for example to estimate the relative importance of water and of CO_2 as greenhouse gases.

Avoid experts having an overview

Some scientists are trained to evaluate a whole system for example engineers whose training is polytechnical.

Engineers are experts in thermodynamics and regulation. It seems that they are few in the IPCC climatology sections. Among the 30,000 academics Americans having signed a protest against Kyoto Protocol, more than 10,000 are specialized in engineering [W3].

The following sections study the four types of alterations in more details:

(1) Distort the data provided

High urban temperature

Global warming is simply read on the logs of the thermometers installed since 100 years. Due to the phenomenon of urban heat islands, the weather stations installed in or nearby cities show warming. The presence of macadamized roads, paved parking and concrete buildings and the absence of vegetation leads to a temperature 3°C higher in cities than in the surrounding countryside, an increase quite important in relation to the current 0.5°C to 0.7°C natural increase per century. According to IPCC, this warming would result from increased consumption of fossil fuels and is projected to grow more since fuel consumption continues to grow. The thermometers installed since 1945 around aviation fields display results that are also dependent on the construction of the tracks and hangars. Warming is especially noticeable in the Northern Hemisphere where there are more lands than seas.

As the readings of these weather stations become more difficult with modern work overload, it was decided in 1960 to keep only the thermometers connected to an electrical and telephone cable for automatic reading, a transformation made progressively on dozens of years. To reduce the price of a long buried cable, only stations close to modern buildings were kept. These installations benefit from the urban heat effect. The sceptics think that one has suppressed the stations which were well situated in clear areas, but that, due to this situation, did not show a sufficient temperature increase.

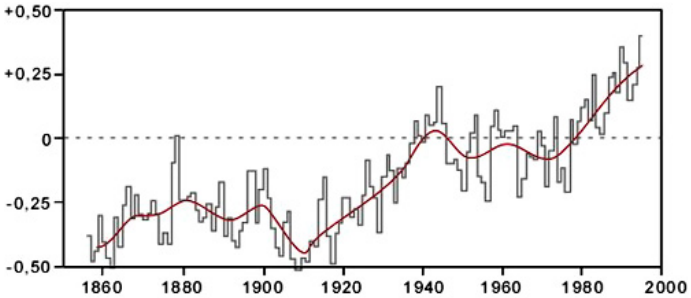


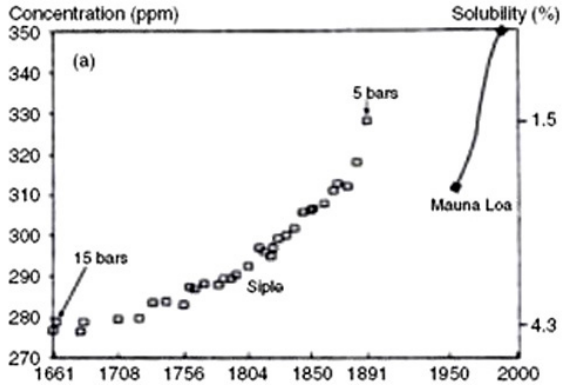
Fig. 20 (Published by Hadley Cru, IPCC, AR4, 2007)

The weather office of Hadley (UK) was in charge of this selection of thermometers. Hadley said it had taken into account the urban heat effect (a claim that the sceptics contest) to determine the evolution of temperatures that it publishes (series Cruterm, fig. 20) and that is displayed in the IPCC publication (AR4),

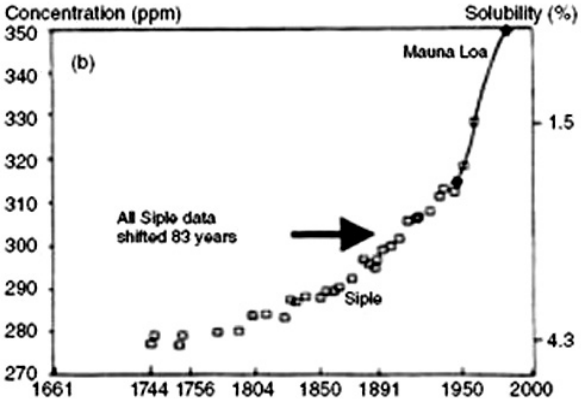
The US administration had copied the internal emails of Microsoft to prove that this enterprise did act intentionally against the antitrust laws. Now, some hackers have copied the internal emails of Hadley. If this "Climategate" is confirmed, these emails would show evidences of intentional manipulation [W1].

Old temperatures

To discover the temperatures for periods older than a hundred years, researchers use 'proxies'. To explain how these proxies are calibrated, the following shows how the atmospheric CO_2 concentration measured in air bubbles of ice cores (series Siple) have been connected to those measured by instruments. (Direct measurements are made since 1958 in Mauna Loa, Tahiti, as shown in figures 21 and 22 [W4]).



(Fig. 21. from W4)



(Fig. 22. from W4)

The two series do not connect (Fig. 21). To achieve this, one assumes that the ice made from snow is shaped into closed bubbles only after 83 years on average and captures the air at that time. With this offset (fig. 22), the two curves are well joined. This procedure, justified here, is used also to prove, edit, or delete other observations.

Figure 23 shows, in the top diagram, a simplified presentation of the results of ice cores i.e. as in the IPCC studies. It shows that the CO_2 increases when the temperature increases. When these charts are presented after having moved the temperature curve below that of CO_2 without changing the dates, one notices that the increase in CO_2 follows the increase of temperature after a delay of about 1000 years. The error is not visible because it is only 1%, 1000 years over the 100,000 years that elapsed between two ice ages.

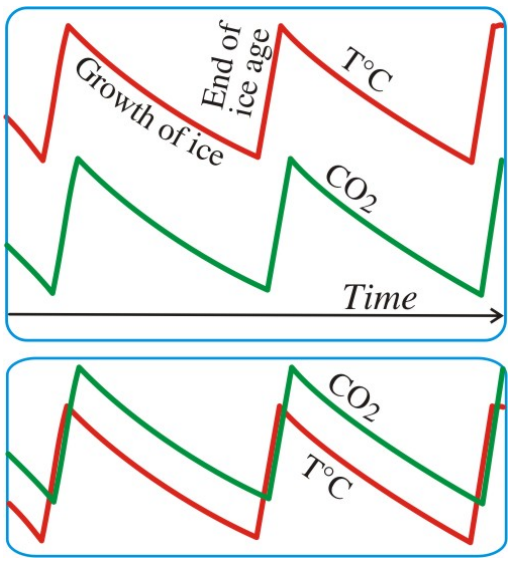


Fig. 23.

Dendrochronology

Researches on old climates were funded by agriculture and forestry departments to study the history of the past yields of crops and forests.

A research in their scientific literature shows the following article: *Detecting the aerial fertilization effect of atmospheric CO_2 enrichment in tree-ring chronologies* (Graybill & Idso, 1993). This article is accompanied by a chart (similar to fig. 24) showing that the thickness of the rings increases suddenly since 1900, a phenomenon that the authors have assigned logically to an increased yield as in greenhouses where the high concentration of CO_2 increases the vegetation development.

Since then, a more precise explanation is advanced. The mountains show horizontal lines at the limit where the trees can grow. The altitude of this limit has varied over time but was higher recently. The 'bristlecones' pines showing recent jumps in growth grow close to this line (circa 3500 m in the USA). At some periods, the pine trees near the limit grow faster than those below [W2].

The world of paleo climatology

Imagine the work of these climatologists before 1990. As the temperature was decreasing from 1940 to 1975 during the cold war, the medias were more interested in climate cooling and nuclear winter than in climate warming. Few scientists thought that weather could be predicted more than a week in advance and those who provide grants doubted about the usefulness to know the past climates.

Some dedicated scientists were anyway studying the rings of trees and the thickness of sediments at the bottom of lakes. These researchers on past climate had therefore few grants to travel in remote places, to search for almost fossilized trunks having lived during many centuries or even thousands of years and to measure the ring thickness. They might have enjoyed solitary expeditions in wild and inhabited places but this work required that they were dedicated to hard science. Nobody doubted the integrity of these scholars who do science for science without great opportunities to get well paid or to be recognized one day.

In the lakes near the Arctic Circle, the sediment strata are thicker since men, just by travelling around in cross country vehicles, have modified the surrounding lands which become more prone to erosion.

Some reports were thus published on climate series: tree ring of trees or varves (strata of sediment) at the bottom of lakes. Nobody judged useful to verify these series and their research archives were poorly maintained.

In 1991, the Soviet Union disappears. Oil and gas fields are privatised. The big oil men (mainly Americans) tried to control the field and to prepare the market for delivery. At that time, the anti-nuclear NGOs got an additional task, to set also a policy against coal. This was translated into a practical method, to fight against the emission of CO_2, itself supported by alarmist messages on AGW.

In 1995, someone in charge of supporting this new policy has discovered that one could interpret the exceptional phenomenon of pines showing recent growth jump in a useful way for their agenda. They found researchers agreeing to conclude that the increase of the thickness of the tree rings is proportional to the temperature. The link of the tree ring to the AGW was published in a paper (Mann et al. 1998) that received a large publicity. Since 1995, the increase of deposits in sediments is also interpreted as a proof of global warming and added to the tree rings as proofs of AGW.

The IPCC had thus a scientific proof, a chart showing that the temperatures had increased suddenly in 1920 in synchronization with the emissions of anthropogenic CO_2. This diagram, reproduced in Fig 25, became famous as the “hockey stick”.

Surprising errors of the IPCC

Two Canadian researchers, McIntyre and McKytrick, although being not specialized in climatology, have then studied in 2003 the scientific evidence that justified the Kyoto Protocol. They therefore examined how the climatologist had carried out the construction of the hockey stick. These investigators complained of many impeachments to get the original data on which these reports had been established, a normal scientific practice to replicate the studies. In 2003 (5 years after the publication of Mann et al.), what they revealed seemed incredible in a domain where a dedication to hard science was usual.

Some explanations on the practices of experimental research are needed here. Most researchers outside of exact sciences have only a limited understanding of mathematics but they must use some methods of statistics to show that the results they produce are significant. They know therefore the operating instructions of some statistical computer 'packages' that justify or not whether their regressions and correlations are significant.

A more complex package is used to discover which common shapes are hidden in series. It uses a statistical method called "principal components analysis". Such a program can detect a hockey stick shape in the series showing strong jumps in recent growth, such as the pines trees of Yamal. But the program they had used goes further: when one feeds it, instead of series with real tree ring thicknesses, with numbers at random, this program (astutely faked) continues to produce a hockey stick shape. This has been verified by parliamentary and scientific committees in the USA.

In 1954, a successful book explained "*How to lie with Statistics*" (Darell). For instance, most statistical packages detect the abnormal data and let the statisticians remove them and keep only those appropriate. The history of the hockey stick fraud is an addition to these methods.

Another trick is to multiply the number of times that the Yamal series were introduced as program data. These anomalies could be errors as usually found in large masses of data, but they are all going in the same direction. All these errors reinforce the conclusion that there is a recent warming that cannot be explained except by a greenhouse effect corresponding to the recent jump in CO_2.

While studying the hockey stick rebuttal by McIntyre and McKitrick, more researchers have adopted a new attitude, called sceptical. The sceptics think that IPCC messages have been manipulated and that the global warming, known since it has been discovered that we are in a period ending an ice age, has been knowingly overstated but is not particularly catastrophic.

The hockey stick fraud

The following explains how the results of tree rings were used to build a temperature curve having the shape of a hockey stick, i.e. how to deduce figure 25 from figure 24.

The main medias, public or private, have a lot of freedom, except in some rare reserved domains where they must be politically correct. The AGW was recently added to the enforced list while patriotism and respect for justice and religion were out. The free press, which still exists in other countries than Europe, has reported the full story of the IPCC manipulation. This explains that there are much more sceptics in the USA than in Europe.

How to connect the tree rings to the measurements of instruments. How to calibrate the ring? The junction method is more complex than for ice bubbles. The following shows how the IPCC has built the hockey stick diagram while solving this connection.

The fitting does not require to slide the time scale but to expand or to reduce the temperatures scales. The variations in temperature and the thickness of the ring are assumed to have the same variance, giving a proportionality factor.

The statistician may select on which periods the variance is computed, for instance one has computed it from 1000 to 1900. In fig. 25, the variance of the area in the grey areas (between -1 and 0.5) is not the same as in the black curve (between 0.2 and -0.2). The variance has no meaning when computed on averages. The annual variances (grey areas) should be compared to the annual tree rings, therefore to the fluctuations observed on the Yamal series and not on the flattened curves.

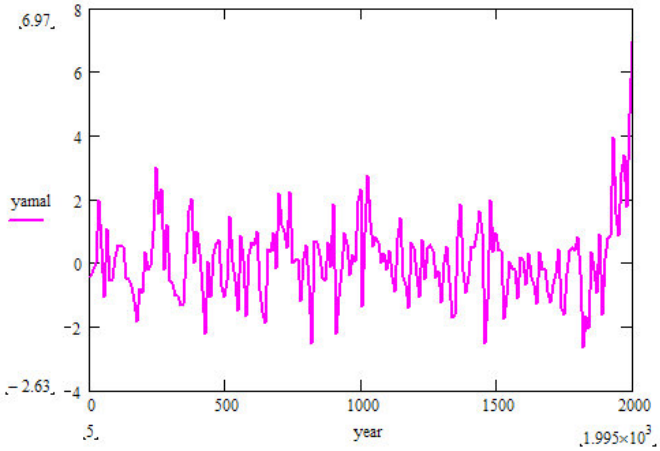


Fig. 24. (Example of original data of dendrochronology).

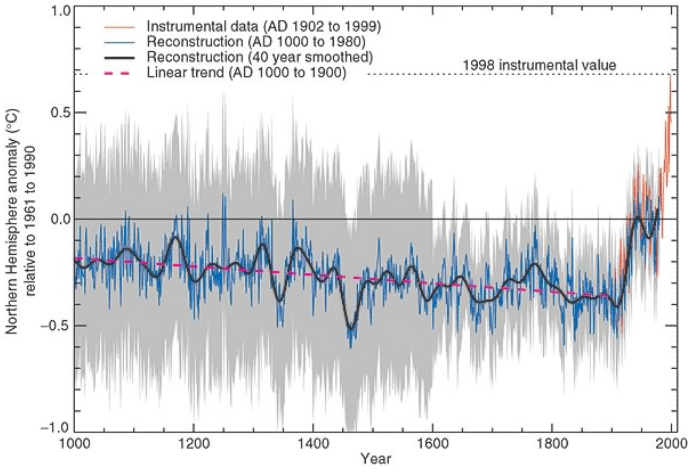


Fig. 25. (Hockey stick published in IPPC, TAR, 2001)

The Hadley CRU (climate research unit) has published a history of the temperatures in the northern hemisphere (fig. 20. Data are from 1860 to 2000. Range varies between -0.5 and 0.5). This curve, compressed over 140 years is reproduced in the red part at the end at the right of the hockey stick (fig. 25). It is scaled to the ring of the same age (between -3 and 7 in figure 24). This scale fitting, added at the end of the hockey stick, assumes that the Yamal exceptional phenomenon is a universal phenomenon.

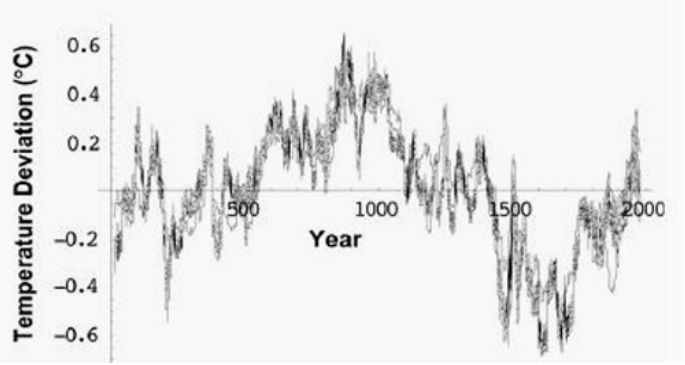
The IPCC had put this "hockey stick" chart at a prominent place and has reproduced it 6 times in its Tar report in 2001. It is used to illustrate the summary for policymakers. The hockey stick scale is dramatically presented in Al Gore *"An inconvenient truth"*.

Thanks to other manipulations accepted by the experts of IPCC (and that the sceptics have revealed since then [W1]), the hockey stick does not reveal the middle age warming and the little ice age. It does not show that the year 1938 was the hottest until 1998. Few Europeans

know that the Earth has cooled after 1998, a year exceptionally hot due to a strong El Nino.

Since then, the IPCC had to remove this hockey stick from its publications (AR4, 2007). The IPCC has also reduced its estimates of global warming and of water level elevation but it has not been up to acknowledge its abnormal errors.

Chart 26 gives the past temperatures deduced in a correct way. The comparison of fig. 26 and the hockey stick (Fig. 25) shows the manipulations. It is clear that the medieval warming period and the little ice age had disappeared because they were not correlated with the variations of CO_2.



(Fig. 26. From climate money)

Using science to justify Kyoto

The Stockholm Conference in 1992 is the first Earth Summit that promoted the new policies of the AGW. In 1997, the Rio Conference receives a much larger and sophisticated advertising. The media and the NGOs announced that warming is certain and dangerous and is caused by humans (by the increased emissions of fossil CO_2). The Medias have widely relayed the officials asking to take emergency measures to reduce CO_2, i.e., to replace coal by natural gas or renewable. (Following a communication campaign started in 1970, the nuclear power was deemed too dangerous to serve as a remedy).

As the renewable cannot provide enough power, the only possible policy arising from these announces is to promote the use of natural gas, especially to generate electricity. These political (or rather economic) changes were detailed at the Kyoto Conference (2003) and were enforced in 2005. An extraordinary budget has been spent to finance the groups of AGW partisans which prepare the texts that will be pushed at the Copenhagen conference. Many NGO have set support demonstrations.

(2) Feedback

Some systems with loops can deviate from their normal operation range if they have a positive feedback. If the atmospheric water vapour could be used for a positive feedback, it would logically justify alarmism on possible warming. As a positive feedback is essential for the AGW aims, one has sponsored climatology papers explaining how the positive feedback functions and how one could find one in climatology. As this impossible task could easily be disproved, the IPCC has introduced the concept of "forcing". As this is a new concept, one can say anything about it and let researchers confuse mechanisms defined loosely with those with a real feedback. Then, one adds, in a non-linear system, the forcing from water vapour and the forcing from CO_2 while only a global forcing has a meaning. A forcing, not being a feedback, can only show the temperature setting.

(3) Energy conservation

Energy conservation rules do not allow Earth to heat up without radiating less energy than that it receives. This can only be avoided if there was a temporary storage of energy, but this is limited as the atmosphere and the land have a very small capacity and the oceans (40 times larger) have normally a limited variability. Few references to thermodynamics and to energy conservation are developed in IPCC reports.

(4) Imposed relative humidity

Lobbyists have taken advantage of a note of two pioneers of computer models of climate. *"Manabe and Wetherald" (1967) showed that with their model, surface warming due to a doubling of CO_2 was 1.3°C when the absolute humidity in the atmosphere remained constant, but reached 2.4°C when the relative humidity remained constant.* (Cited in Dufresne *et al*., 2006).

Although we could not establish a link from cause to effect, the IPCC has imposed using a constant relative humidity in tests of computer climate models to be able to compare these models. This constraint increases (multiply by two) the forecasts of future warming.

Adaptation of the IPCC forecasts

The GCM models are calibrated by tuning them to predict the past climates. As these data of the past have been distorted (absence of middle age warming and of little ice age), the models are thus poorly adjusted and give an exaggerated importance to CO_2 relative to water vapour. They are also ill-adjusted to predict warming because their initial weather data have a humidity of 1.2 prcm instead of 2.6 prcm, thus increasing the greenhouse effect of CO_2 relative to the one of water vapour.

Climatologists must use IPCC official method to be considered, financed and cited. A test of their model must predict what happens with a doubling of the CO_2. GCM computing models have not forecast the warming absence from 1999 to 2009, unlike some models developed by sceptics.

Sea level rise

The history of water levels is given here to estimate the relationship between human activities and oceans. It shows how little is known about the causes of major climate changes long before any human intervention, and how easy it is to alarm people on climatic catastrophes and on AGW.

The study of ancient corals is a proxy to find the history of the level of the seas, since more than 20,000 years before present (BP). At the end of the last ice age,

glaciers covering the north continents have melted, increasing the level of the seas of more than 100 m in 10,000 years (blue trace on figure 27). Other studies of corals show the more recent history of sea levels in the green trace. The sea level rise has slowed (10 m in 5000 years or 2 mm/year or 20 cm per century). This elevation of seas continues (18 cm per century).

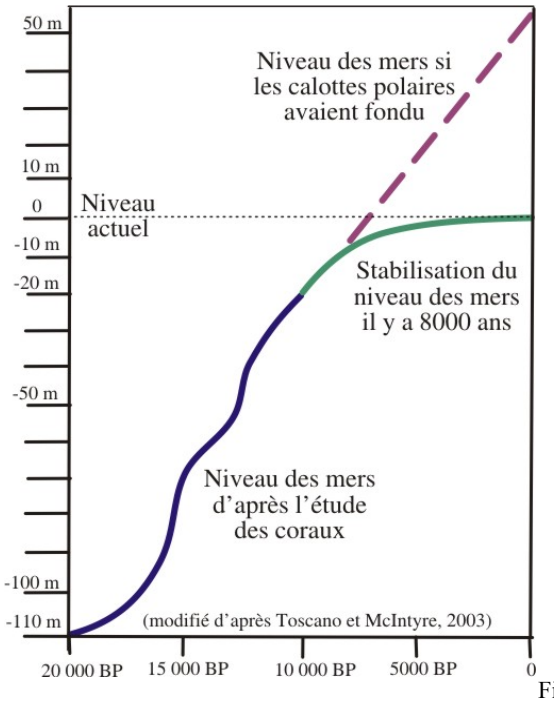


Fig. 27.

In the four preceding ice age, the melting did not continue up to the melting the polar ice caps. (Greenland glaciers have a mass that can move up the sea level by 7 m and the South Pole glaciers have a much larger mass that can move up the seas by 50 m). There is no reason to believe that the current end of the ice age could behave differently from the previous ones.

Climatologists can only advance assumptions to explain the ice age. The Sun influence during the Earth movements (eccentricity, variable inclination of the axis of the Earth) modifies the solar flow much more than the human actions. In some conjunctions, there are no heat waves during summers and some lands keep thus the accumulated snow for more than a year. This increases the albedo and cools the Earth to the point where ice subsists in the higher latitudes even during the warm seasons (Theory of Milankovitz, 1920, see Foucault 2009).

Extrapolation of sophisticated models

The Sun has magnetic cycles every 11 years. These perturbations (much stronger than the Sun brilliance) might influence the global climate. These oscillations are combined in the example of figure 28 in periods of 66 years. During these periods, some climate oscillations could occur on the North Atlantic and on the Pacific. These cyclic perturbations have already been repeated and could be repeated again. Extrapolating these observations (a small regular increase in temperature and a periodic oscillation around every 66 years), one gets forecasts that seem more valid than those of the expensive IPCC models. In figure 28, the forecast on the red line is correct up to now (2009). This example shows that a simple extrapolation gives much better forecasts that the IPCC models. To say that "*The science is settled*", is irresponsible when considering the hundreds billion dollars that could be wasted by inappropriate decisions.

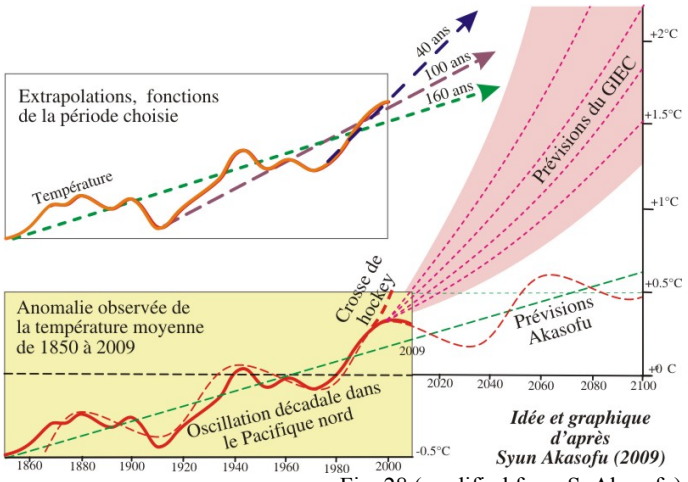


Fig. 28 (modified from S. Akasofu).

Using science to justify Kyoto

The Stockholm Conference in 1992 is the first Earth Summit that promoted the new policies of the AGW. In 1997, the Rio Conference receives a much larger and sophisticated advertising to be surpassed only by the coming Copenhagen show. Since Rio, the Medias and the NGOs announced that warming is certain and dangerous and is caused by humans (by the increased emissions of fossil CO_2). The Medias have widely relayed the officials asking to take emergency measures to reduce CO_2, i.e., to replace coal by natural gas or renewable. (Following a communication campaign starting in 1970, the public opinion believed that nuclear power was too dangerous to be used. As the renewables cannot provide enough power, the only possible policy left by these announces is to promote the use of natural gas, especially to generate electricity. These political (or rather economic) changes were detailed at the Kyoto Conference (2003) and were enforced 2005 (Kyoto Protocol).

(9) History of climatology

How were so many officials drawn to believe in AGW? The following is an attempt to rebuild this story. The events are dramatised and told in a style for a science fiction novel.

Modern advertising campaigns

Imagine that I was entrusted in 1992 to develop a communication campaign to persuade the public that the Earth is promised to disaster because of global warming caused by fossil fuel greenhouse gases. Imagine that I am convinced that this noble task should be carried out by all means. Suppose I have unlimited credits to convince

public relations agencies to act wisely and to purchase any media.

Imagine that a few oilmen executive believe that one should increase the consumption of natural gas (i.e. to fight competition). This would tilt the law of supply and demand and increase the price of natural gas. During oil prospection, one drills too many wells issuing more natural gas than petroleum. Oilmen, as soon as they have enough petrol for the demand, have thus too much natural gas for the demand. The natural gas production is currently too large and is expected to remain too high for more than hundred years. World production of natural gas (in 2007) is 1296 Mtoe (million tons of equivalent petrol), i.e. (1296/3532=) 37 % (in energy units) of the oil production [W8]. The total sales of oil (at 70$/barrel for 22.5 billion barrels/year), is 1.58 T$. The total sales of natural gas (sold at 67% of the barrel price for equal energy) is (0.37*1.58*0.67=) 392 G$/ year.

How much should a producer invest for advertising? Its investment must be in relation to the earnings expected. If one expect that the lobbyism campaigns will change the energy policy and raise the prices by 20%, then the natural gas would be sold at 80% of the oil price and the sales would increase by 78 G$/year. This amount was only the direct profits. The AGW campaign could afford now other opportunities. The global market of carbon and CO_2 (a market of 126 G$ in 2008 in USA [W5]) may be as profitable as the power market if it is designed as wisely as the electricity market invented by Enron.

The US budget for climate researches and climate actions is currently 7 G$/year. The cumulative amount from 1989 to 2009 has reached 79 G$ [W5]. This has been paid by taxes and not by the campaign which has just to support the lobbying expenses to influence the politicians that vote these budgets.

Imagine that I have convinced the oilmen to spend 20% of their expected additional profits to finance this lobbying campaign. Thus my budget (in the USA and Europe) would be more than 15 G$/year. My task is to fight the competing energies, such as coal, by imposing them with additional taxes as a tax on CO_2. I would thus have a practically unlimited budget to hire consultants in public relations to support environmental NGOs, to organize lobbying campaigns, and to give huge grants to any scientist believing in AGW. The money available for the medias is broader than anything that had existed until now. The spending for this campaign is only limited by the requirement that the identity of end sponsors be kept secret and to conceal anything that could make them suspect. (This has been done successfully since the public believes that the oilmen support the sceptics rather than the AGW supporters).

Communication campaign

We must avoid a naive view on how to use these credits. Nobody comes with piles of banknotes to meet the researchers. The methods to fund the propaganda have been developed by the Russians and Americans during the cold war and have still been refined since.

The Soviet bureaucracy, copied by the bureaucracy of the CIA, is trained to fill databases of all the persons concerned, such as researchers, politicians, officials, journalists, activists, NGOs, organizers of events, redactors of medias, including private and national TV. As for each of the citizens of the Soviet Union, the bureaucracy of the communication agencies fills the data for each person, mentioning their attitude towards deep ecology. To recruit its writers and its experts, the IPCC bureaucracy has already done half of work at the expenses of the United Nations, i.e., of the contributing countries. Sometimes, a case can be filled by going on a personal site to guess the opinions of its author.

The medias (the modern vehicles of propaganda) have disqualified the sceptics. In these sectarian environments, the classifications are black or white and the attitudes are polarised. One is an alarmist or a sceptic. The propaganda presents the sceptics as 'deniers' (a word used for those who do not believe in the Holocaust), reactionaries lacking any solidarity ideal. The sceptics are accused of being at the service of oilmen and to spread a selfish propaganda paid by capitalists without human emotions. These efforts prove at least that the sceptics have a growing audience.

Most IPCC researchers are prominent scientists who have made advances in their researches, bringing their stone to a big monument of which they do not control the architecture and do not know the few critical weaknesses.

In the internal information papers for each category of scientists, the communication agency are using their specific skills to insert unsigned messages presenting the sceptics as fundamentalists denying any value to the IPCC work and refusing stubbornly the evidences showing a warming.

Any clever advertising campaign can be presented as a conspiracy. The sceptics are presented as adepts of conspiracy theories, i.e. as hard minds who have a bad reputation since they believe amateur historians or science fiction authors or sneakers seeking evil everywhere.

Imagine that I am in charge of financing the communication agencies (identified by the pronoun 'One' in this text). My conditions would be that they only hire trained propagandists who have learned to present enemies as the religious men present the daemon. A few sentences in interviews or apparently innocuous added texts can convince unconsciously that the opponent is a despicable and irremediable contrarian. This can be very successful with activists who are provided only with selected and superabundant information.

This subtle propaganda has not only abused the newspaper reader and the television viewer but has even abused some conscientious scientists who, driven by the AGW propaganda, have sincerely admired the IPCC work (or have grants depending on this attitude) but this

has also strengthened the opposition of researchers more dubitative or more reluctant to any sign of brainwashing or to any imposed consensus.

In the bureaucratic folders, one notes the professional situation and the environmental opinions of each manager, administrator and editor. This could be used to help the professional career or the contrary. One examines the financial situation of all publishers to rescue them if they have financial difficulties. Most magazines, including scientific journals, are indeed in difficulty. The tacit counterpart is that they should support any politically correct opinion, such as the AGW.

The scientists are rated according to their number of papers that were accepted in scientific journals. The submitted articles are reviewed by 'peers' who judge the quality and originality. This system works quite well, at least while there are no groups of friends that promote each other. The IPCC experts are also examiners, a situation which explains that any paper supporting the AGW is immediately accepted. Sceptical articles have more difficulty to be accepted in scientific journals. When an official media reports a conference organized by sceptics, it uses this opportunity to denigrate them.

One multiplies the interviews and articles that make famous the alarmists. Dr. Hansen had a high position in the NASA climatology. He was a proven alarmist, thinking that the sea level was going up by 6 m per century. He became famous after he was interviewed a thousand times by cooperating journalists (while none were proposed for the sceptics). The media have to publish the opinions of alarmists selected with the agreement of the 'ethic office' (formerly called the 'censor office').

After any report by an AGW partisan, magazines and newspapers publish the following title: "*Scientists have discovered that the (*keep one of the following: *global warming, sea level rise, retreat of glaciers, ice melting, GHG increase) is worse that what was expected. »*

As the security of natural gas supply is of concern for the international policy, lobbyists have been helped by the politicians and the secret services of countries which depend on foreign natural gas or which sell their natural gas. Although this is rarely mentioned, the relations of Russia with Europe depend on these economic and political issues more than on the ideology.

In the files of politicians and senior officials, one notes their friends and their relations and how each one can be convinced. As the Nobel price on politics (called the Nobel peace price) is granted by the Stockholm politicians, one had to lobby them to convince a majority to crown all AGW heroes, Al Gore, the IPCC, and those who might have a decisive weight on the decisions, such as President Obama.

A politician that supports AGW will find that it is well presented in the press and that its chances of being elected increase. One pays secret consultancy contracts to produce arguments against the sceptics. One describes the sceptics as having mental problems. A website lists the errors committed by a sceptical Nobel Prize during his career. One search which means of pressure is effective on any climatologist so that he cooperates or loses its academic position or its research grants. One can put him on a black list to prevent him to disseminate his ideas in the public and the official scientific circles. Journalists are monitored by political groups able to cut him from his supports and relations.

If you do not believe these methods, review nominative actual cases in a SEPP study [W5].

Regulations and opportunism

Some idealists had banned the consumption of alcohol in America during the prohibition. This allowed a few opportunists to organize a profitable business. The organizers of the alcohol distribution channels had allowed the speakeasy tenants to also make a fortune. This organisation assured an efficient collaboration of everyone and the development of a strong mafia. Since then, most gangsters were prevented to cause troubles but the episode has left traces. America continues to drink as much as the other countries and the mafia, created on this occasion, are still active.

Now, new idealists think one should force everyone to act as an activist in deep ecology. Their arguments (existence of anthropogenic global warming) proved false and their remedies (photovoltaic and wind) were shown ineffective. As during prohibition, the possibility of huge profits in renewable business has attracted opportunists. Wind developers and those that help them make fortunes. Those that issue the permits to pollute (quotas of carbon) get rich thanks to the subsidies which pour money in the circuit. The difference with the prohibition period is that the manoeuvres are now legalized, including the conquest of residential areas and remarkable landscapes that the wind developers can destroy with full impunity.

Instead of creating profitable jobs, the politicians are now interested in subsidized activities on which they can benefit as well as those that help them in the process. The leaders forget that profitability was the motor of the past industrial developments. The contractors, supported by the media, give priority to work subsidized instead of profitable work. They are not anymore interested in the general interest (which is improved by a cost-effective use of money) but they seek their own profits at the expense of other citizens forced to reimburse the subsidies in their taxes and in the supplements on their electricity bills. The economy must support unnecessary spending to install renewable energies instead of effective energies, a deviation which increases the financial crisis.

As the IPCC manipulations are now clearly demonstrated by the sceptics, the lobbies lead a retardation fight so the truth did not be diffused before the signatures organizing an environmental control by the United Nations and by the related administrations. Politicians satisfy the lobbies while preserving their

future reputation by having the excuse that they believed in AGW.

It is therefore not surprising that so many scientists have doubts and think that:
- The CO_2 will not warm the Earth's surface as it has insignificant effects (0.5°C for a doubling of the CO_2 concentration).
- The IPCC has overstated the importance of global warming (it is less than 1 ° C per century).
- The seas level is going up since 20,000 years but this natural rise has decreased recently (18 cm per century).
- The glaciers recede since 1820, before humans have issued fossil CO_2.

he CO_2 reductions proposed in Kyoto do nothing for the real problems.

Was the hoax justified?

Was it necessary to mount this gigantic AGW hoax? Could scientists believe that the tricks would not be discovered? Has climate science lost its respectability? Were the AGW organizers overtaken by the events that they had initiated? Since 1960, the fight against the chemical pollution, such as smoke from coal, plants and exhausts, has been extremely effective without needing ideologies or global authorities. Would it not have been sufficient to modernize the generators of energy, improve the yields and reduce the consumption?

Would it not be more efficient to alarm only on the depletion of fossil fuels: oil, natural gas, coal? The remedies would have been somewhat similar: economy of energy, insulation of buildings, transportation less intensive on fuel, electricity generators with better performances, cogeneration, thermal solar plants, exploitation of other sources of energy (nuclear, fusion), search for productive biomasses. Would it not be better to focus the efforts on improving the water cycle or on enhancing plant efficiencies?

The merchants of natural gas seem to have a different agenda because the fight against coal demands the conviction that one must reduce CO_2. They promote wind power to sell their gas because wind power no longer works when there is no more natural gas for backup. The wind is also incompatible with the nuclear power. Although this one is indispensable to ensure the base electrical production, the propaganda could make believe that wind (and other renewable sources) can provide a sufficient energy.

Issues expected at the Copenhagen Conference

The politicians of large countries have scientific advisers who provide, in secret reports, the actual state of scientific questions, while drawing attention to what is politically incorrect. These leaders, especially those who have a technical training as in China or in India, do not ignore therefore that global warming is not anthropogenic and is not catastrophic. It is hoped that these leaders would take measures without practical consequences (such as the limitation to 2°C of the acceptable warming).

However, those who finance the lobbies of the renewable energies want to benefit as long as possible of the profits made possible by environmental regulations (carbon market, green certificates, authorizations to build subsidized systems, jobs in the new administrations of the environment for activists of the party, subsidies for the production of renewable).

Political activists want to take this opportunity to build a global permanent administration that would be needed to monitor the quotas of CO_2 emissions and to manage other environmental issues that, as they say, would save nature. Some AGW supporters go further and want a World Government (called multilateral). This one may rather be dictatorial and enforce the new religion of deep ecology.

One has funded NGOs to promote this new global government (or rather this global religion). The activists are in charge to require that the world government get the right to levy their own taxes (Tobin tax and international transport tax), without any control from electors.

There is concern that, against the strong coalition of AGW agents supported by the Medias, the Heads of States would not have a sufficient independence to avoid the pitfalls prepared in the yet unpublished regulations that will be submitted for signature during Copenhagen Conference [W10]. These regulation texts are prepared in the monthly meetings of well chosen AGW agents created at Bali Conference.

References

Darrell (1954). *How to Lie with Statistic*s, Norton, New York.

Dufresne et al. (2006) Simulation du climat récent et futur par les modèles du CNRM et de l'IPSL, *La Météorologie* N° 55, novembre 2006, pp. (45-59).

Foucault A. (2009) *Climatologie et Paléoclimatique*, Dunod, Paris.

Graybill, D.A., Idso, S.B. (1993) Detecting the aerial fertilization effect of atmospheric CO_2 enrichment in tree-ring chronologies. *Global Biogeochemical Cycles* 7(1): 81-95.

Kiehl, J.T. and Trenberth, K.E. (1997) Earth's annual global mean energy budget. *B. Am. Meteorol. Soc*. 78, 197-208.

Legendre A. (2009) *L'homme est-il responsable du réchauffement climatique ?* EDP Sciences.

Manabe, S., and R. T. Wetherald (1967) Thermal equilibrium of the atmosphere with a given distribution of relative humidity. *Journal of the Atmospheric Sciences*, 24 (3), 241-259.

Mann, M.E., R.S. Bradley and M.K. Hughes (1998) Global scale temperature patterns and climate forcing over the six centuries. *Nature*, 392:779–782.

Miskolczi F.M & M.G. Mlynczak (2004) The greenhouse effect and the spectral decomposition of the clear-sky terrestrial radiation, *Időjárás, Quarterly Journal of the Hungarian Meteorological Society* 108 (4): 209-251.

Miskolczi F.M. (2007) Greenhouse effect in semi-transparent atmospheres, *IDŐJÁRÁS Quarterly Journal of the Hungarian Meteorological Society,* 111 (1), 1-40.

Web references

-[W1] http://bishophill.squarespace.com/blog/2009/11/20/climate-cuttings-33.html
-[W2] http://www.sciencedaily.com/releases/2009/11/091116163206.htm
-[W3] http://www.heartland.org/publications/NIPCC%20report/PDFs/NIPCC%20Final.pdf
-[W4] http://www.ferdinand-engelbeen.be/klimaat/jaworowski.html
-[W5] http://scienceandpublicpolicy.org/images/stories/papers/originals/climate_money.pdf
-[W6] http://www.leseoliennes.be/histoireole/histoireenvironment.htm
-[W7] http://www.leseoliennes.be/economieolien/energyflow.htm
-[W8] http://www.iea.org/publications/free_new_Desc.asp?PUBS_ID=1199
-[W9] http://www.leseoliennes.be/Calculs/earthdata.xls
-[W10] http://wattsupwiththat.com/2009/10/16/obama-poised-to-cede-us-sovereignty-in-copenhagen-claims-british-lord-monckton/
-[W11] http://www.wnd.com/index.php?fa=PAGE.view&pageId=113219
-[W12] http://www.leseoliennes.be/GHG/tempterre8.pdf
-[W12b] http://www.leseoliennes.be/GHG/AGWUS.pdf