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6/6/11

Mr. Scott Morrison MP
Suite 102, Level 1
30 The Kingsway
Cronulla, NSW, 2230

Dear Mr. Morrison,

QUESTIONS FOR THE CSIRO

I write to you as my local Federal Member. I would be grateful if you would obtain answers to the following questions from the CSIRO, on my behalf.

1. When replicating the earth's recent climate history, for the 'base case' scenario, does the CSIRO's global climate model increase or decrease the period of the 'historical' virtual global hydrological cycle as the earth's 'historical' virtual temperature increased, and by approximately what percentage? (e.g. the 'historical' virtual period lengthens by say 4% for each 1 degree increase in 'historical' virtual temperature.)

2. When projecting the earth's future climate, for the 'base case' scenario, does the CSIRO's global climate model increase or decrease the period of the virtual global hydrological cycle as the earth's virtual temperature increases, and by approximately what percentage?

3. Could the CSIRO please cite the reference to a published peer reviewed climate research paper that provides observational data, which clearly shows the global hydrological cycle slows down (i.e. the period lengthens) as global temperature increases?

I make this request having read the Climate Commission's recently published report "The Critical Decade – Climate science, risks and response". I found their assertion "*Similarly, although considerable evidence points toward an acceleration of the hydrological cycle as the climate warms – increased evaporation, more water vapour in the atmosphere, and increased precipitation – this trend is still being debated in the research community*" (page 21) of great concern.

In the same paragraph the Climate Commission makes the very influential and very emotive assertion that "*These uncertainties, however, in no way diminish our confidence ..... in our assessment that human emissions of greenhouse gases are the primary reason for this warming.*" I note that the Climate Commission uses the term "*assessment*" rather than "*observation*", because there is no observational data to support this assertion and, as the Royal Society has stated publicly, this assertion rests on evidence manufactured by global climate models (GCMs).

The Climate Commission is clearly unaware that the above two assertions are completely incompatible. The climate research community cannot be uncertain about whether the hydrological cycle accelerates or slows down as temperature increases, but still be confident that human greenhouse gas emissions were the primary cause of recent global warming or will, if unfettered, cause dangerous global warming.

Does the hydrological cycle slow down, remain unchanged or accelerate as temperature increases?

At present it takes on average around 11-days for water vapour to evaporate, be transported by air currents to colder higher altitudes and latitudes, condense and fall back to the surface, mainly as rain.

As far as I am aware, all the major GCMs are programmed in such a way, that the period of the virtual hydrological cycle lengthens by between 3% (11.33-days) and 5% (11.55-days) for each 1 degree increase in temperature, depending upon the GCM.

There is, as the Climate Commission says, considerable evidence that the hydrological cycle accelerates as temperature increases and this evidence has been validated through a process of intensive scrutiny by the wider climate research community.

As far as I am aware, there is no published peer reviewed and validated observational data which clearly shows the hydrological cycle slows down as the temperature increases.

Hence, the urgent need for the CSIRO to provide an answer to my Question 3, above.

A brief discussion of the theory

When a cold, dry parcel of air descends to the earth's surface it will most likely come into contact with water, since oceans cover 71% of the earth's surface. Most evaporation (86%) takes place over the oceans where the parcel of air absorbs water vapour and is warmed.

As a parcel of warm, moist air rises it expands and cools down. This causes the water vapour it contains to progressively condense, release latent heat of vapourisation as sensible heat and warm the parcel of air thus giving it additional buoyancy

There is a temperature gradient in the troposphere from the warm surface to the cold upper troposphere. Because of this temperature gradient the warm, moist parcel of air will be less dense than the air immediately above it and will therefore rise.

Consequently, the rate of ascent of the now warm, moist parcel of air is governed by two factors. These are the amount of water vapour it contains and the steepness of the temperature gradient.

What happens to these two factors when the earth warms up by say 1 degree?

The amount of water vapour picked up by the air parcel, mainly over the oceans, would increase by around 6.5%. This additional water vapour will release more sensible heat and provide greater buoyancy and cause the parcel of air to rise faster.

The temperature gradient would lessen and cause the parcel of air to rise more slowly.

Which wins: the additional water vapour or the lower temperature gradient?

As far as I am aware, the CSIRO is adamant that the lower temperature gradient wins and wins handsomely, so that the period for the hydrological cycle lengthens by around 4% for each 1 degree increase in temperature.

As far as I am aware, there is irrefutable observational data showing that the additional water vapour is the winner by a small margin. This observational data shows the period of the hydrological cycle either remains unchanged or shortens by around 1% per 1 degree increase in temperature.

Does getting the period of the virtual hydrological cycle wrong by a few percent or a few fractions of a day matter?
Yes it does. The virtual temperature increase needed to re-establish the earth's energy balance, following a doubling of virtual CO2 is highly sensitive to these small percentage changes in the period of the virtual hydrological cycle.

Firstly, if the scientists who program a GCM get the period wrong by say 5% and their GCM predicts a 3 degree increase in temperature, then the period will increase overall by 15% (3 times 5%) from 11-days to 12.65-days.

It is generally agreed that a mooted doubling of CO2 would increase downward long wave radiation at the surface by around 3.2 Watts per square metre (W/sqm).

It is generally agreed that for each 1 degree increase in temperature, with no change in the period of the hydrological cycle, evaporation would cool the earth's surface by an additional 5.1 W/sqm. Most evaporation (86%) takes place over the oceans and in equatorial regions and mid-latitudes. Consequently, evaporation also cools planet earth because the water vapour condenses and releases the latent heat of vapourisation as sensible heat above most of the greenhouse gases. Consequently this sensible heat, having by-passed most of the greenhouse gases, can easily radiate into space, but only a small percentage can radiate back down to re-warm the surface.

A 4% lengthening of the period of the hydrological cycle, which is about the average slowdown of the virtual hydrological cycles programmed into the major GCMs, reduces virtual evaporative cooling from 5.1 W/sqm per degree rise in temperature to just 1.75 W/sqm per degree, a reduction of around 3.3 W/sqm per degree.

Consequently, a GCM that predicts a fixed 3.2 W/sqm of additional warming due to a mooted doubling of CO2 will result in a say 3 degree increase in temperature will need to reduce the 'unchanged period' virtual evaporative cooling of 15.2 W/sqm to just 5.3 W/sqm, a huge 9.9 W/sqm (3 times 3.3) reduction to get this result.

As far as I am aware, the predictions that a mooted doubling of CO2 would be likely to cause more than a 1 degree increase in temperature are based on speculations, that the period of the hydrological cycle lengthens, that are unsubstantiated.

No caring and responsible government should impose any costs on businesses, households or the Federal budget until the CSIRO cites the reference for published peer reviewed research papers that contain observational data which clearly proves the period of the global hydrological cycle lengthens as global temperature increases. It is now 'Show & Tell Time' for the CSIRO.

Mr. L. B. Cummings MBA (UNSW), BE (UNSW) 6th June 2011