

# So exactly how much can CO<sub>2</sub> actually warm the planet?

The answer to the above question depends on CO<sub>2</sub>'s climate sensitivity. The climate sensitivity can essentially be defined by two parameters (the Transient Climate Response (TCR) and the Equilibrium Climate Sensitivity (ECS)). The ECS will be higher than the TCR. For practical purposes, I'll focus on the TCR. The ECS requires thousands of years to reach equilibrium (and that assumes that we are currently near an equilibrium state (which is not that likely)).

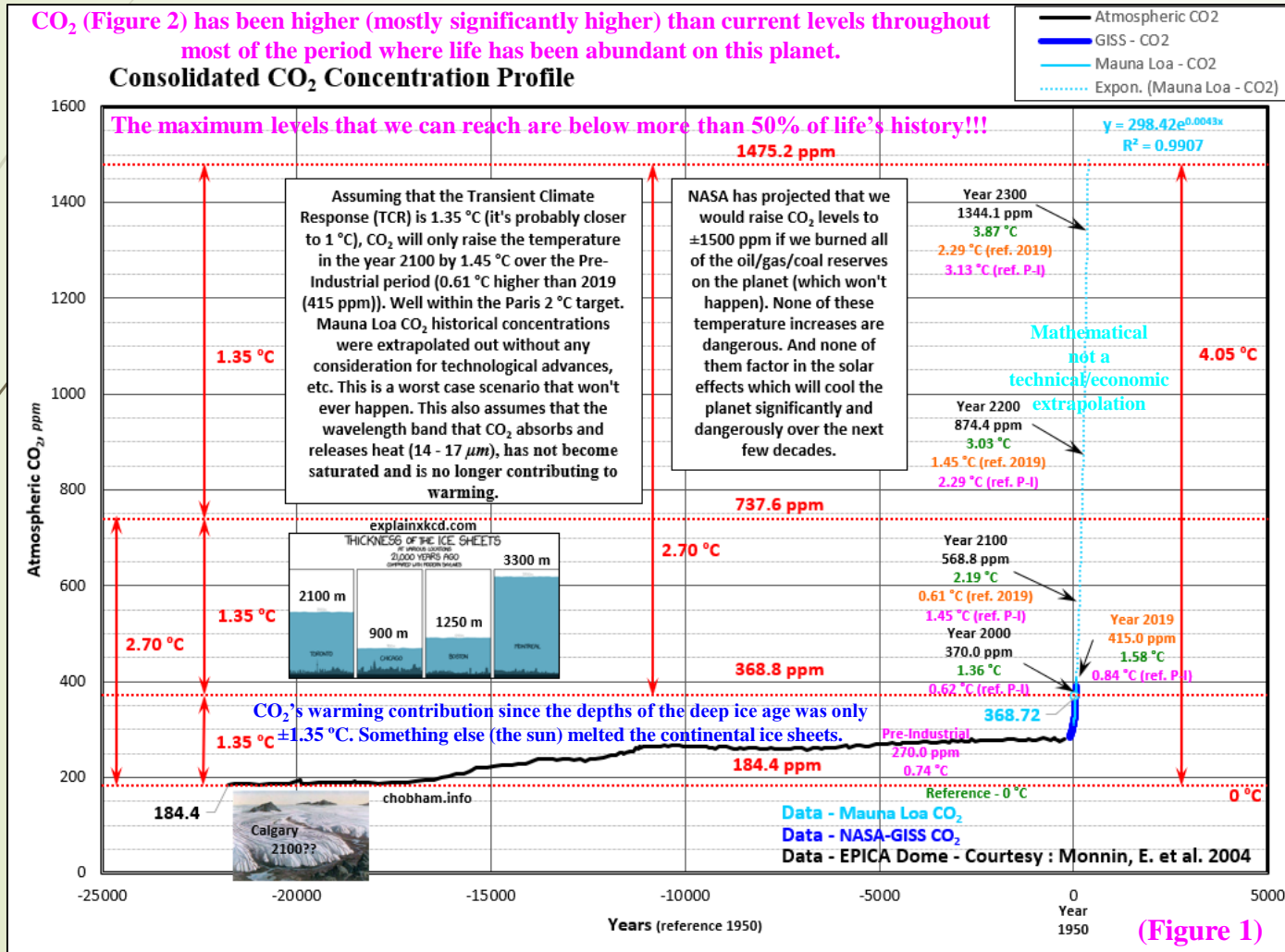
The IPCC uses a TCR range of 1.0 – 2.5 °C (from their AR5 Assessment report). Judith Curry et al looked at the TCR and came up with a range of 1.31 - 1.36 °C based on a variety of time periods (assuming that all of the warming is due to CO<sub>2</sub> with adjustments based on the IPCC's AR5 aerosol forcing estimate). I'll use 1.35 °C for the example laid out on this page. The actual TCR will go down significantly when solar forcings, ocean cycles, etc. are factored in.

Ignoring solar activity is an extremely dangerous path forward. The sun hasn't suddenly stopped driving the climate despite what the IPCC/alarmist crowd has decreed. The coming Grand Solar Minimum (GSM) will drop temperatures.

More detail? Google "Ronald Davison climate"

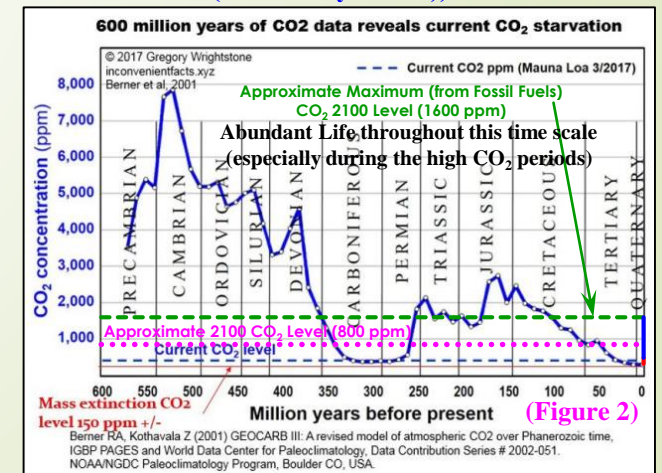
## CO<sub>2</sub>-Climate Sensitivity

We will soon be very thankful for whatever warming CO<sub>2</sub> has provided over the last 70-80 years. Hopefully, that CO<sub>2</sub> warming will be enough.



(Figure 1)

So what does a TCR of 1.35 °C actually mean? Every time CO<sub>2</sub> doubles, the global temperature increases by 1.35 °C. That means that CO<sub>2</sub> can only increase global temperatures in 2100 by 1.45 °C over Pre-Industrial levels (0.61 °C over current levels). That's good news since the Paris target was higher at 2 °C. When all solar activity forcings are accounted for properly, the TCR estimates will drop into the 1 °C range (and possibly lower). Much lower if the narrow CO<sub>2</sub> absorption band (14 – 17 μm range) is saturated. The IPCC adds in positive feedbacks to come up with their alarmist projections (which are based on unproven theories (water vapor positive feedbacks) programmed into their unsubstantiated computer simulations). CO<sub>2</sub> warming will not be dangerous at any of these levels and will in fact be beneficial. The changes in atmospheric CO<sub>2</sub> appear to be drastic, but the temperature response is not (even if you assume that the solar forcings are negligible (which they're not)).



(Figure 2)