

**SOME QUICKIE
CLICKER REVIEW QUESTIONS**

ATTENTION!! THESE ARE UNREGISTERED CLICKERS WITH POINTS BUT NO NAME ATTACHED

**CHECK YOUR CLICKER
DEVICE ID ON THE BACK
– DOES IT MATCH ANY
OF THESE NUMBERS
WHICH HAVE NOT YET
BEEN REGISTERED TO A
STUDENT’S NAME?**

**IF SO –
EMAIL DR H as
soon as possible
and include your
Device ID #**

Sec 51+52
12:30 – 1:45 pm

5A401
6B7D4
71C5C
71C7D
72384
74596

Sec 53+54
3:30 – 4:45 pm

5A561
7180E
725BF
7296B
72FC6

Which of the following are NOT expected consequences of GLOBAL WARMING, based on model results?

- 1. More cold days and frost days are expected over nearly all land areas**
- 2. Sea level is expected to rise throughout the 21st century**
- 3. Some diseases of the tropics may become problems in mid-latitudes**
- 4. Changes in species composition may occur in forests.**

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The view of scientists who have studied the Global Warming issue extensively is . . .

- 1. . . . that there are too many uncertainties to determine whether the trend of human-induced increasing GH gases is responsible for the global warming of the last 50 years.**
- 2. . . . equally divided. About half of the scientists are Global Warming Deniers and the other half are IPCC-sympathetic scientists who agree that Global Warming is occurring and that humans are largely responsible.**
- 3. . . . that GH gases ARE increasing due to human activities, but global warming and cooling occur due to natural causes ONLY.**
- 4. that the Earth's surface IS warming and that MOST of the observed warming over the last 50 years IS likely from increased GH gas concentrations due to human activities.**

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YOU CAN FORECAST THE FUTURE:

You now know that different kinds of global changes will affect different parts of the energy balance.

For each of the following global change scenarios, **SELECT THE SYMBOL** that best represents how the earth/atmosphere system will respond to the change.

$$R_{NET} = \begin{array}{c} \text{SW} \\ \downarrow \end{array} + \begin{array}{c} \text{SW} \\ \vdots \downarrow \end{array} - \begin{array}{c} \text{SW} \\ \swarrow \end{array} - \begin{array}{c} \uparrow \\ \text{LW} \end{array} + \begin{array}{c} \text{LW} \\ \downarrow \end{array} = H + LE + G$$

"MORE" means that the proportion of energy in this part (symbol) of the balance will INCREASE after the global change scenario takes place

"LESS" means that the proportion of energy in this part of the balance will DECREASE after the global change scenario takes place.

e.g. **LESS**



means that albedo will decrease.

SCENARIO: An explosive and climatically effective volcanic eruption occurs, similar to that of Krakatau or Pinatubo.

Which is most likely to happen to the energy balance for 1 to 3 years immediately following the eruption:

1. MORE **LE**

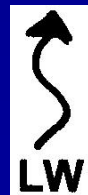
2. MORE incoming direct solar



3. MORE atmospheric albedo



4. MORE IR out to space



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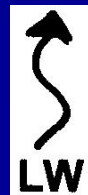
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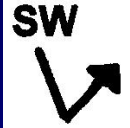





4. MORE IR out to space



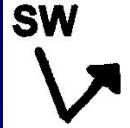




SCENARIO: Congress -- claiming that the evidence for anthropogenically enhanced global warming is not compelling -- allows a "business-as-usual" approach to CO2 emissions and the increased burning of fossil fuels in the United States.

Which is most likely to happen:

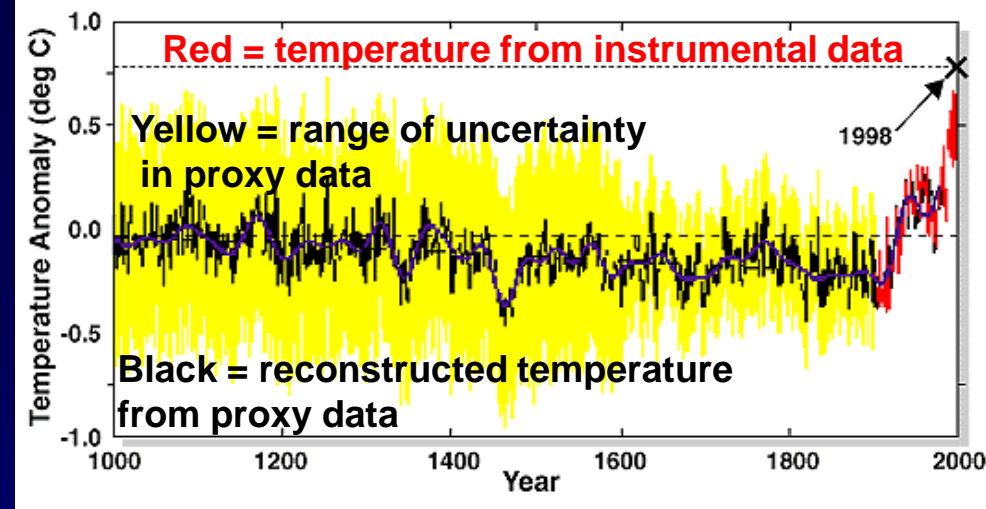
1. MORE surface albedo A square box containing the letters "SW" in the top left corner and a black arrow pointing downwards and to the right.
2. MORE IR to Earth's surface A square box containing the letters "LW" in the top left corner and a black wavy arrow pointing downwards.
3. LESS IR to Earth's surface A square box containing the letters "LW" in the top left corner and a black wavy arrow pointing downwards.
4. MORE IR out to space A square box containing the letters "LW" in the bottom left corner and a black wavy arrow pointing upwards.

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Which is most likely to happen:

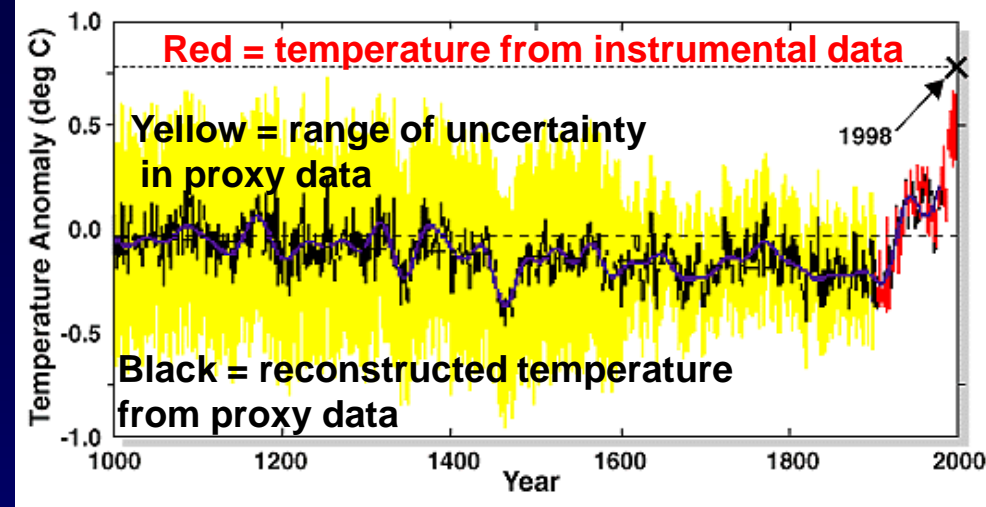
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Here is the “HOCKEY
STICK DIAGRAM:
What does it tell us?



1. That late 20th century OBSERVED (measured) temperatures are really no different than the range of temperatures in the PAST when GH gas concentrations were much lower under natural conditions
2. That the WARMING OBSERVED in the late 20th century is unprecedented when compared with ANY other period of the last 1000 years.
3. That the trend and range of NATURAL temperature variability of the PAST can account for the OBSERVED WARMING of the late-20th century.

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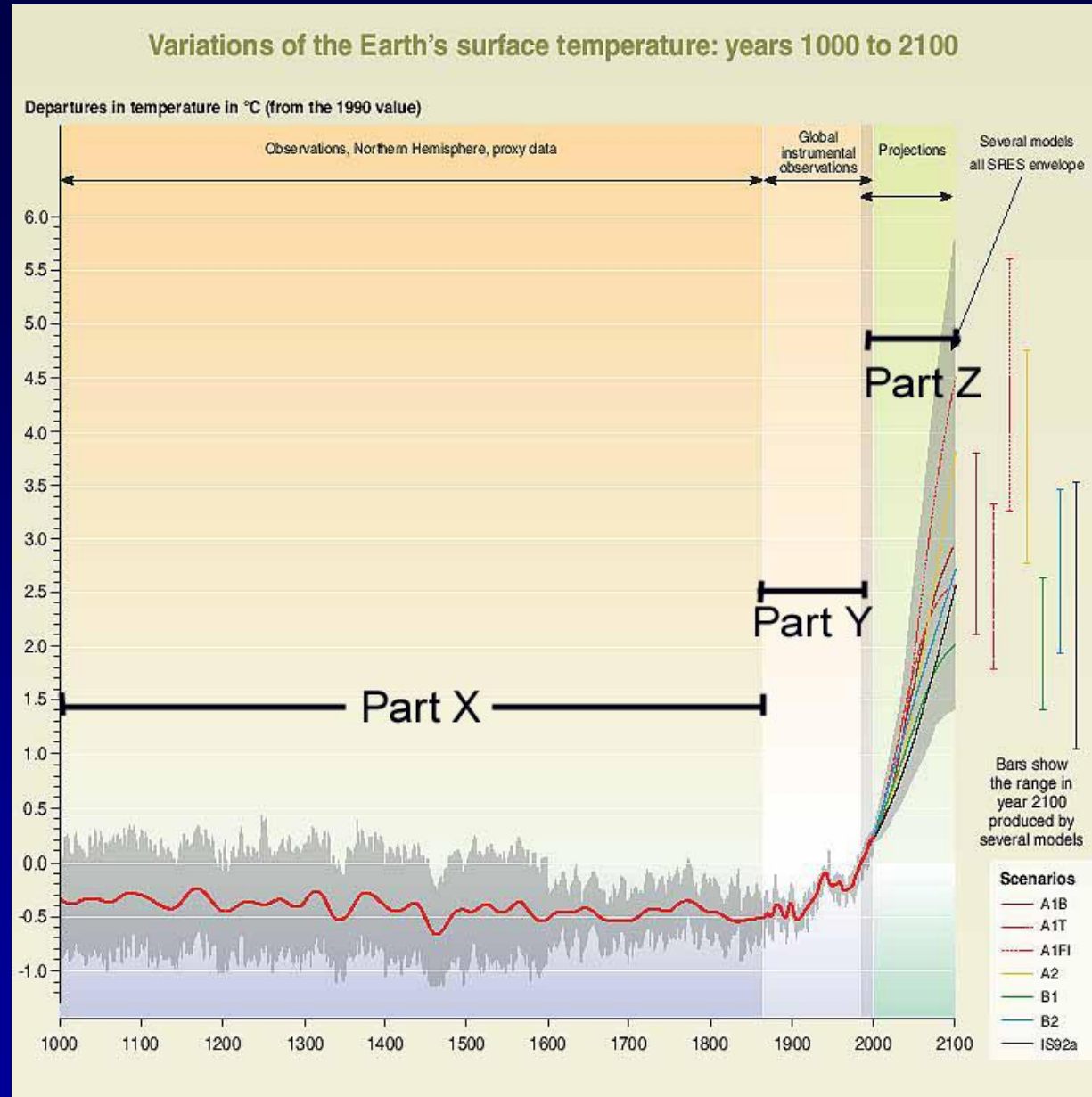
This figure is based on results from global change scientists using 3 different modes of analysis to study global warming:

X = Proxy data

Y = instrumental observations

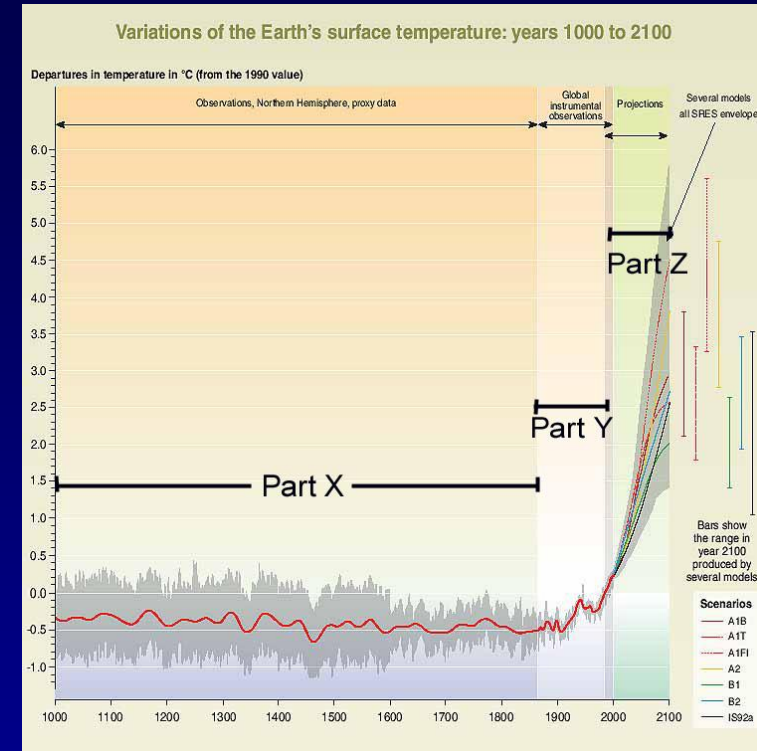
Z = Projected GCM model results

What is the significance of this figure?



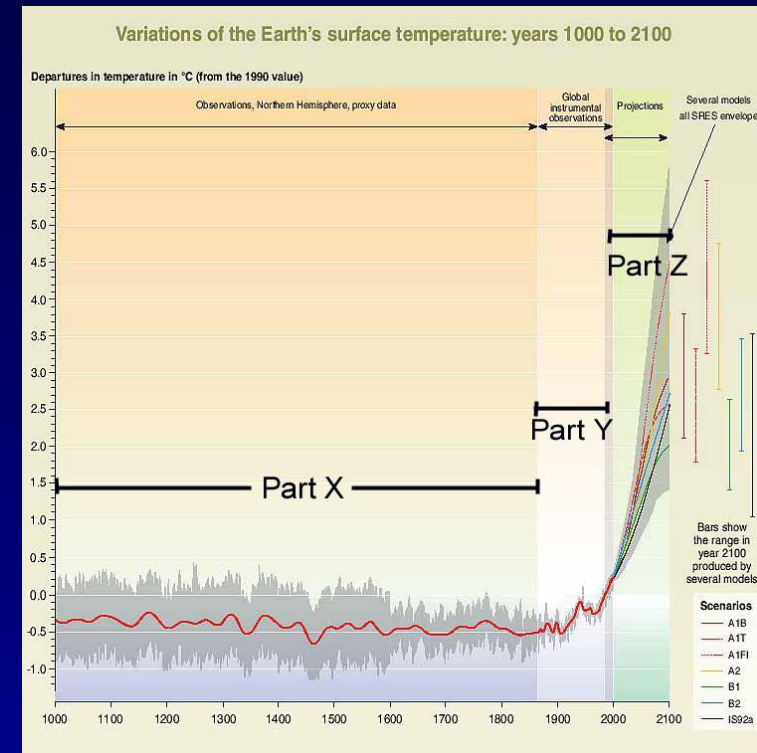
This figure is based on results from global change scientists using 3 different modes of analysis to study global warming. What is the significance of this figure?

1. It shows that temperatures of the **PAST** under natural conditions (from **proxy data, Part X**) are **NOT** very different from temperatures of the **FUTURE** (projected by **computer models, PART Z**).
2. It shows that **global instrumental observations** of temperature (**Part Y**) do **NOT** exhibit any **TREND** during the 20th century.
3. It shows that **ALL** the **computer projections of future climate (Part Z)** indicate that average Earth surface temps over the next century will be **WARMER** than any experienced in the **PREVIOUS 1,000 years (Parts X & Y)**



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What does kind of car does Dr. Hirschboeck drive?

1. Prius

2. Hummer

3. Echo



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