

**George Marshall Institute
Washington Roundtable
on Science and Public Policy
(to be given on 11 October 2006 at Noon)**

HURRICANES AND CLIMATE CHANGE

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Colorado State University
Fort Collins, CO 80523**

TOPICS

- 2006 Hurricane Season
- Hurricanes and Global Warming
- Past and Future Global Temperature Change
- Failure of Global Models
- Exaggeration of Human Influences
- Recommendations

2006

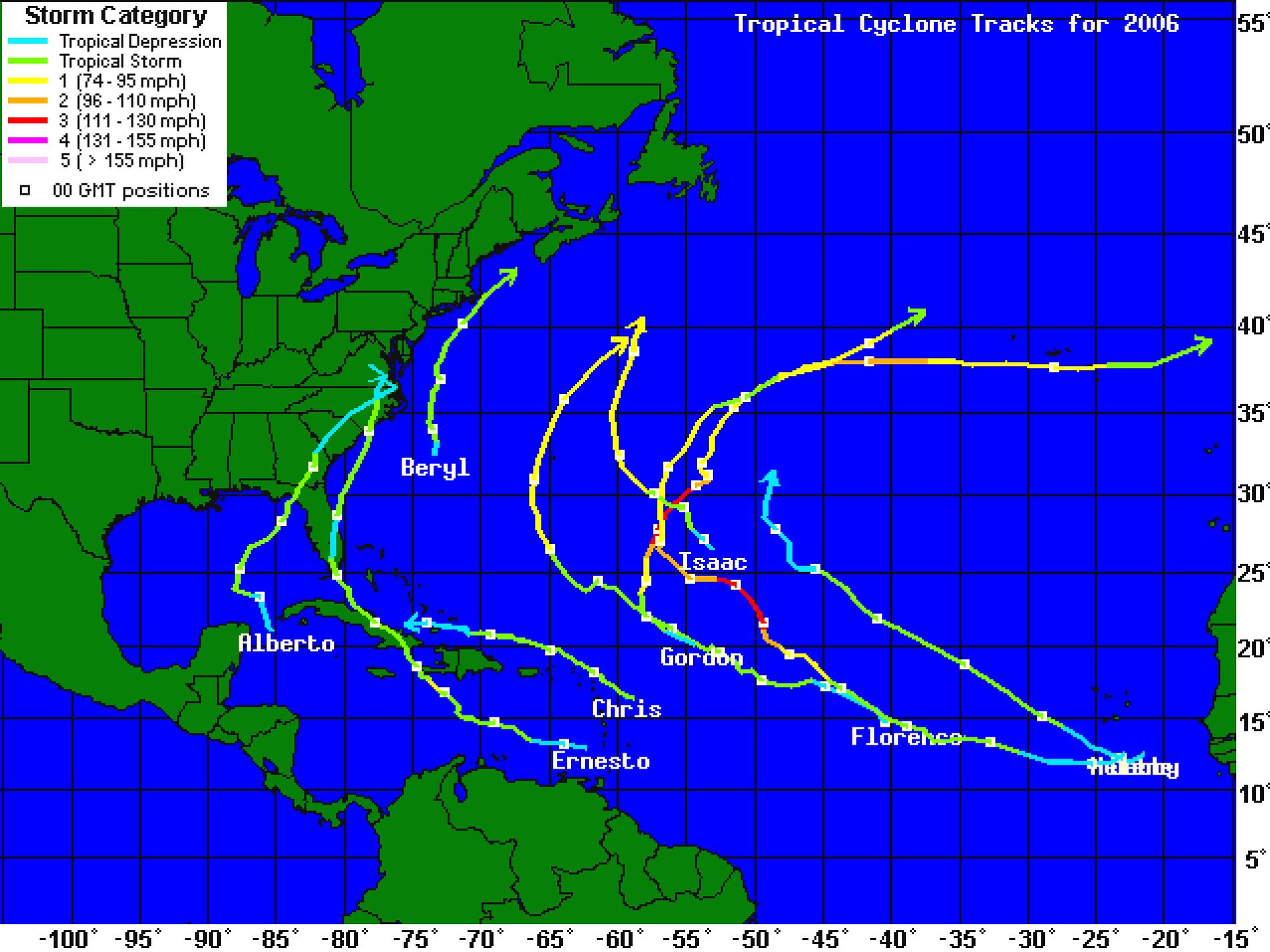
Hurricane

Season

Tropical Cyclone Tracks for 2006

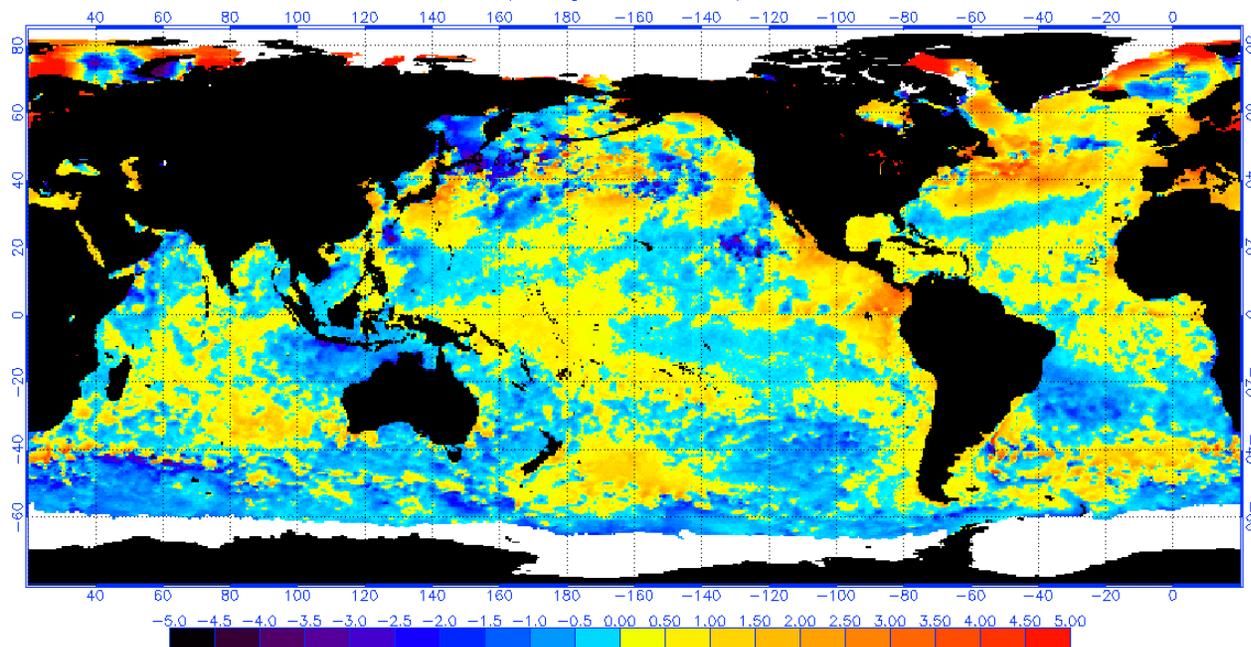
Storm Category

- Tropical Depression
- Tropical Storm
- 1 (74 - 95 mph)
- 2 (96 - 110 mph)
- 3 (111 - 130 mph)
- 4 (131 - 155 mph)
- 5 (> 155 mph)
- 00 GMT positions



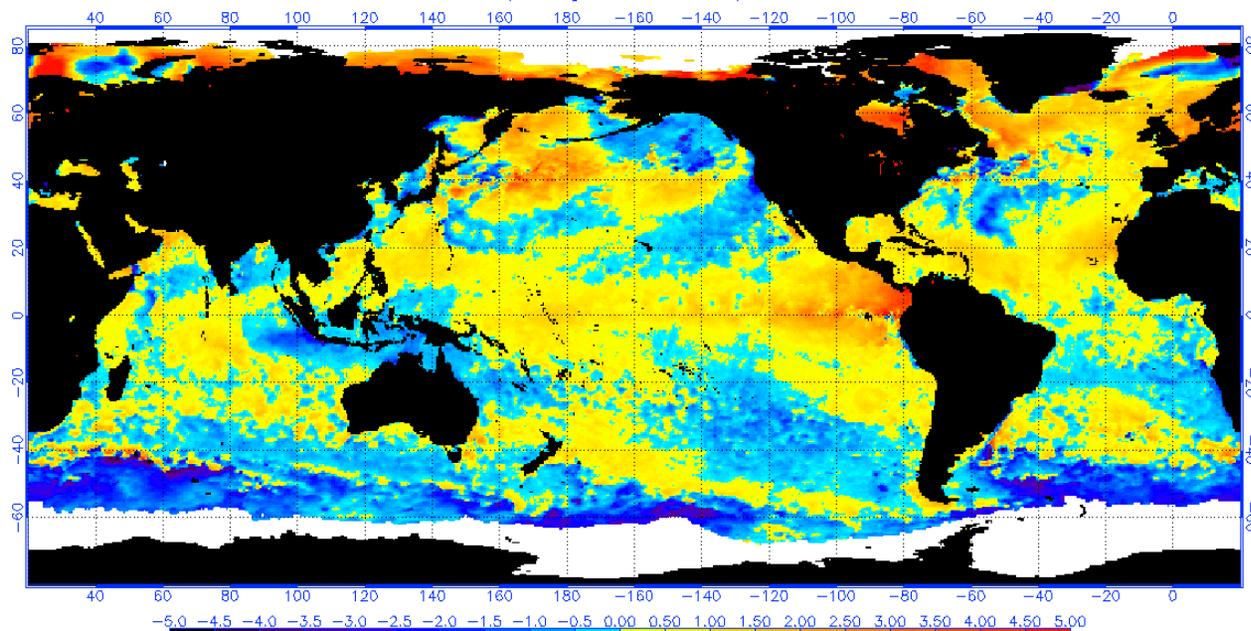
Full Season Tropical Cyclone Parameters and their 1950-2000 Climatology (in parentheses)	Full Season Adjusted 3 August '06 Forecast	Full Season Adjusted 1 Sept '06 Forecast	Observed Activity Through September	Updated Oct-Nov Forecast	Full Season Adjusted 3 October '06 Forecast
Named Storms (NS) <i>(9.6)</i>	15	13	9	2	11
Named Storm Days (NSD) <i>(49.1)</i>	75	50	48	10	58
Hurricanes (H) <i>(5.9)</i>	7	5	5	1	6
Hurricane Days (HD) <i>(24.5)</i>	35	13	19	4	23
Intense Hurricanes (IH) <i>(2.3)</i>	3	2	2	0	2
Intense Hurricane Days (IHD) <i>(5.0)</i>	8	4	3	0	3
Net Tropical Cyclone Activity (NTC) <i>(100%)</i>	140	90	83	12	95

NOAA/NESDIS 50 KM GLOBAL ANALYSIS: SST - Climatology (C), 7/15/2006
(white regions indicate sea-ice)



**Mid-July
2006**

NOAA/NESDIS 50 KM GLOBAL ANALYSIS: SST - Climatology (C), 9/26/2006
(white regions indicate sea-ice)



**Late-Sept
2006**

New Landfalling Hurricane Web Application

**Currently Available at the
following URL:**

<http://www.e-transit.org/hurricane>

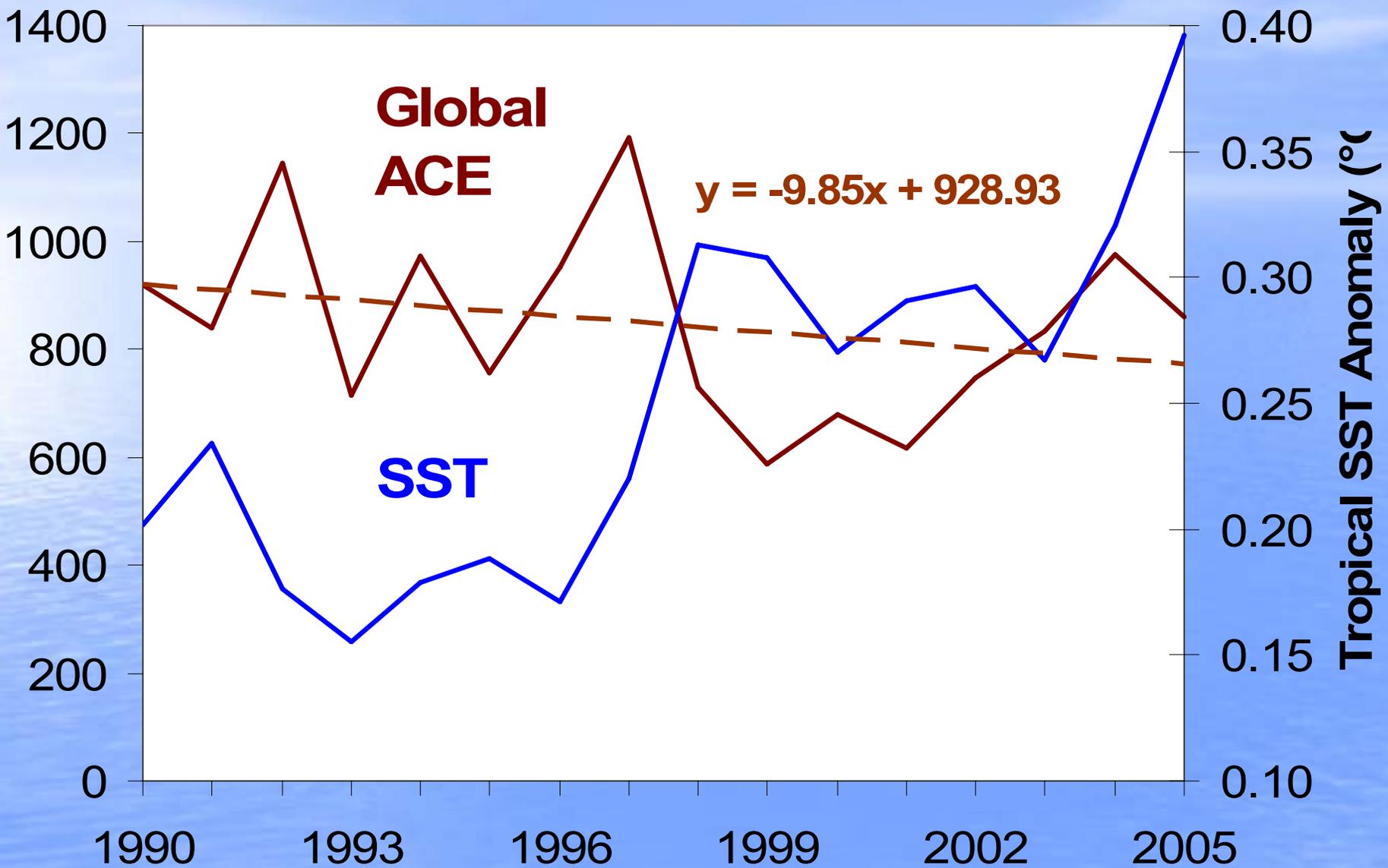
**In partnership with the GeoGraphics
Laboratory – Bridgewater State College,
Bridgewater MA**

HURRICANES

and GLOBAL

WARMING

(What's Coming)



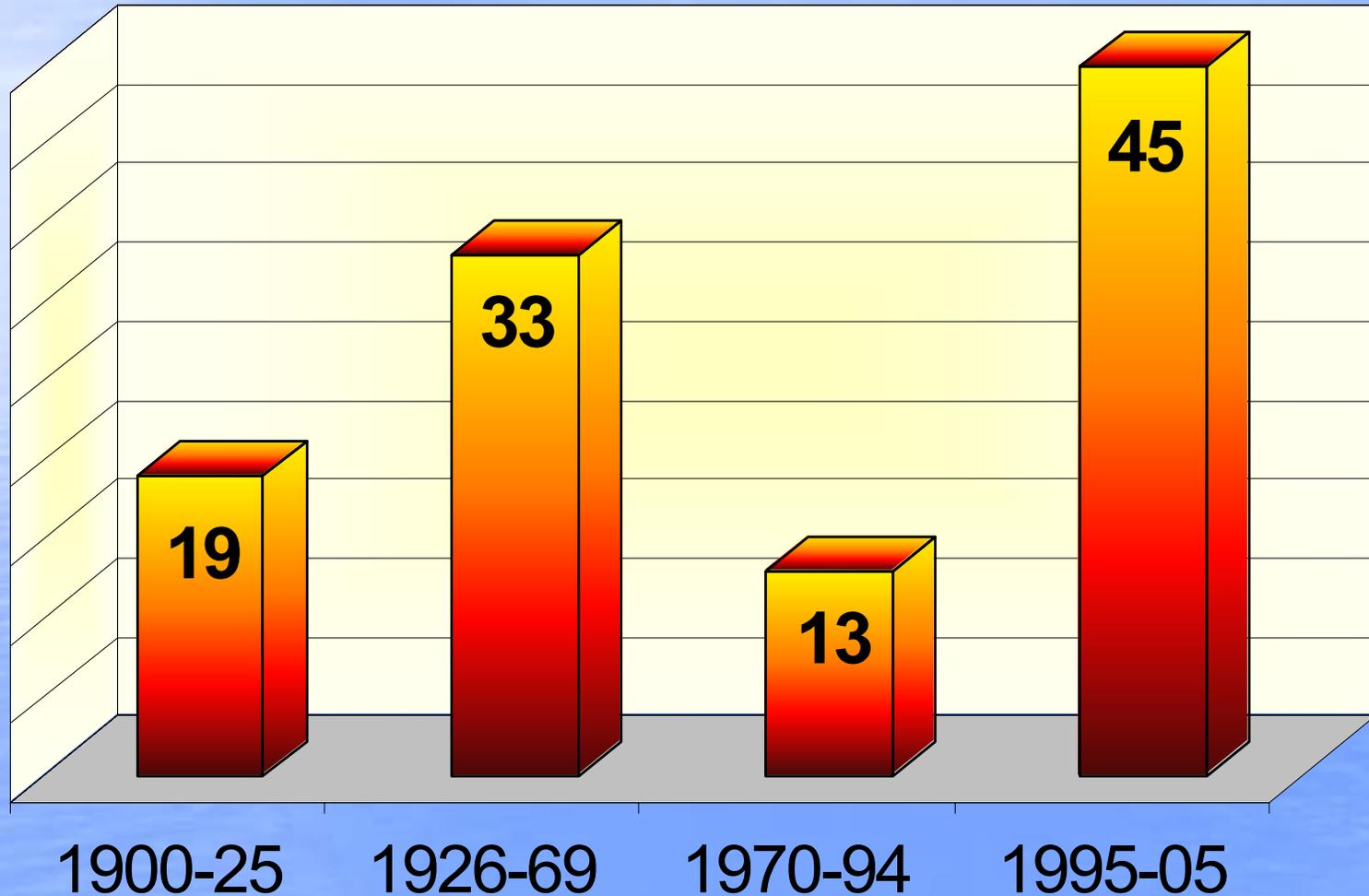
US Landfalling tropical cyclones by intensity during two 50-year periods

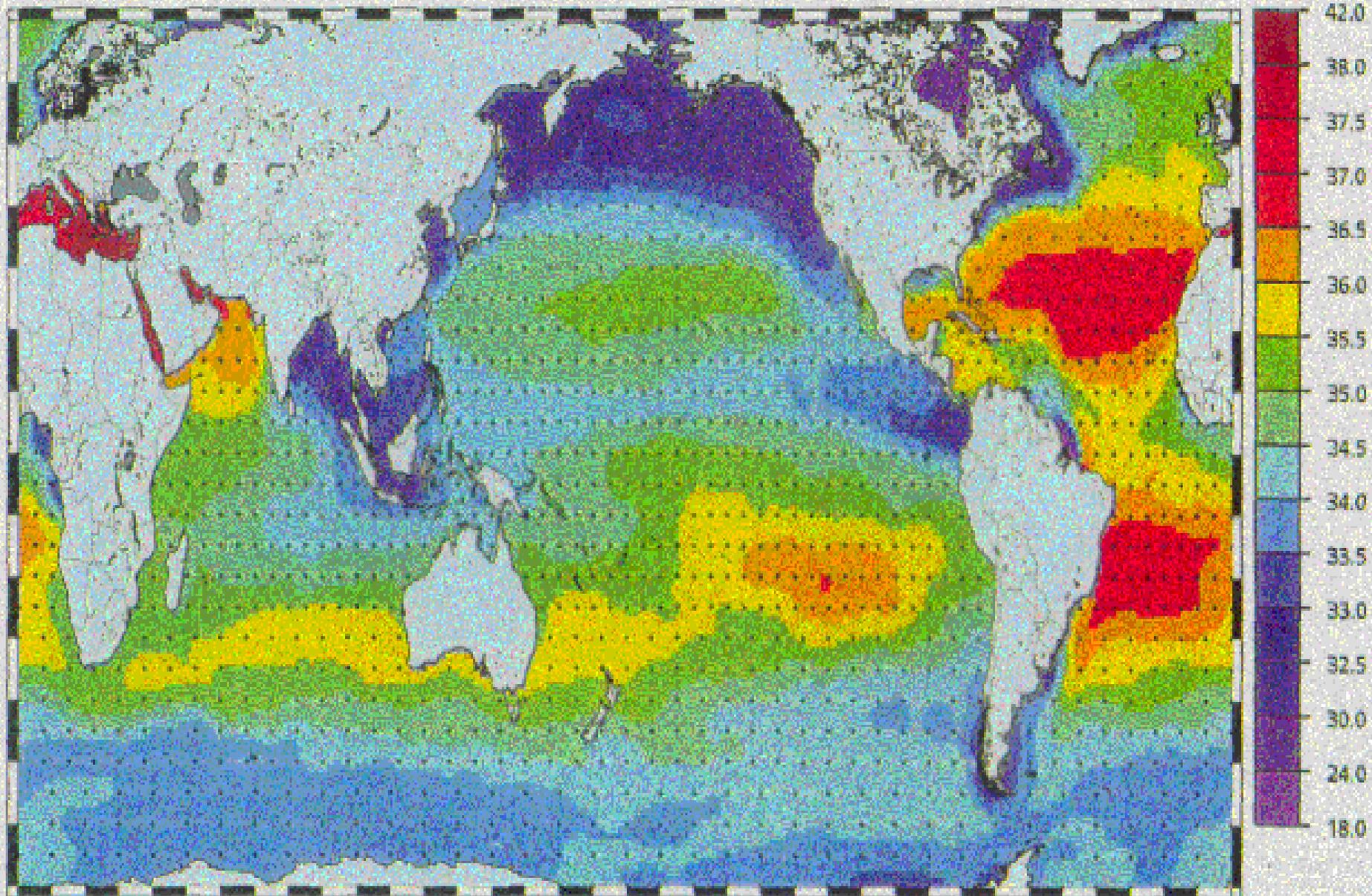
<i>YEARS</i>	<i>Named Storms</i>	<i>Hurricanes</i>	<i>Intense Hurricanes (Cat 3-4-5)</i>	<i>Global Temperature Increase</i>
1900-1949 (50 years)	189	101	39	+0.4°C
1956-2005 (50 years)	165	83	34	

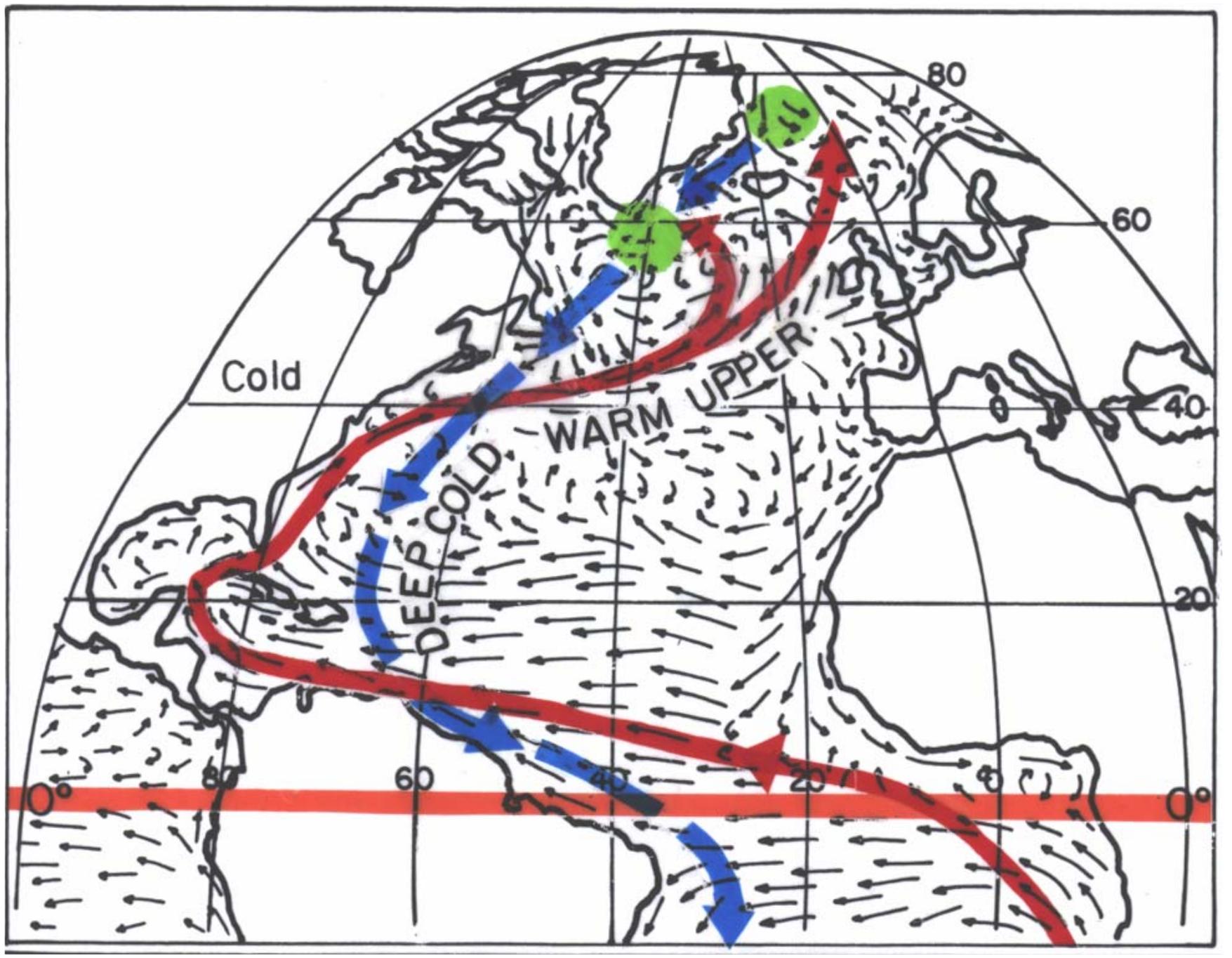
MULTI-DECADAL VARIABILITY

**The Atlantic
Thermohaline
Circulation (THC)**

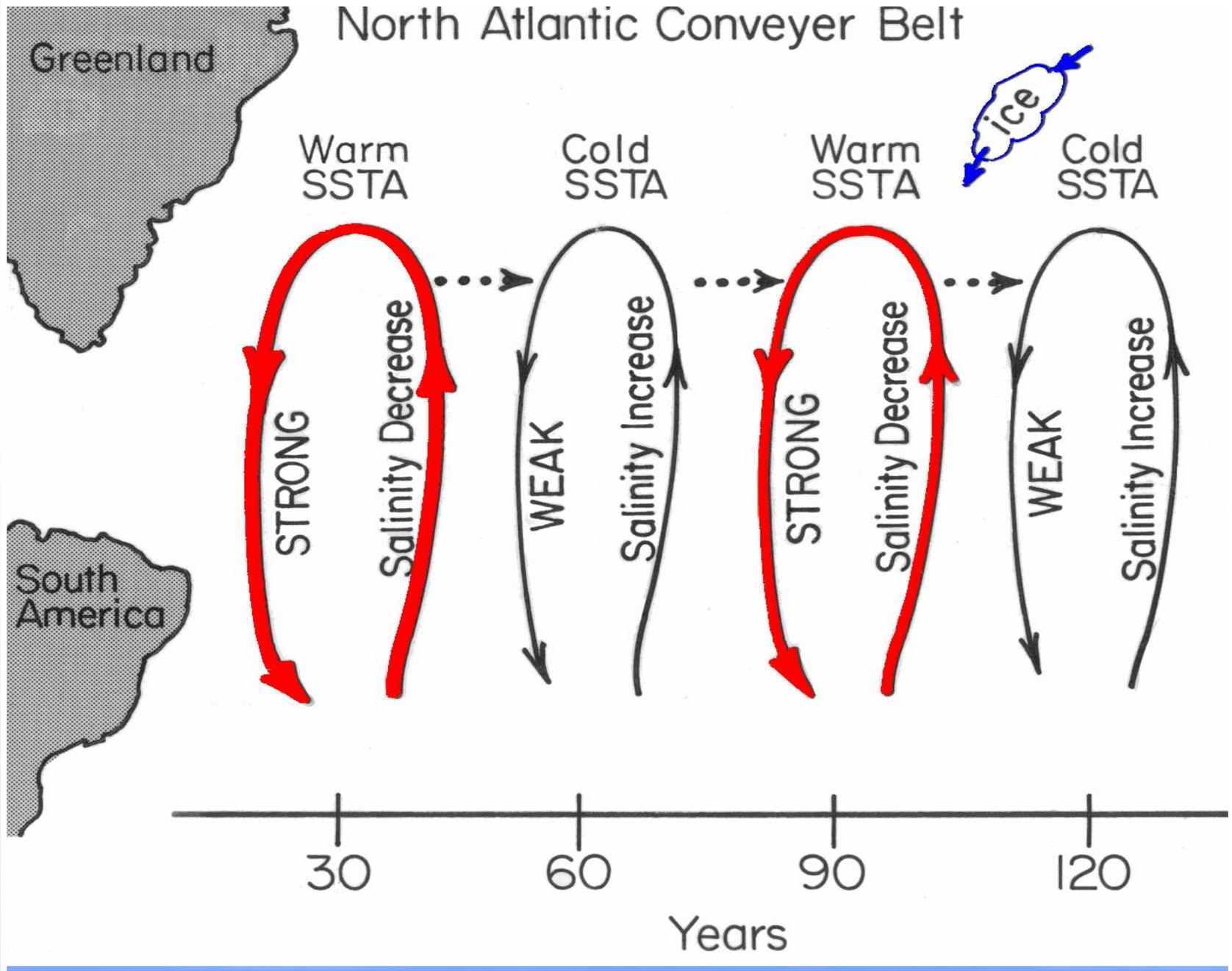
Annual Number of 6 Hour Periods for Cat. 3-4-5 Hurricanes in the Atlantic







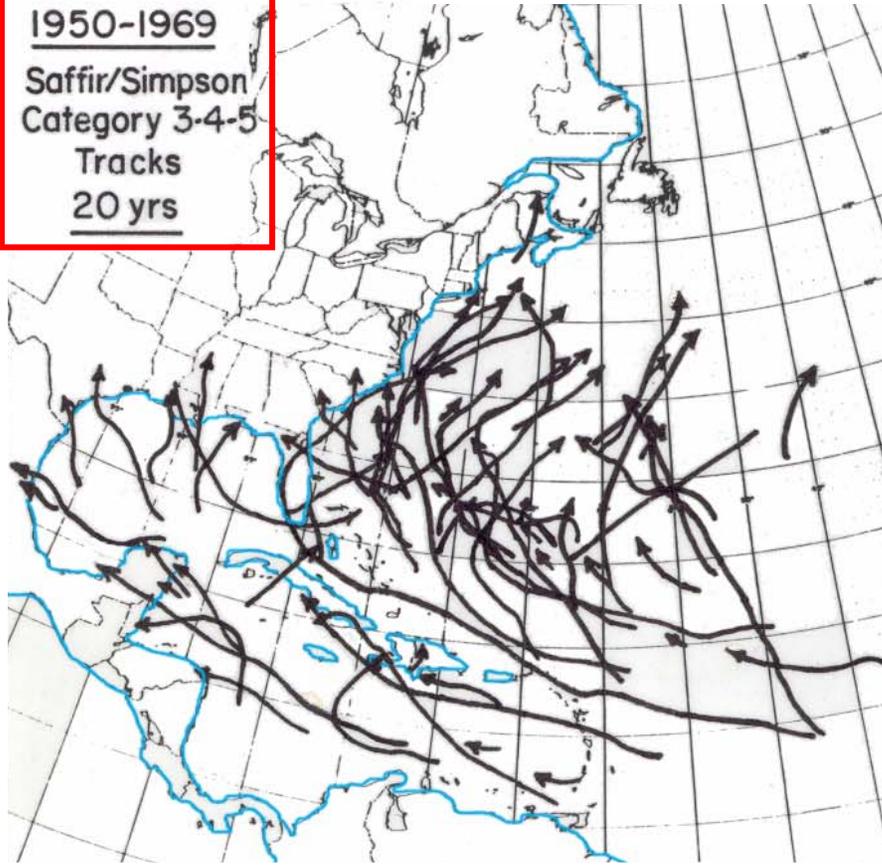
North Atlantic Conveyor Belt



TRACKS OF CATEGORY 3-4-5 HURRICANES

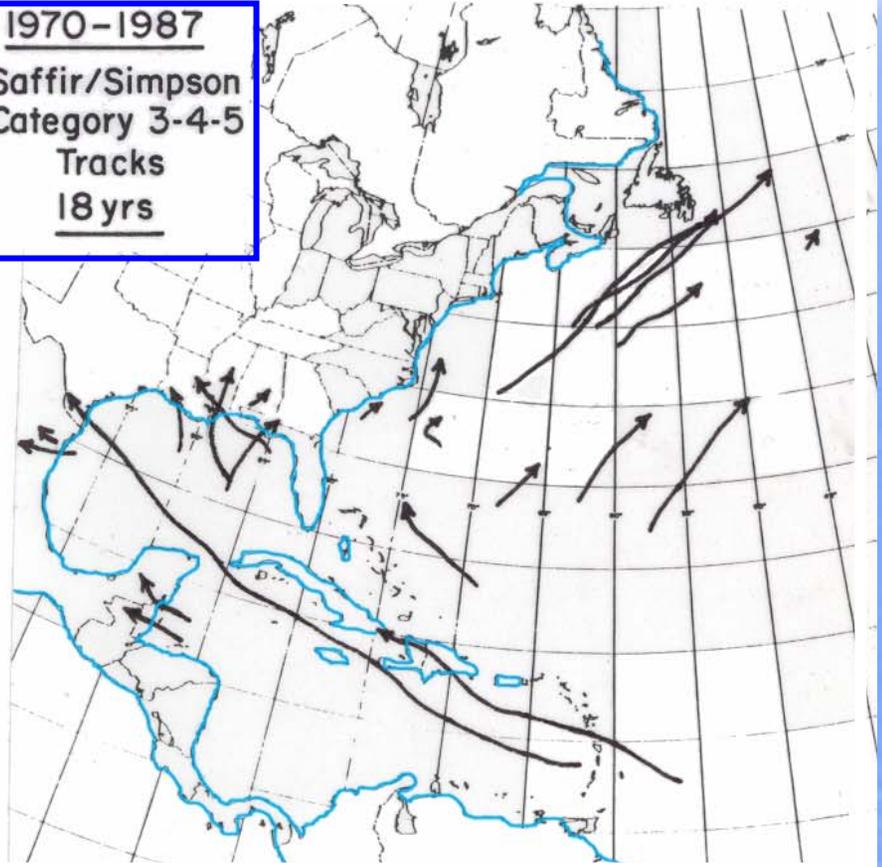
1950-1969

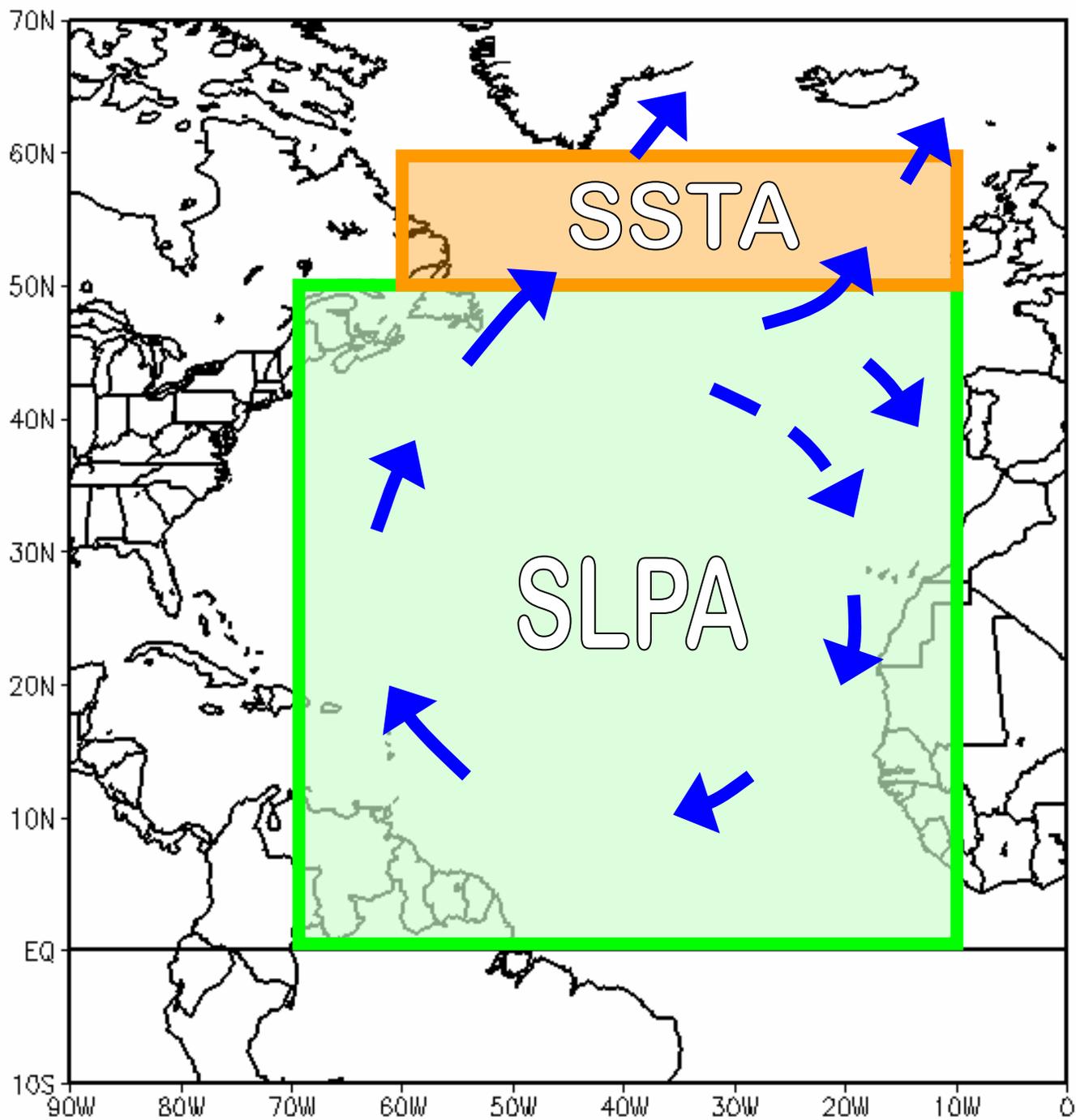
Saffir/Simpson
Category 3-4-5
Tracks
20 yrs



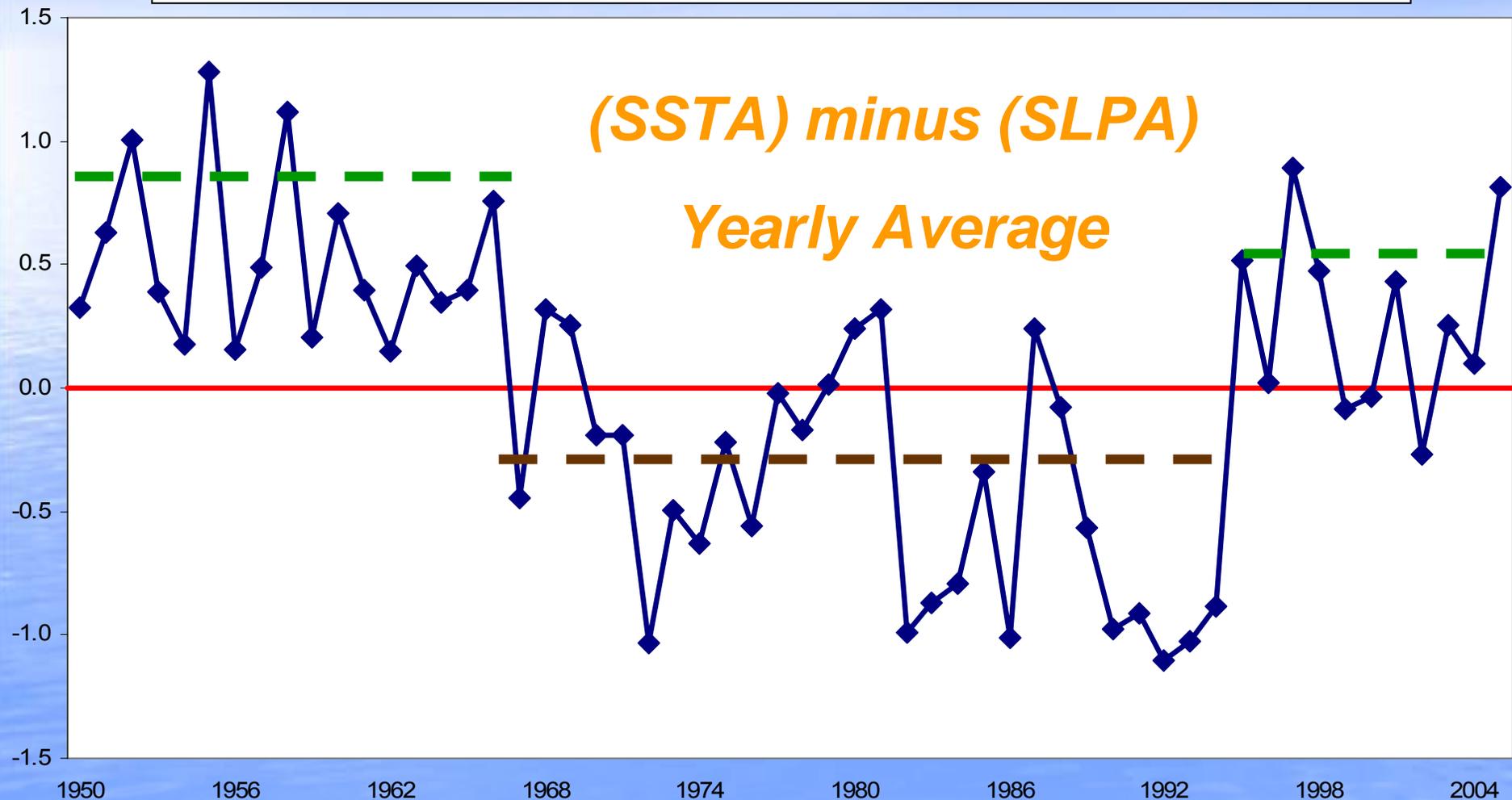
1970-1987

Saffir/Simpson
Category 3-4-5
Tracks
18 yrs



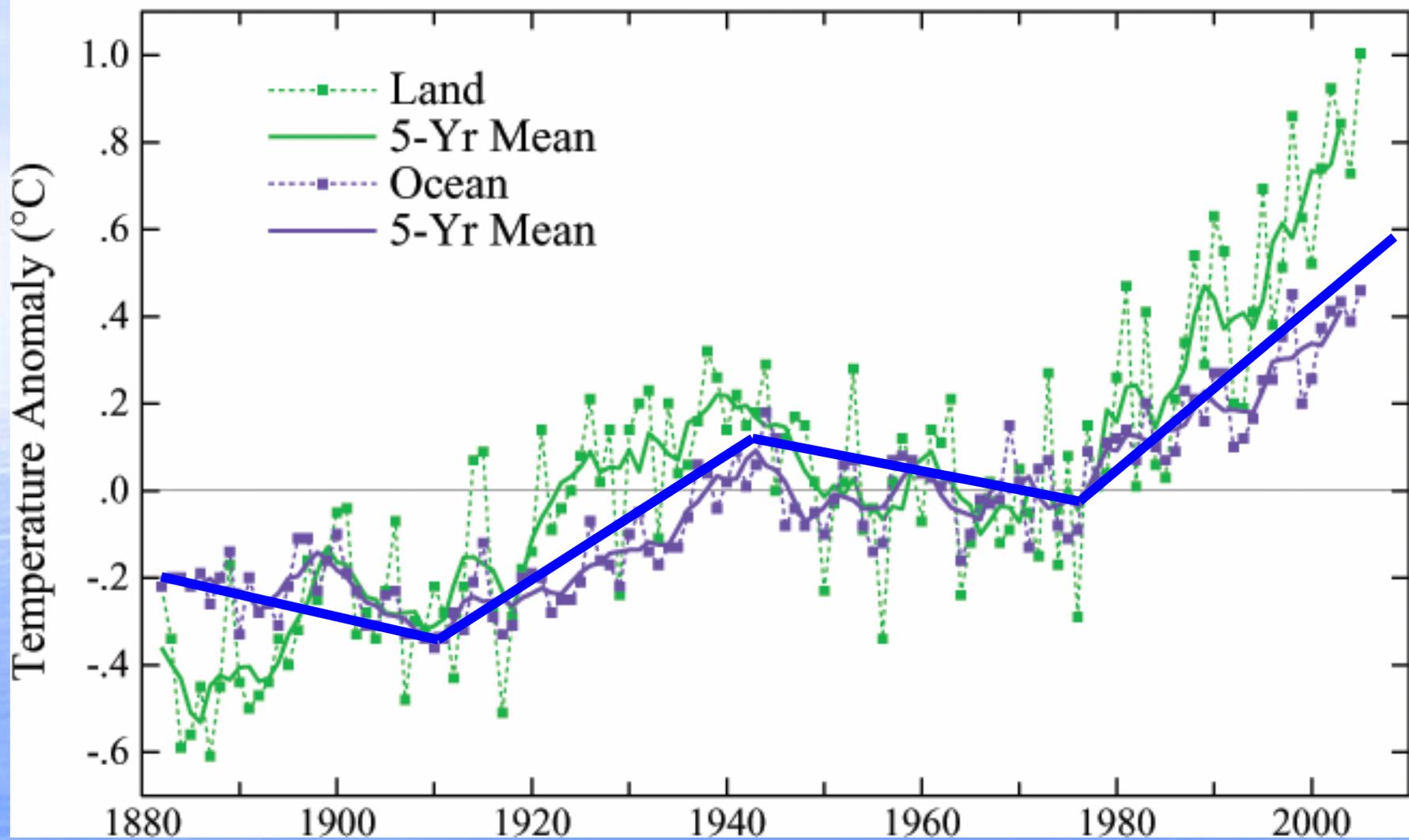


PROXIE TO ATLANTIC THERMOHALINE CIRCULATION OR AMO

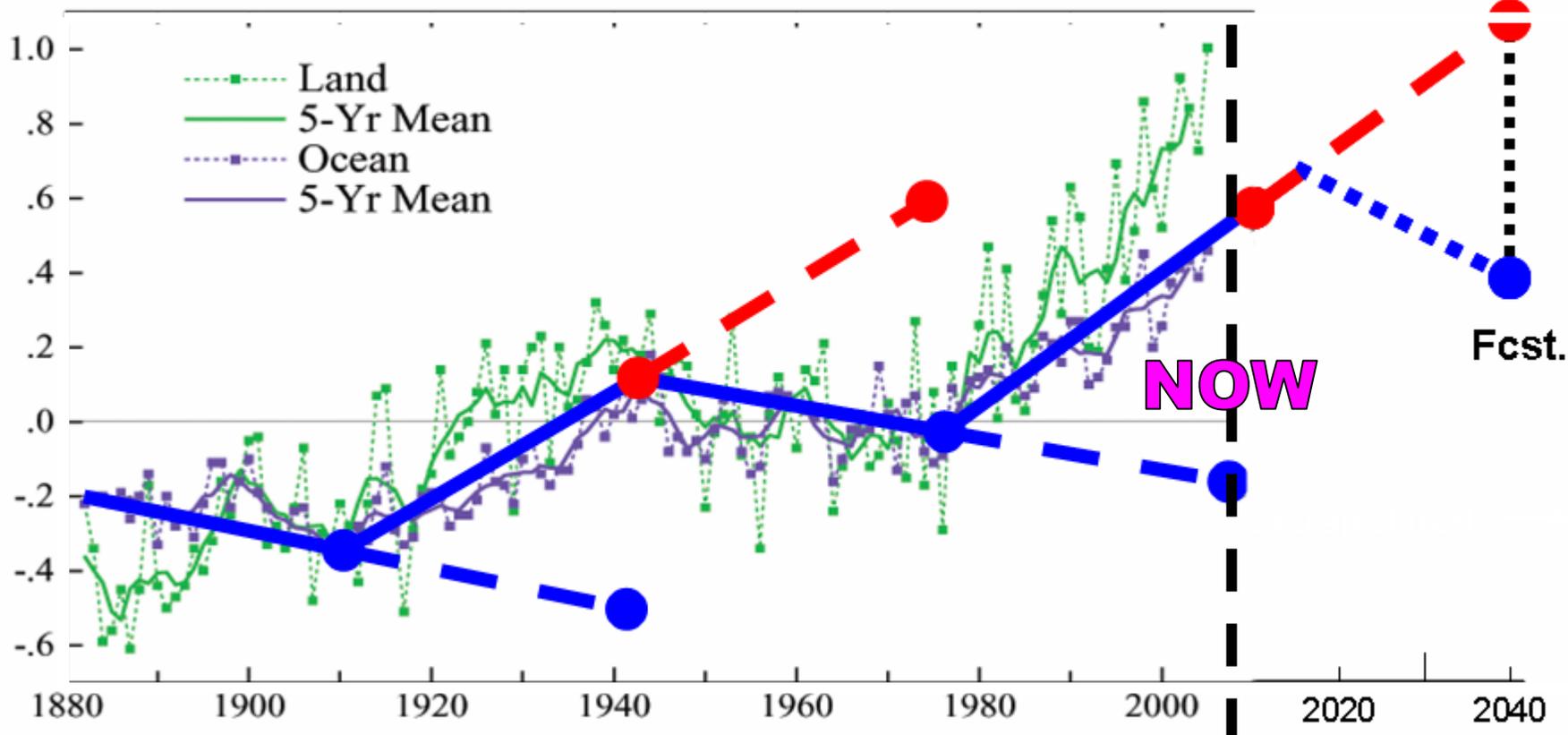


**PAST AND
FUTURE
GLOBAL
TEMPERATURE
CHANGE**

Mean Temperature over Land & Ocean



Mean Temperature over Land & Ocean



The New York Times

September 14, 1975

Reported that “The current global cooling may mark the return to another ice age.”

Newsweek

April 28, 1975

In an article titled “The Cooling World” said that meteorologists are almost unanimous that catastrophic famines might result from global cooling.

SEPTEMBER 10

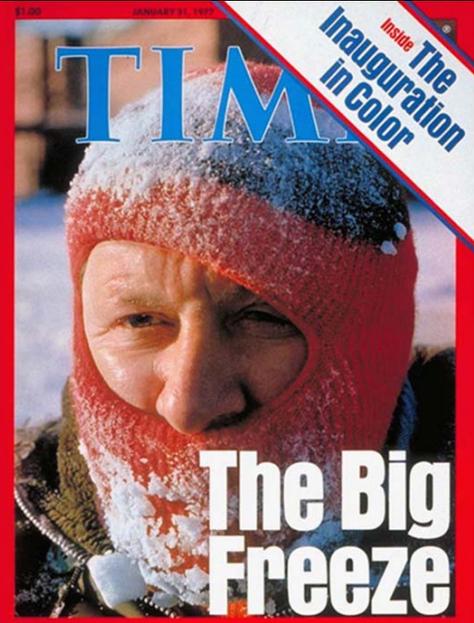
TIME



The World is Sizzling!

1945

JANUARY 31



1977

APRIL 3



2006

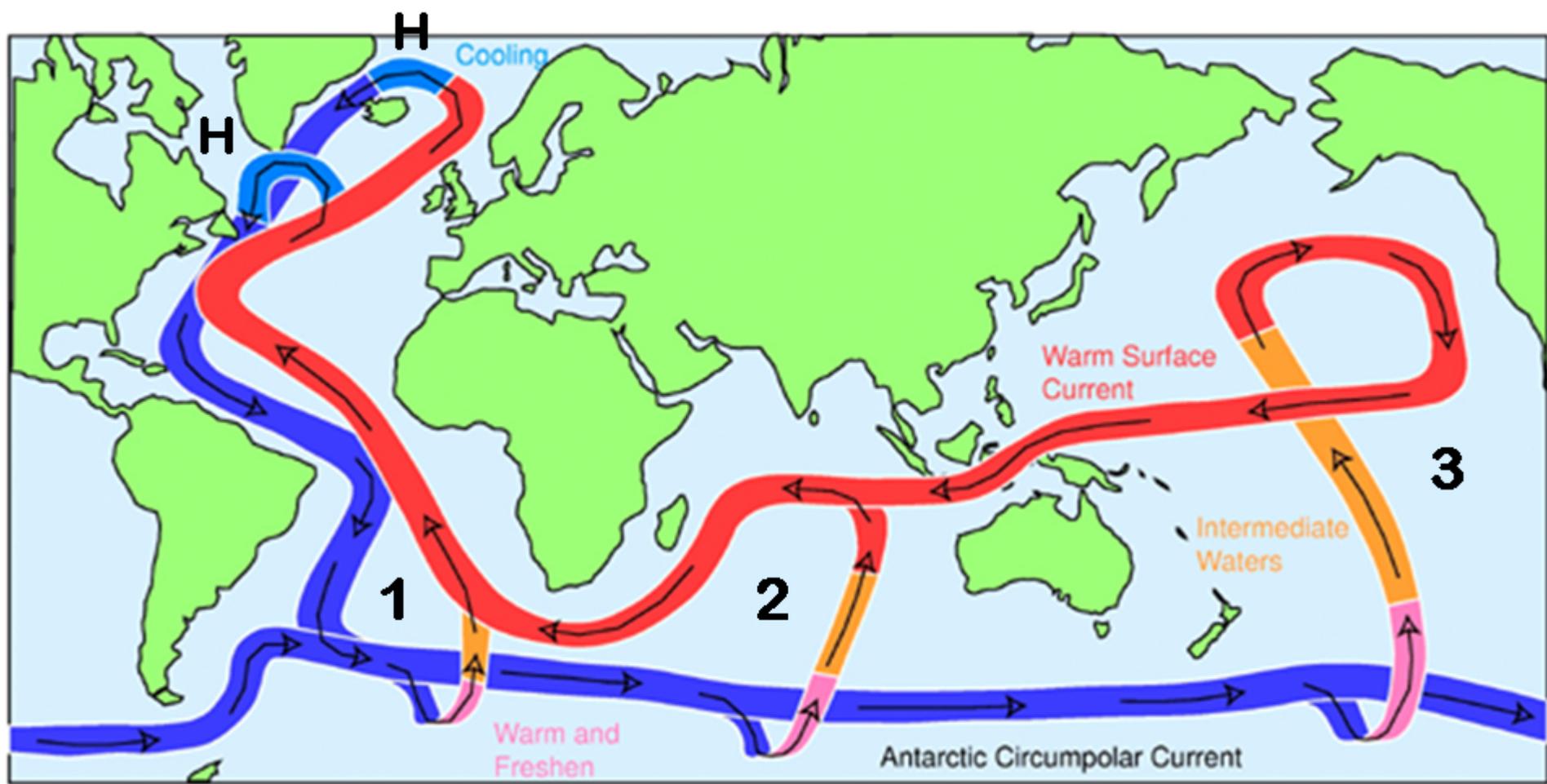
MARCH 14

TIME

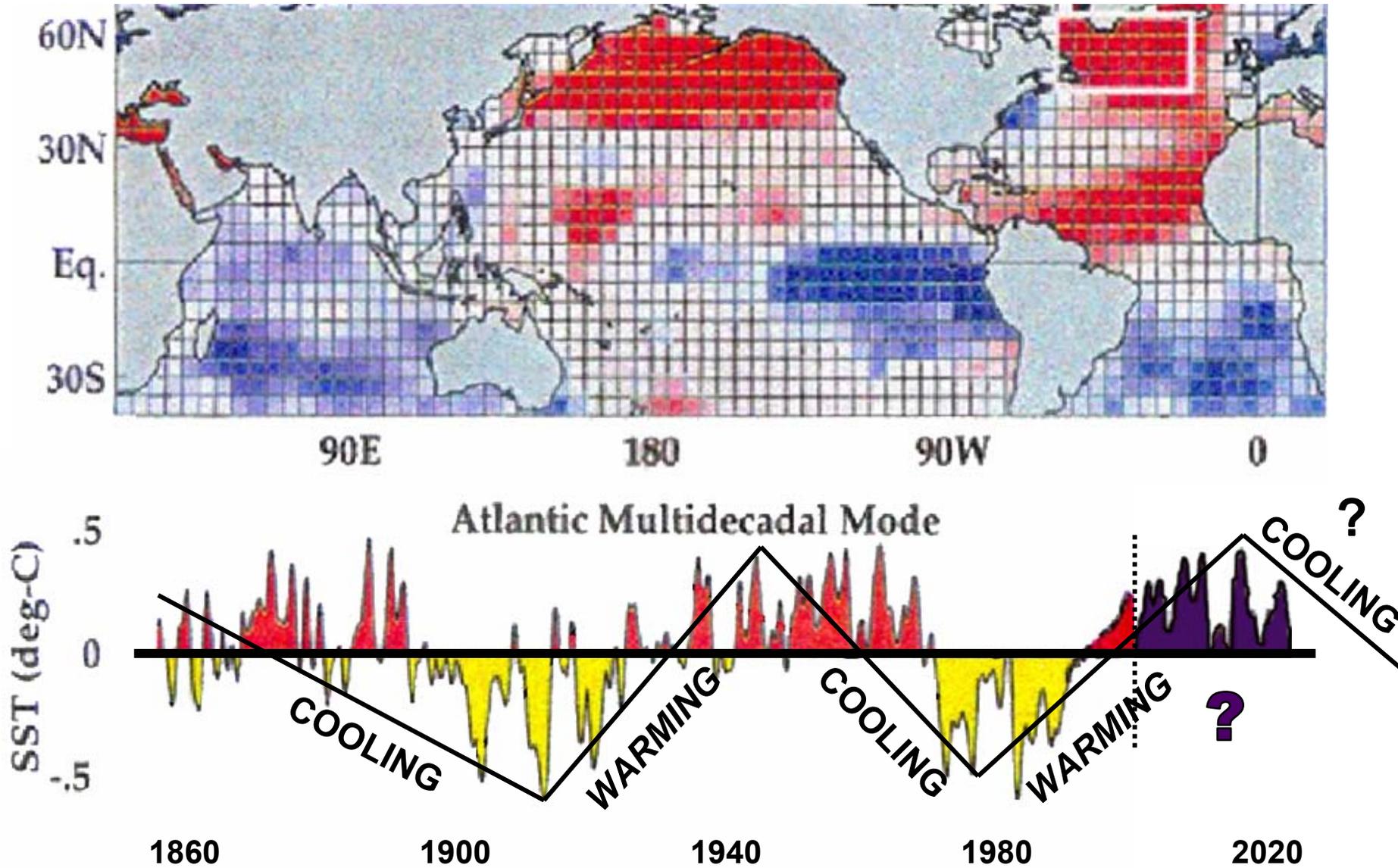


2009

**CAUSE OF
GLOBAL
TEMPERATURE
CHANGE**



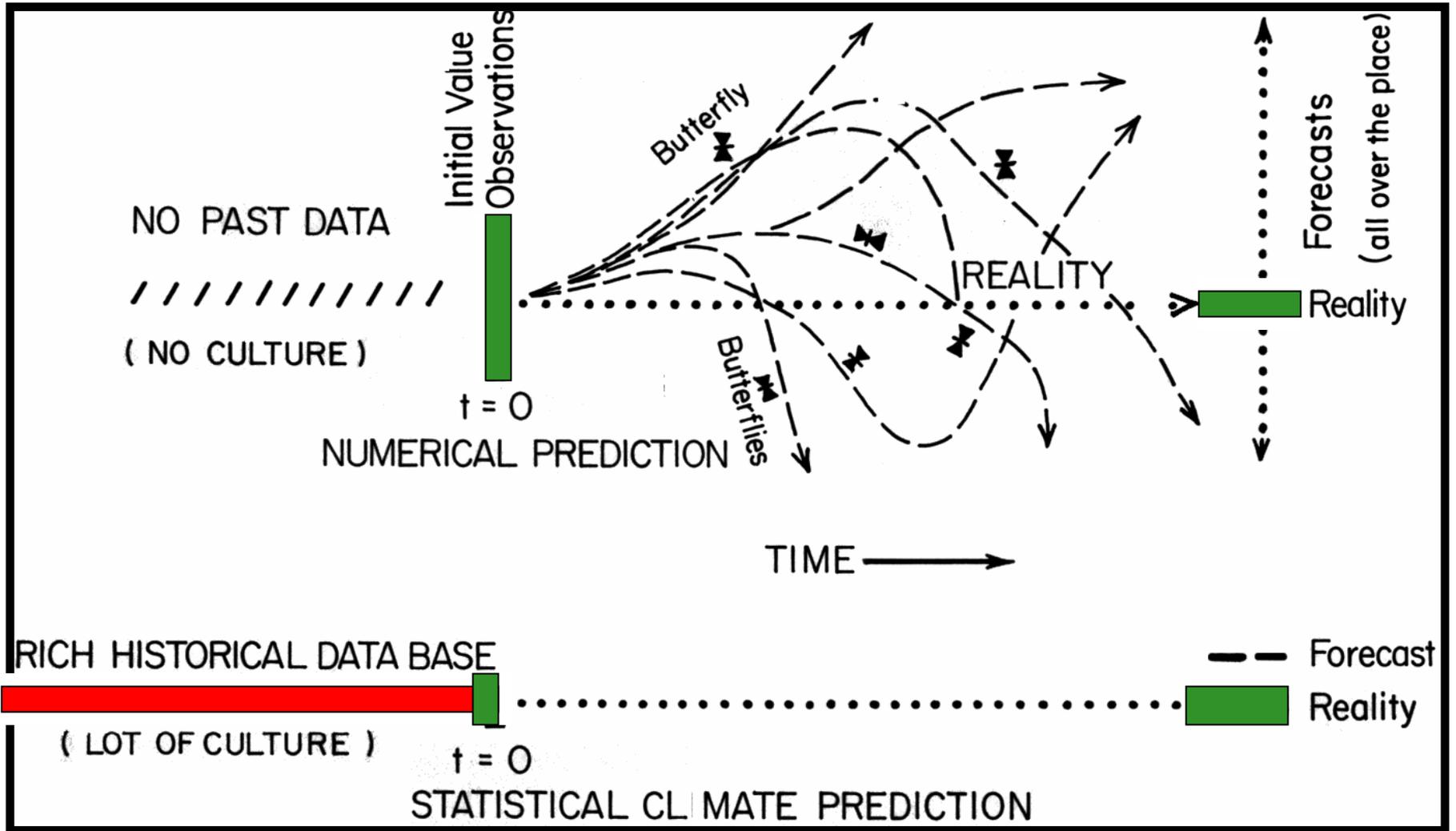
THC - Strong

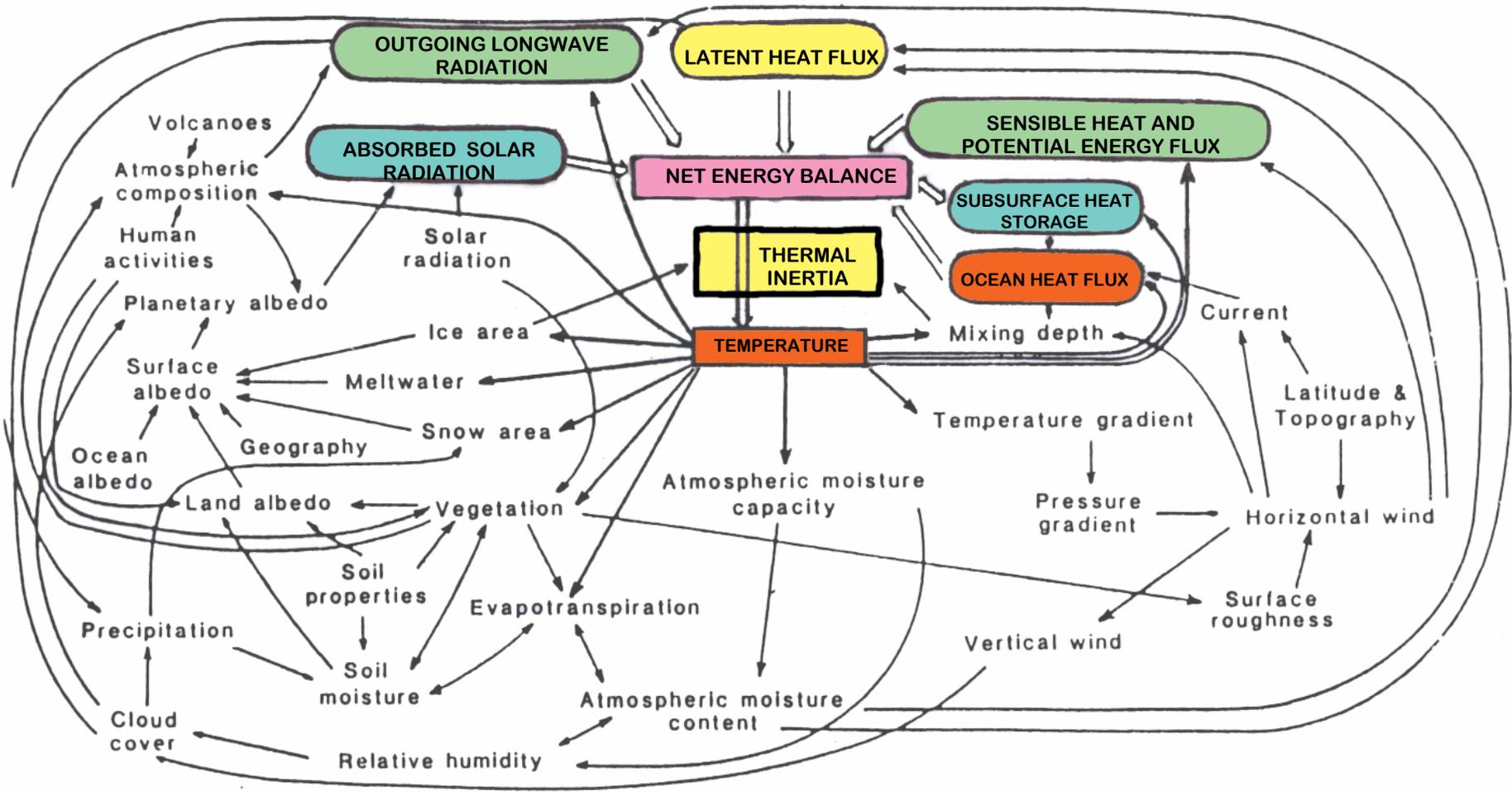


PREDICTION

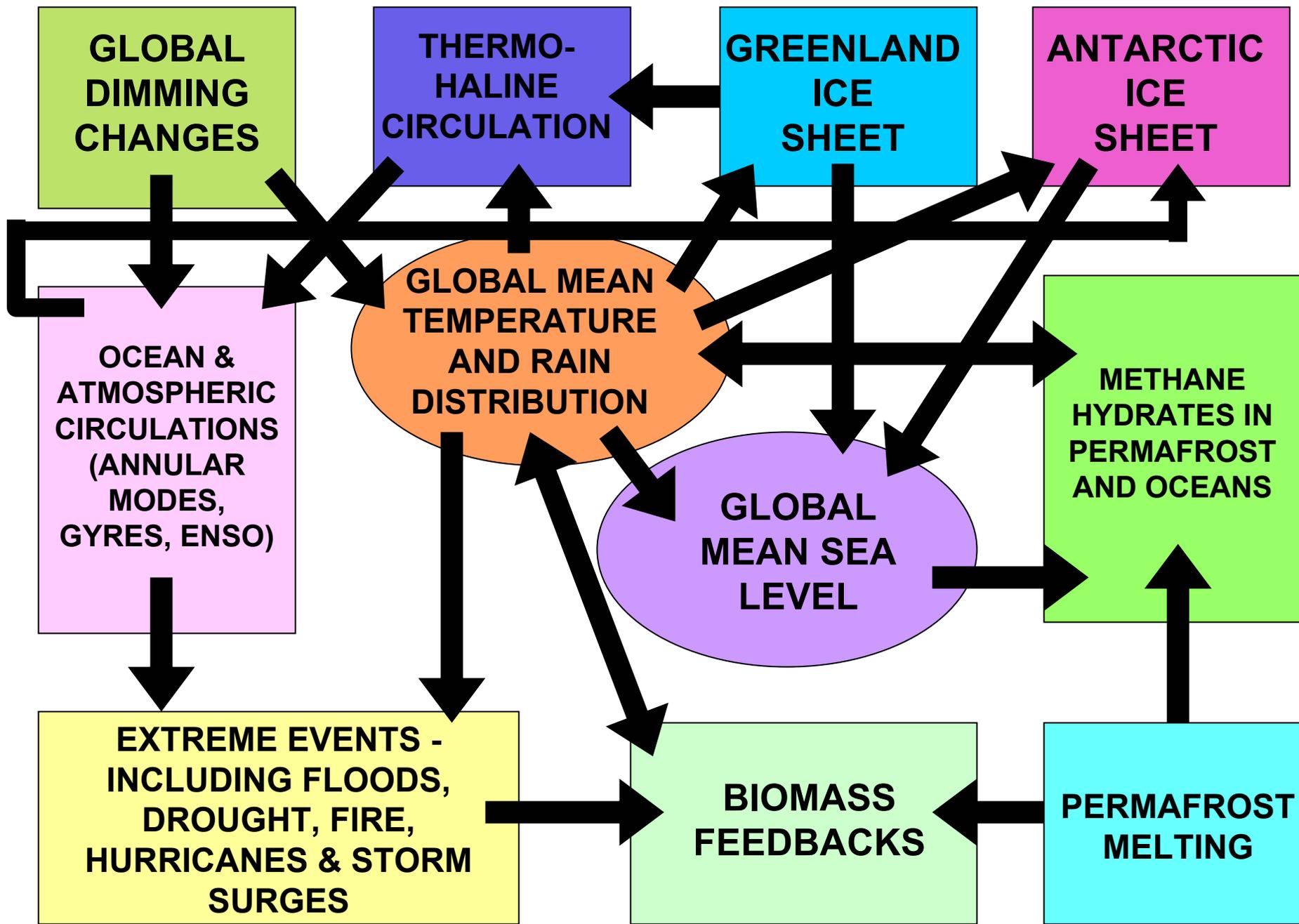
- The last 30-year global warming trend will come to an end in the next 5-10 years.
- The global mean temperature 20 years from now will be lower than it is now.

FAILURE OF GLOBAL MODELS (GCMs)





**Flow diagram for climate modeling, showing feedback loops.
From Robock (1985).**



**Global models
do not issue
seasonal, yearly,
or decadal forecasts -
why? They don't
have any skill**

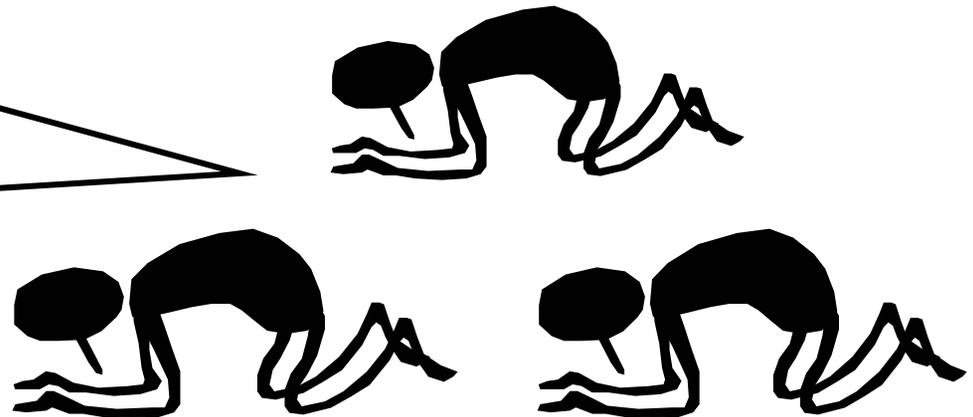
The Ascendancy of the
Religion of Numerical
Modeling and the loss of
Meteorological Judgment
and Reality.

ORACLE AT DELPHI

Climate Model Department



We prostrate ourselves before
our all knowing GOD. We
humbly accept your
GLOBAL WARMING
judgement.

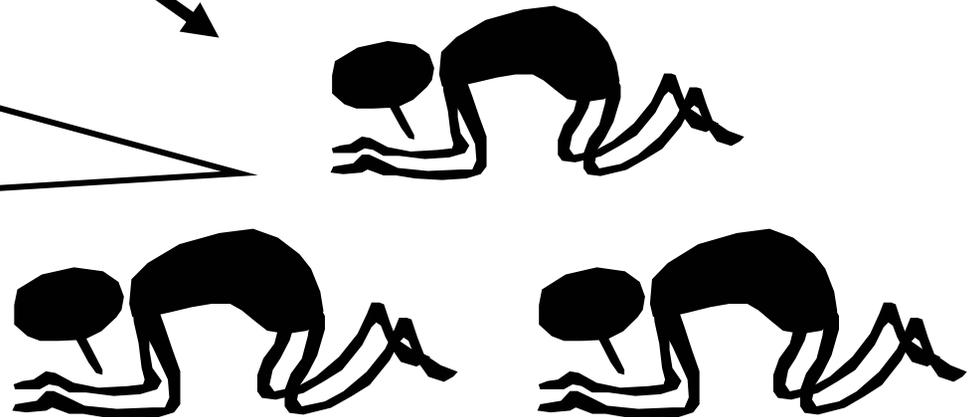


ORACLE AT DELPHI

Climate Model Department



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our all knowing GOD. We
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GLOBAL WARMING
judgement.



GCMers



**DIFFICULTIES IN MODELING
THE OCEAN**

GCMers



DIFFICULTIES WITH WATER VAPOR FEEDBACK

GCMers



We are
causing
warming

TOTAL DIRT UNDER RUG

Some researchers argue that even with these caveats the report overstates the case. Says Richard Lindzen, an atmospheric scientist at M.I.T.:

“The margin of error in these models is a factor of 10 or more larger than the effect you’re looking for.”

Even if Lindzen is wrong and the IPCC report is right, there might not be much anyone could do.

It's absurd to claim we can predict future climate

By Roger A. Pielke

The controversy over global warming has captured the attention of governments and the general public alike. It's even found its way into the 1992 presidential campaign.

Unfortunately, however, the media have given short shrift to the views of most scientists who actually study the subject.

What's been left out as a result of this lapse? Here's just one example: At a recent 30th year reunion of the Department of Atmospheric Science at Colorado State University, the gathered alumni were asked whether man's input of greenhouse gases has already caused global warming. Of about 200 alumni, students, and faculty in the audience, not one answered "yes."

Atmospheric scientists are skeptical about global warming for a number of reasons. Among them: we have serious doubts about the reliability of the general atmospheric circulation models that have been used to assess potential global warming. We also have serious concerns about the limits of science's current understanding of the natural variability of the climate.

Those who believe that global warming is occurring talk about making "climate predictions" when in fact nobody knows how to do that. Predicting tomorrow's weather

knowledge from the scientists to develop programs which benefit both the environment and the economy. These two goals are not mutually exclusive.

As a society we need to be prepared for both short- and long-term changes of weather and climate and to continue to investigate the ecological and societal effects of any atmospheric fluctuations, both natural and man-caused. Droughts, floods, hot spells and cold waves will continue to occur with irregular frequency. Over longer time periods, global warm and cold cycles (e.g., the Little Ice Age of several hundred years ago) have naturally occurred and undoubtedly will again.

These natural climatic variations are so great as to make it absurd to argue that long-term climate warming is predictable. The current state of our knowledge of atmospheric science leaves us with great uncertainty about the future. But this does not mean that effective policies to meet the potential challenges of global change cannot be formulated.

Effective policies in the face of scientific uncertainty simply need to be decentralized, small-scale, and short-term. Decentralization allows for different responses to different needs in various contexts. Policies that are small-scale limit the costs of making

OTHER voices



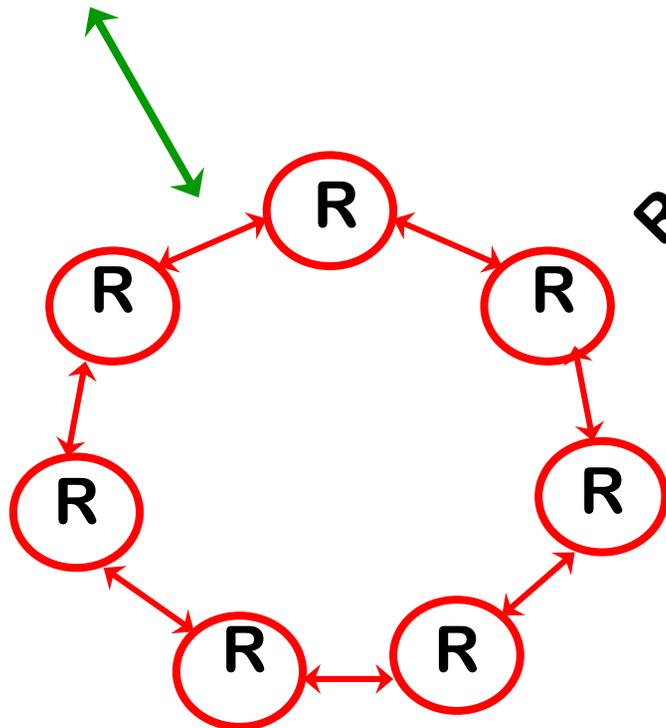
ROCKY MOUNTAIN
NEWS

Board of Editorial
Contributors

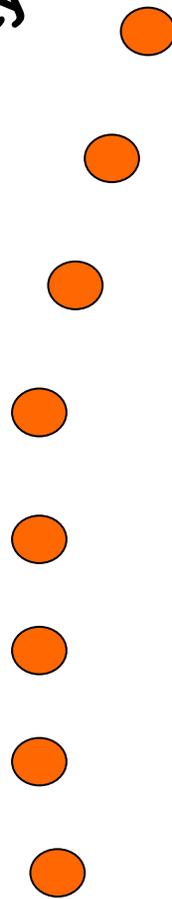
Roger A. Pielke is professor of atmospheric science at Colorado State University in Fort Collins.



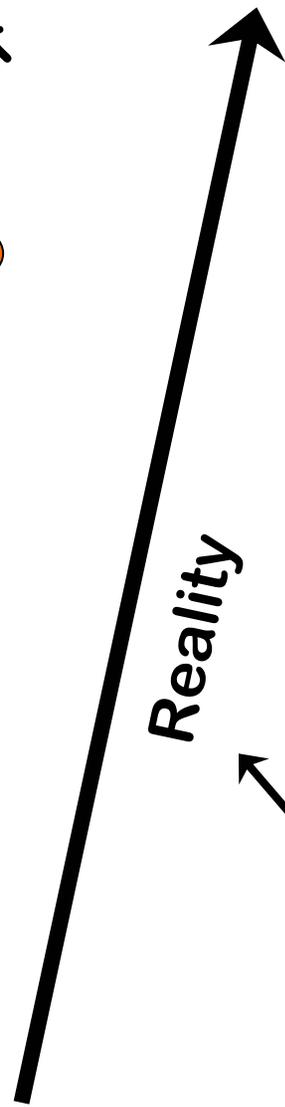
Funding
Publication



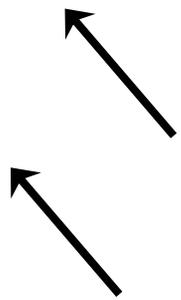
Reality Barrier



Downward



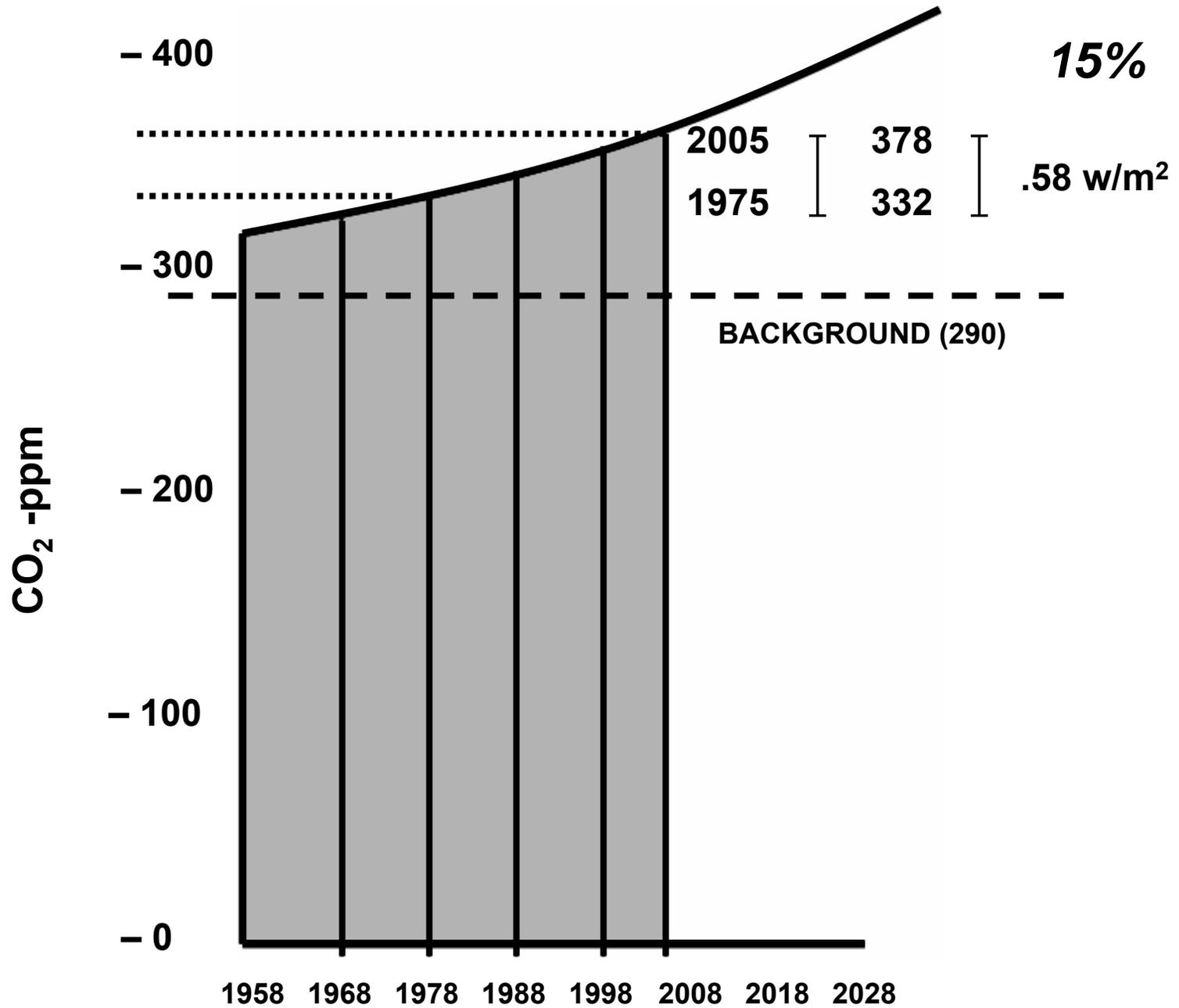
Reality

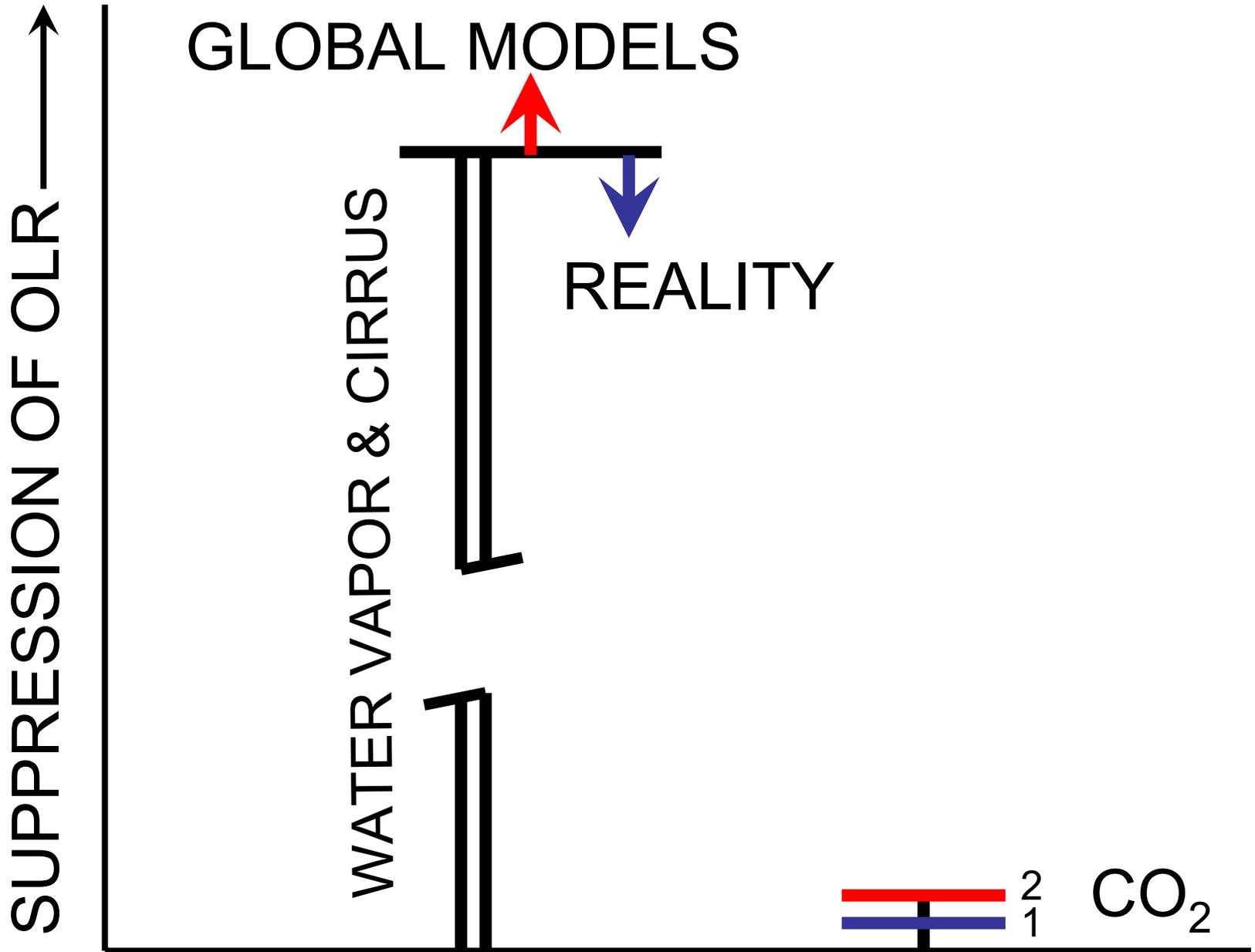


Public

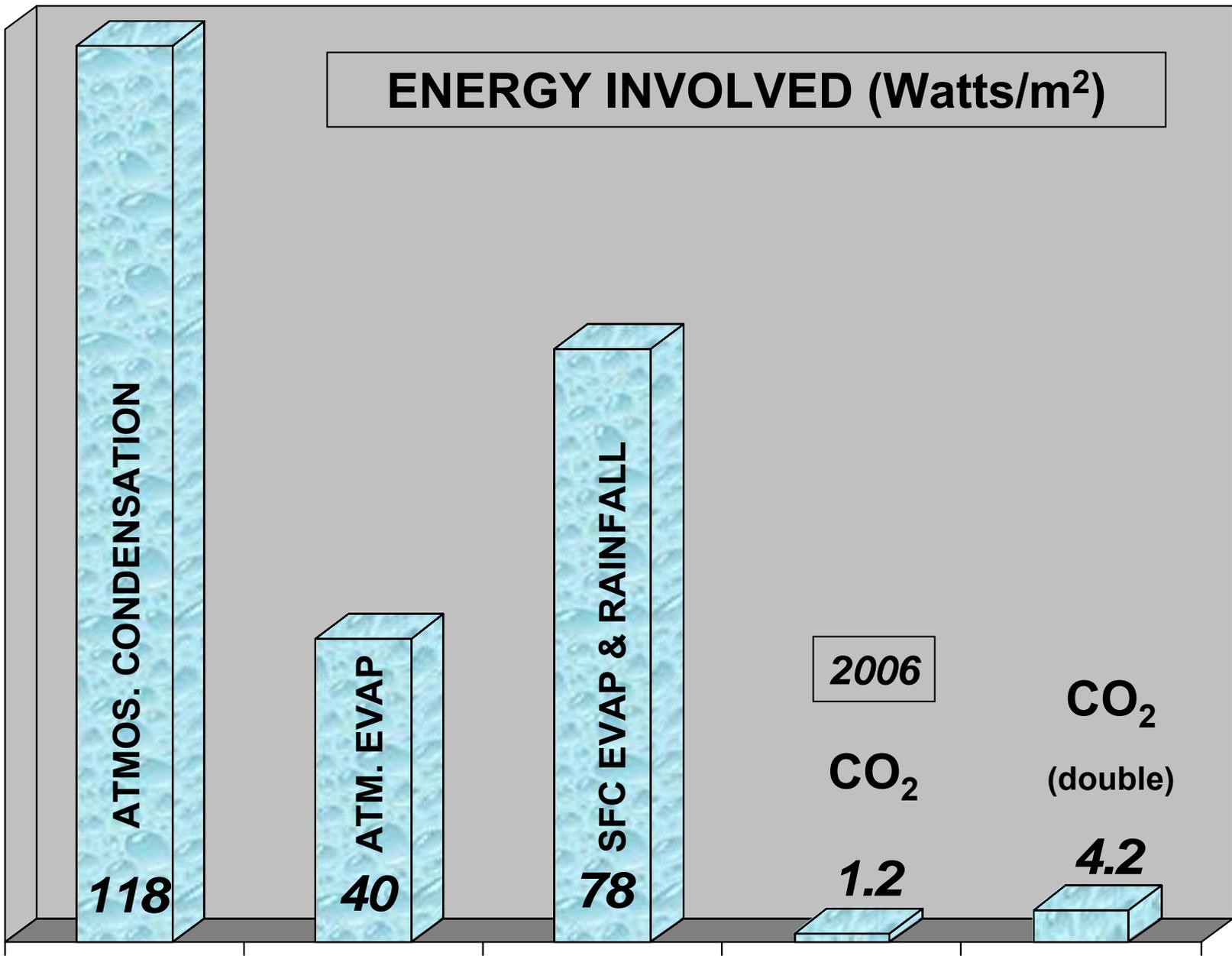
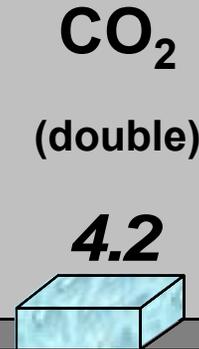
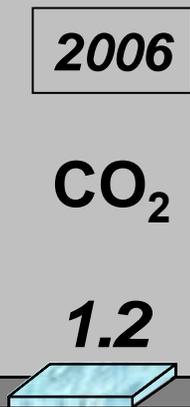
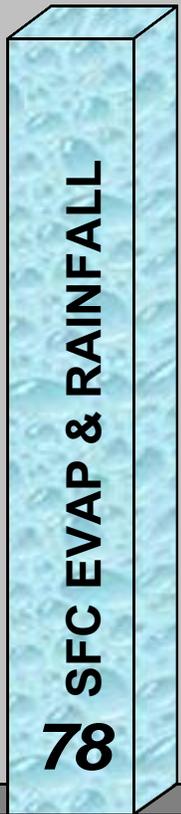
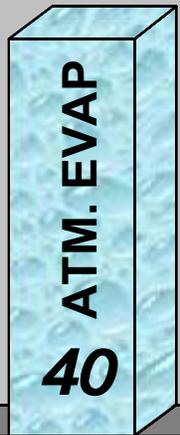
WHO AM I TO COMMENT?

- **BACKGROUND**
- **EXPERIENCE IN TROPICS
(MOIST PROCESSES)**
- **SEASONAL FORECASTING**
- **PERSONAL SITUATION**





ENERGY INVOLVED (Watts/m²)

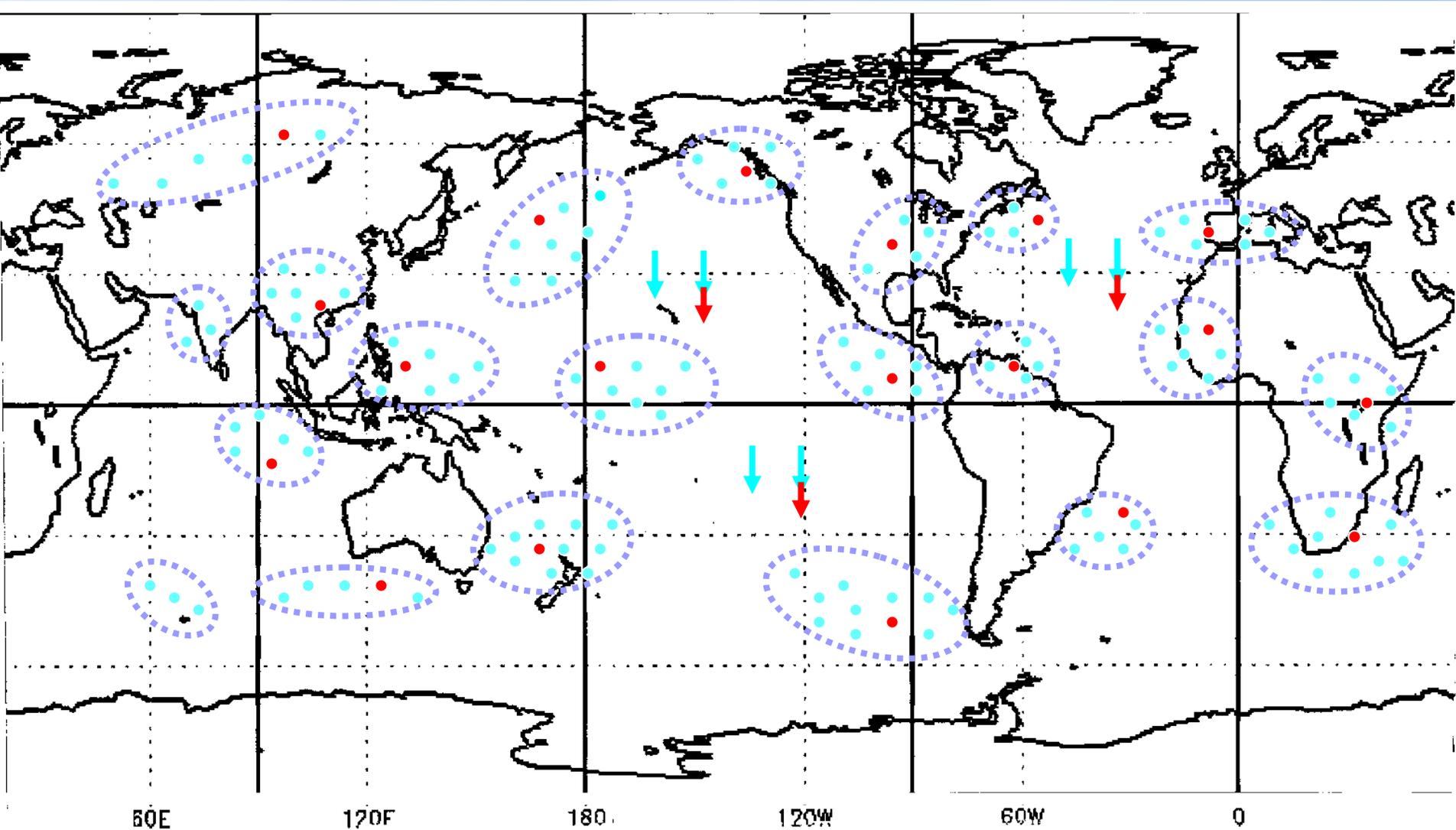


Let's be clear: the work of science has nothing whatever to do with consensus. Consensus is the business of politics. Science, on the contrary, requires only one investigator who happens to be right, which means that he or she has results that are verifiable by reference to the real world. In science consensus is irrelevant. What is relevant is reproducible results. The greatest scientists in history are great precisely because they broke with the consensus..."

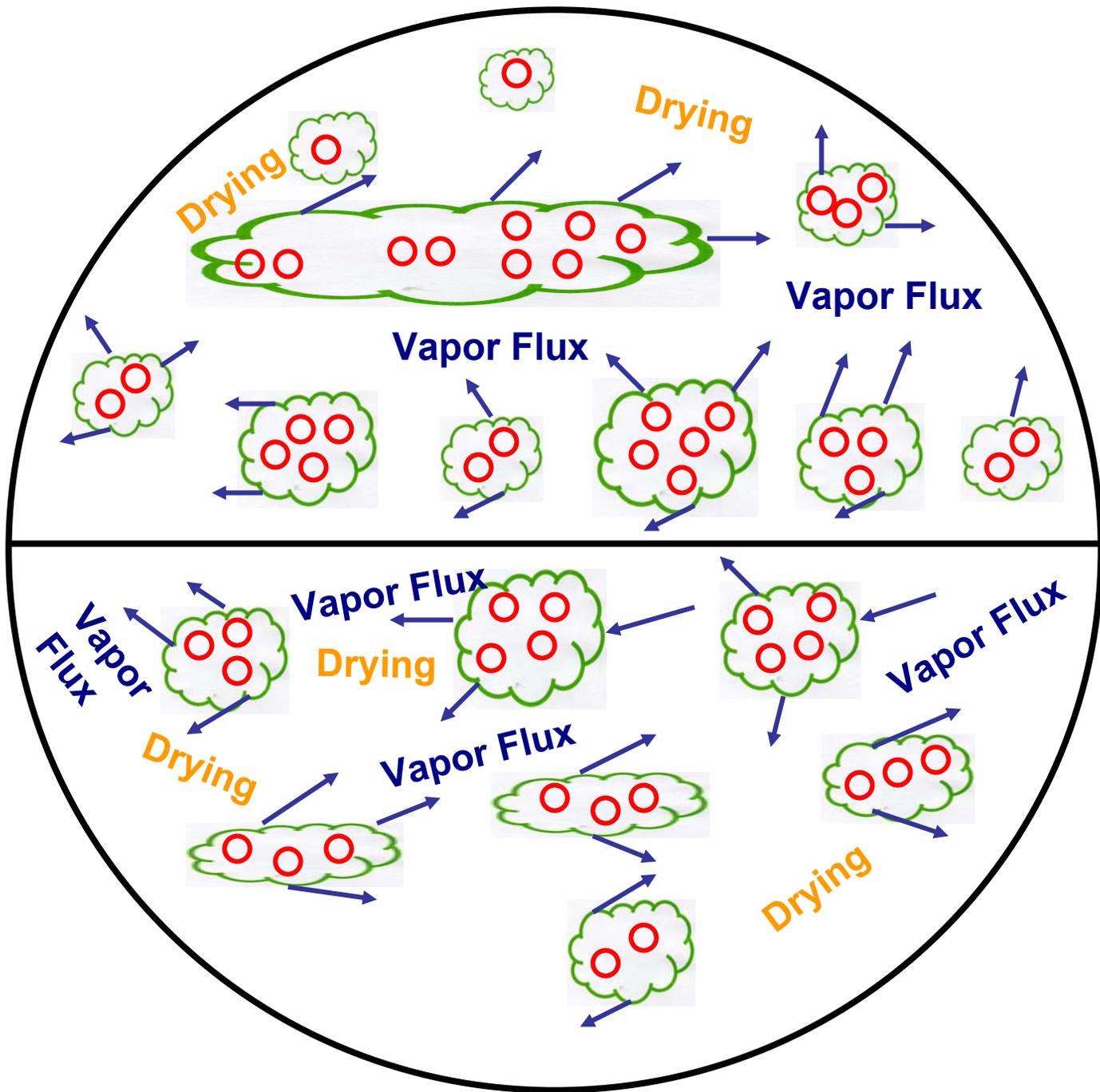
--- *Michael Crichton (2003)*

Northern Hemisphere SUMMER

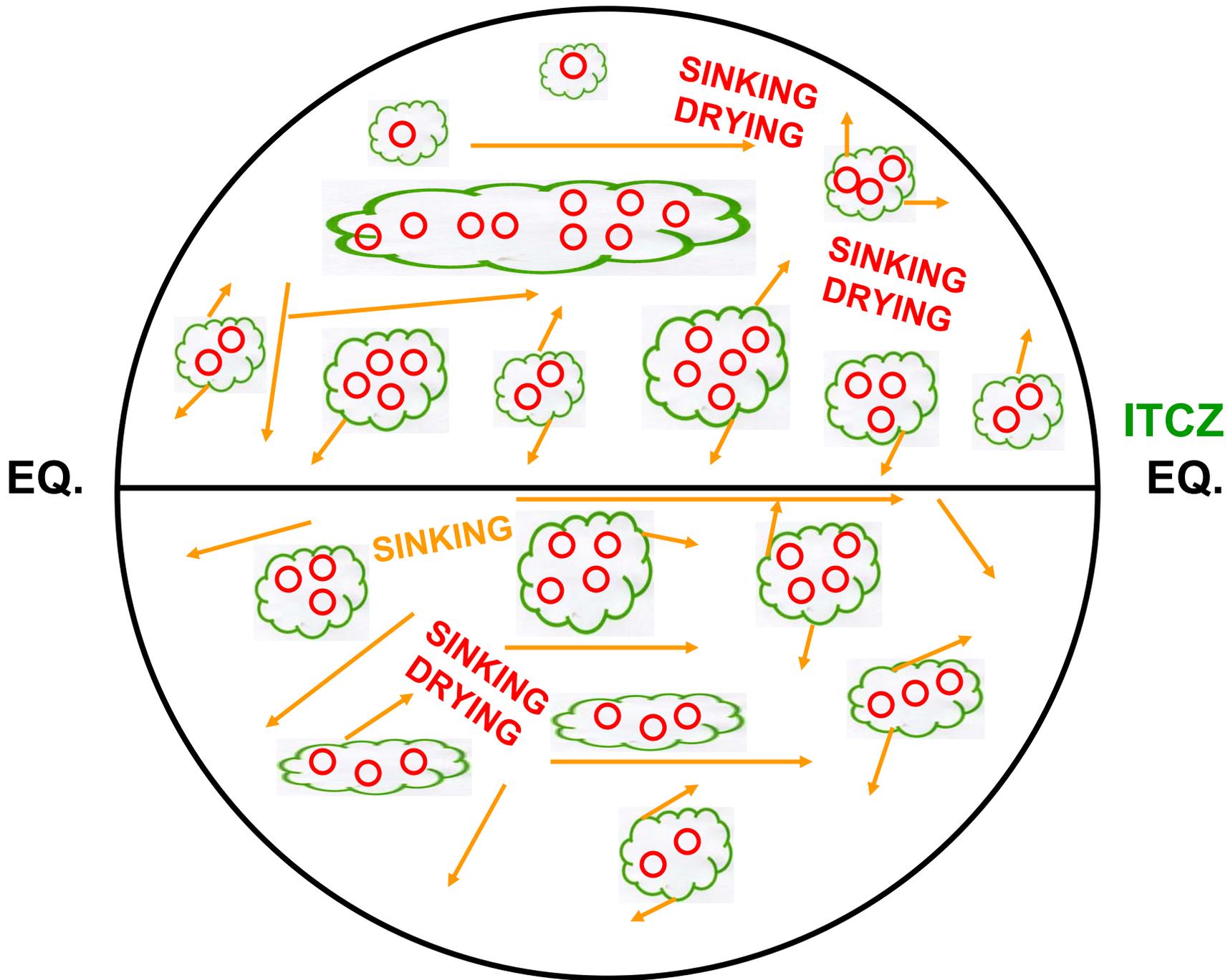
- Areas of Rain
- Extra Areas of Rain

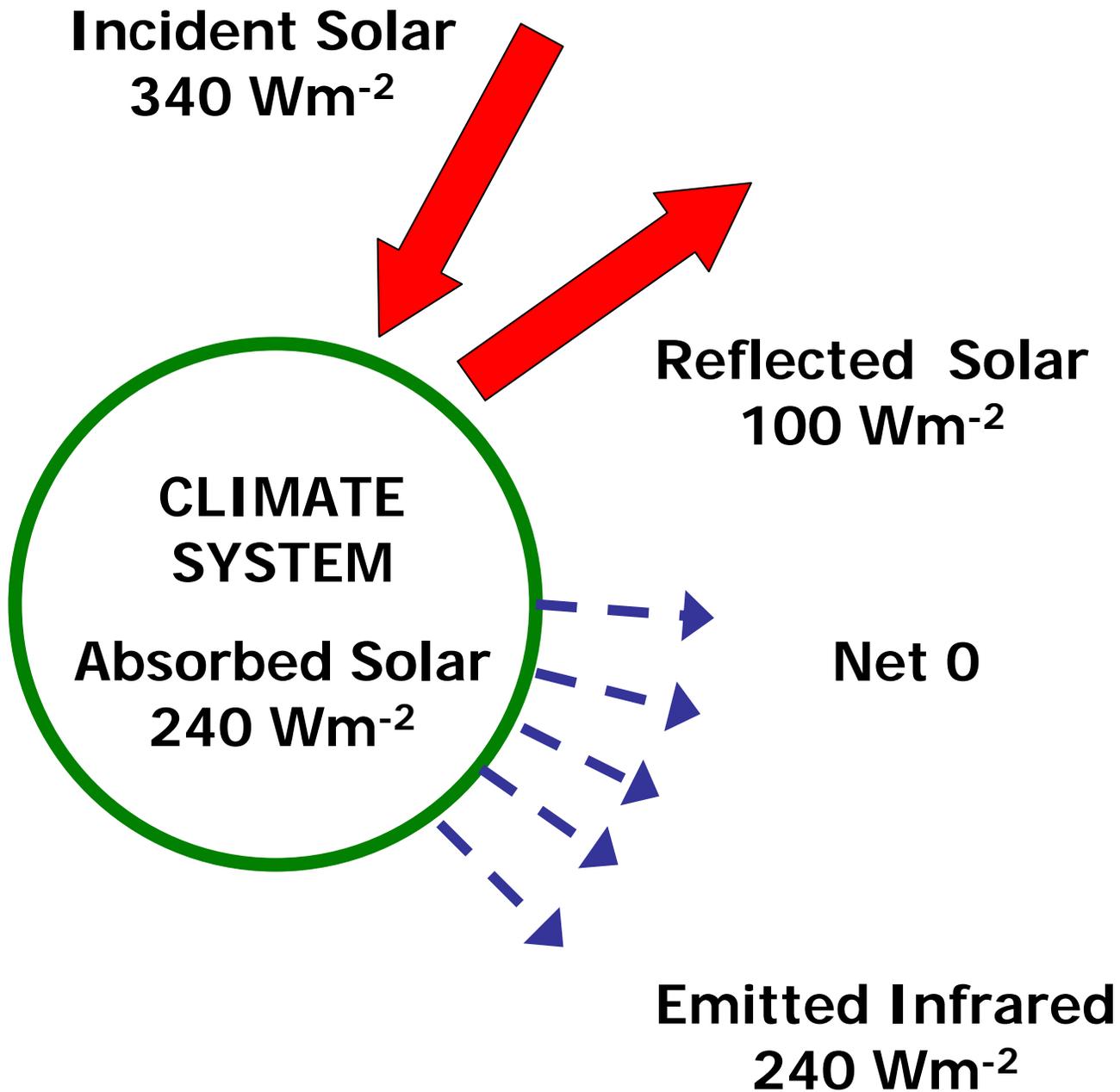


EQ.

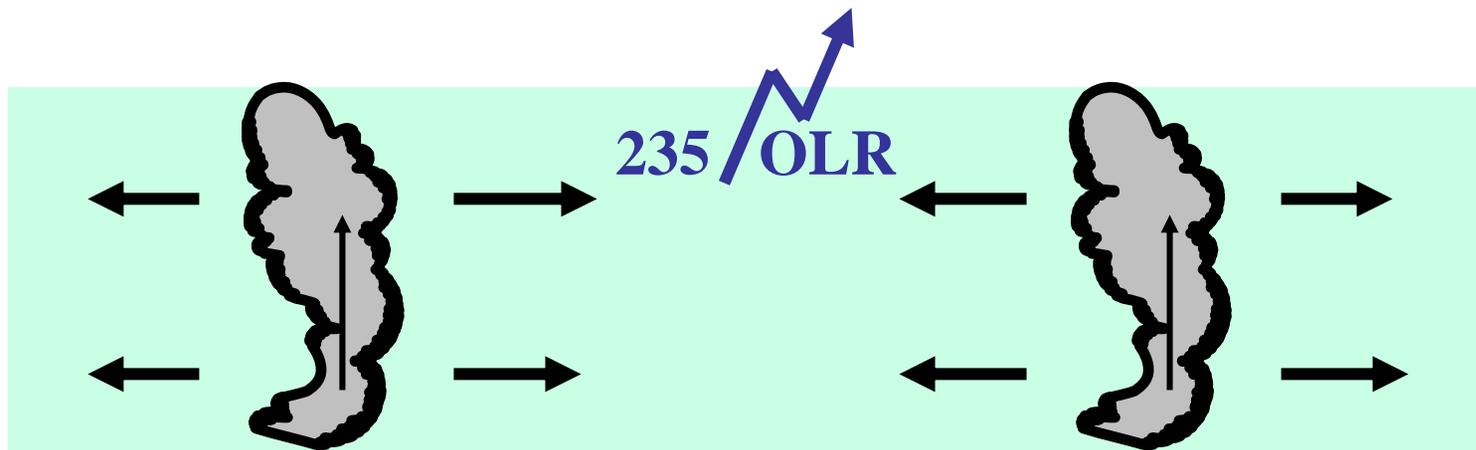


EQ.

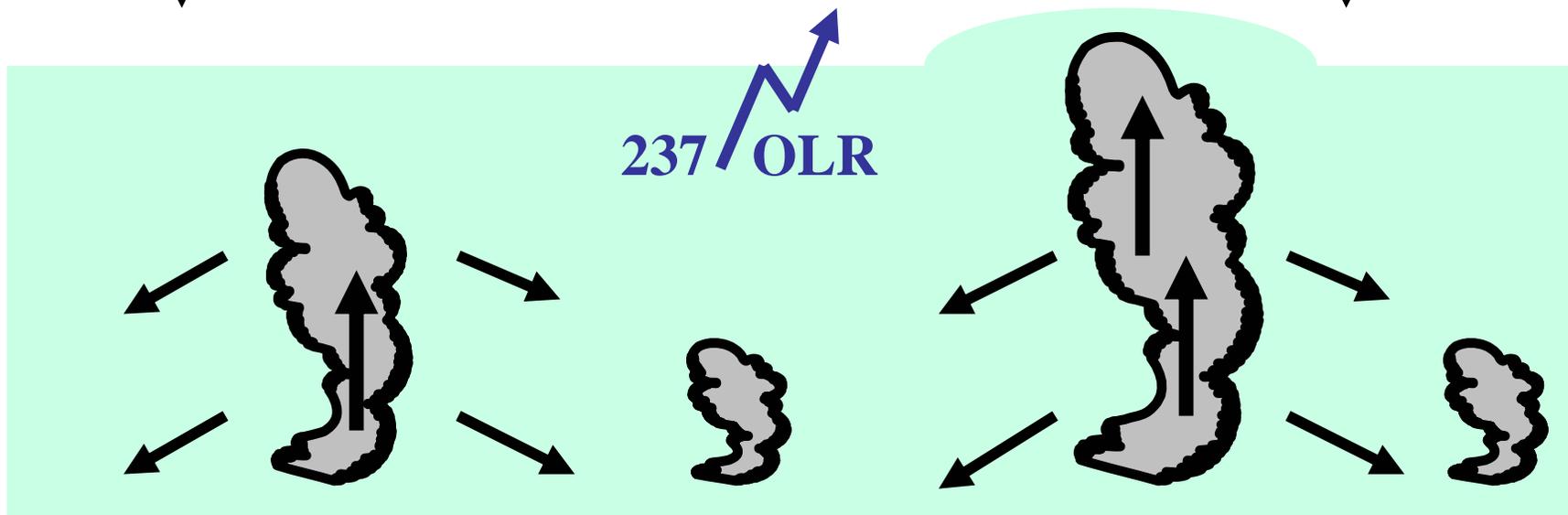




NORMAL CONVECTION

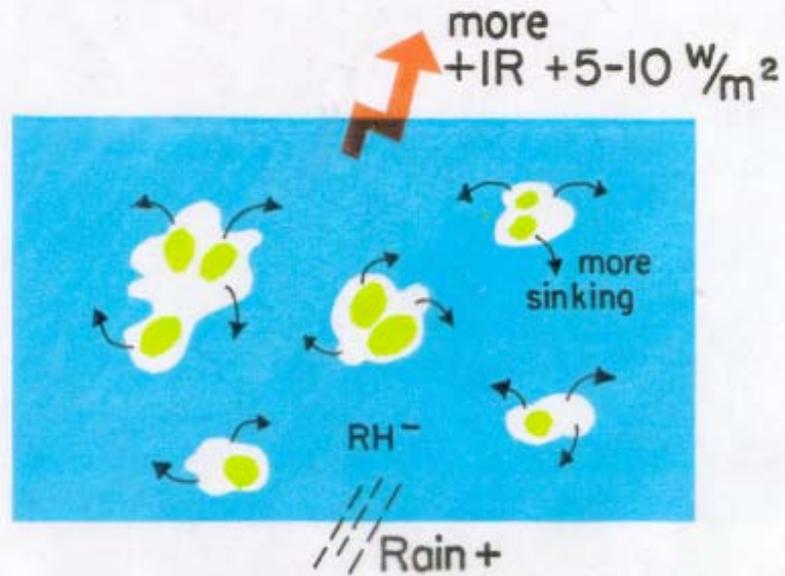


INCREASED CONVECTION

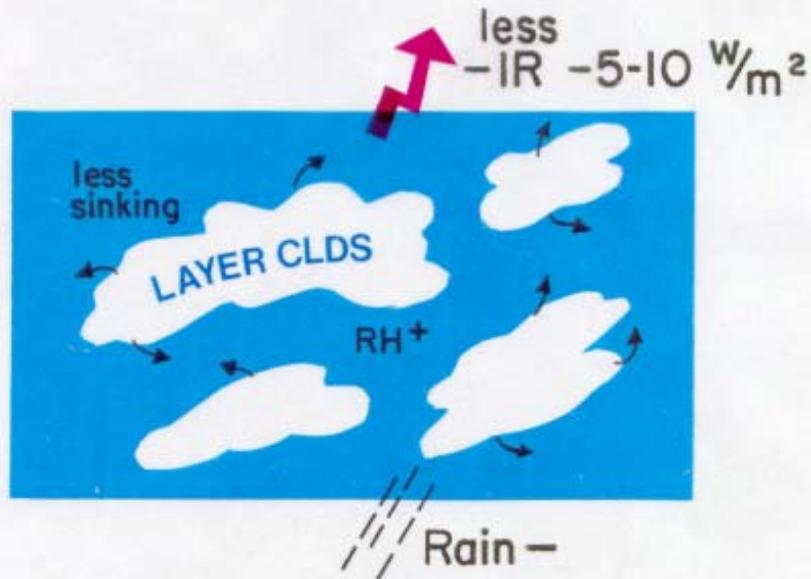


CLOUDY and PARTLY CLOUDY AREAS

Morning
03-11
LT



Aft-Even.
15-23
LT



An aerial photograph of a vast, circular geological formation, likely a caldera or a large crater, situated in a desert landscape. The formation is characterized by concentric ridges and a central depression. The surrounding terrain is arid and sparsely vegetated. The word "ABOMINATIONS" is overlaid in large, bold, orange letters with a white outline at the bottom of the image.

ABOMINATIONS

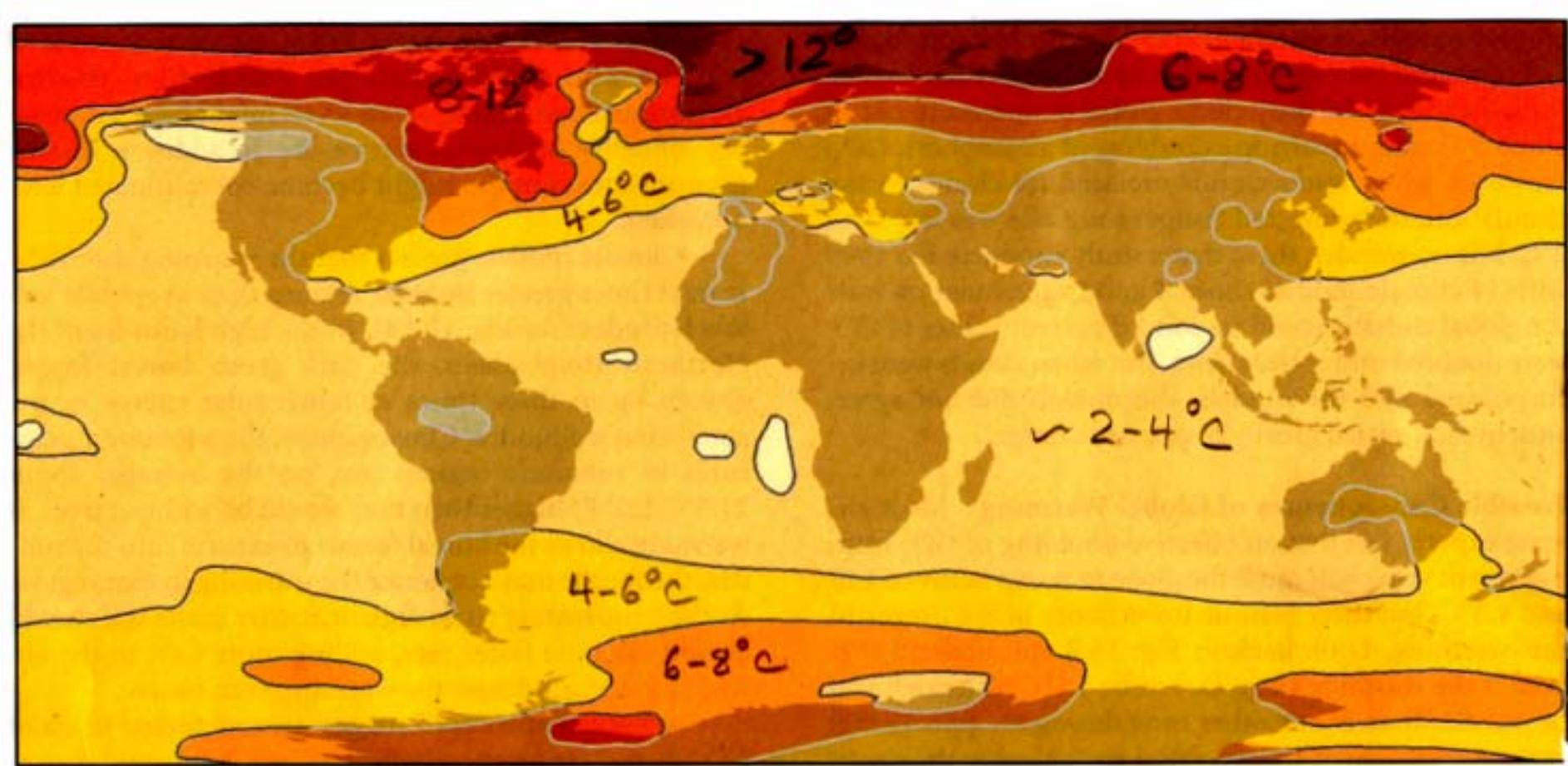
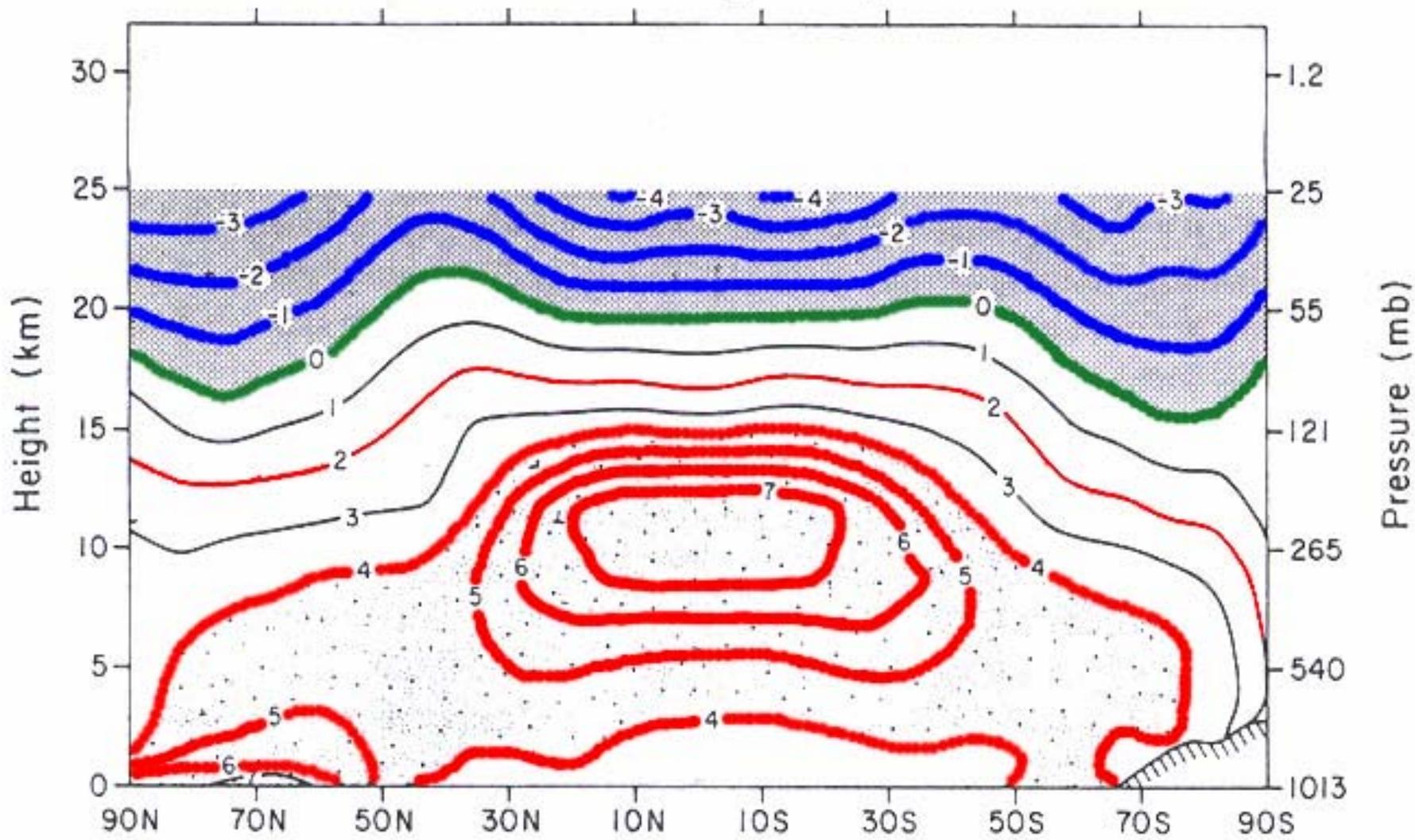


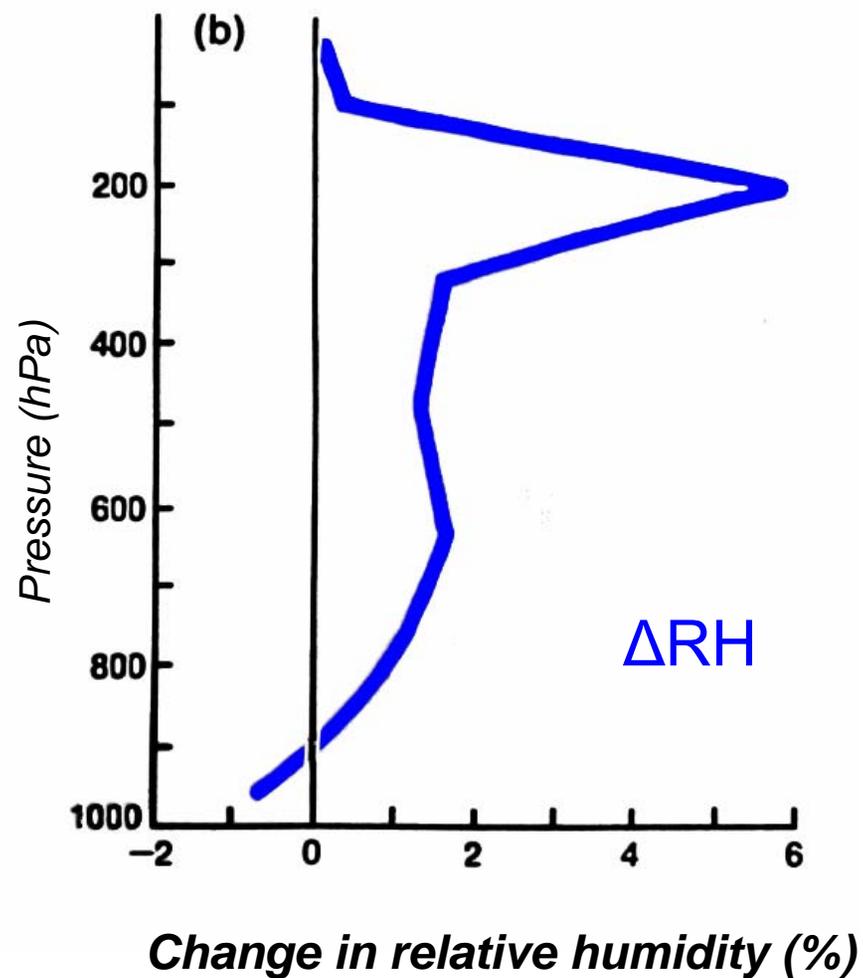
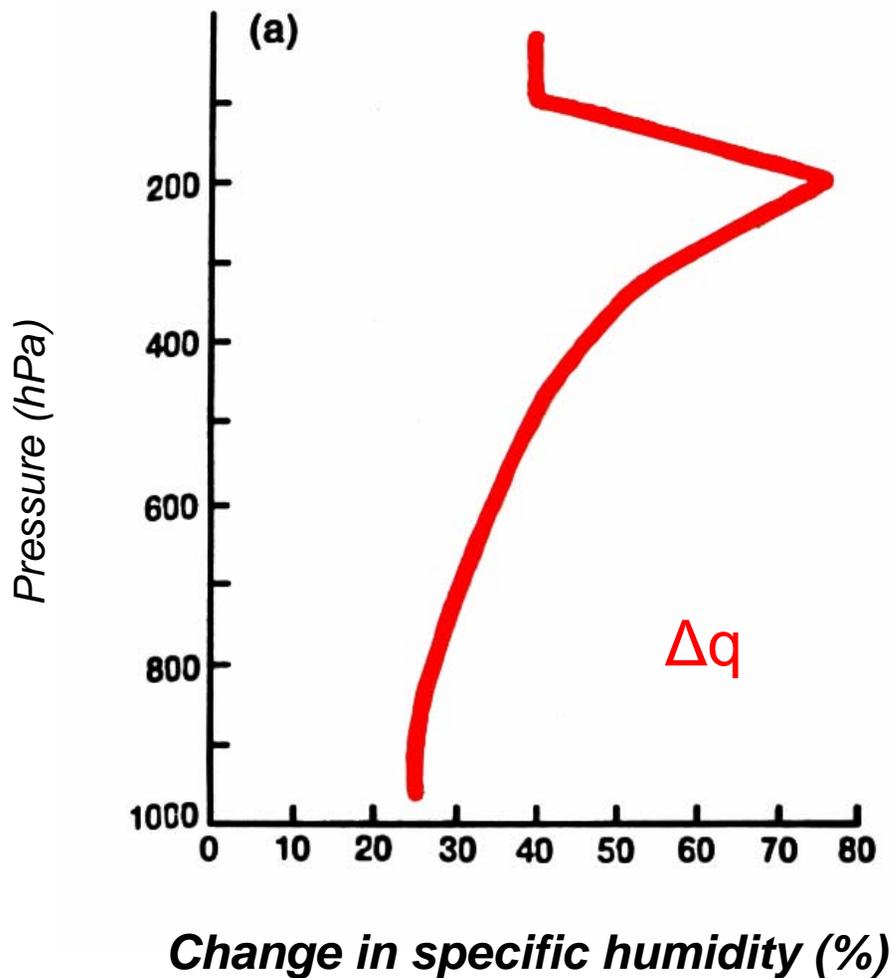
FIGURE 18.18

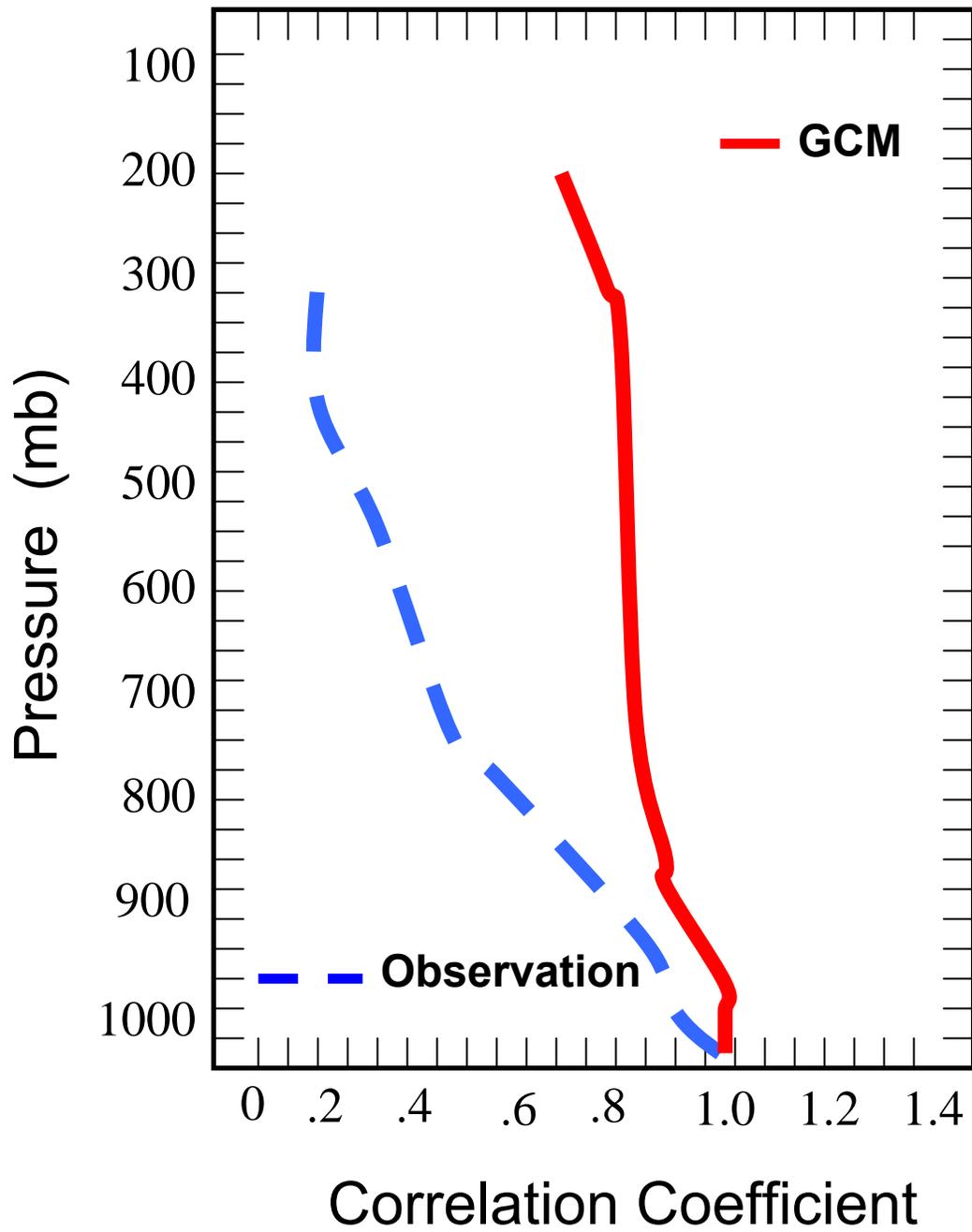
Projected changes in surface air temperature averaged for the months of December, January, and February, due to a doubling of CO₂, as simulated by the Geophysical Fluids Dynamic Laboratory model. Notice that, during the Northern Hemisphere winter, the greatest warming is projected for the polar latitudes.

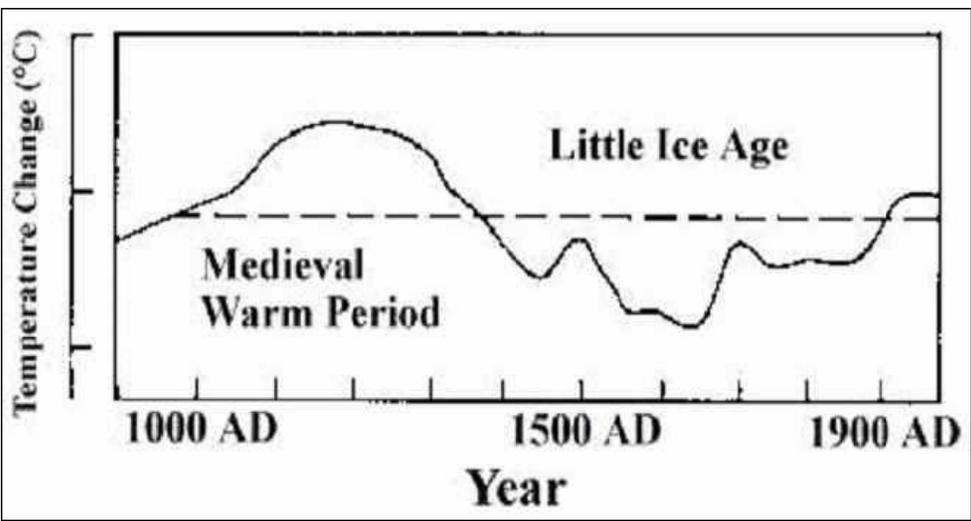
GISS, $2\times\text{CO}_2 - 1\times\text{CO}_2$



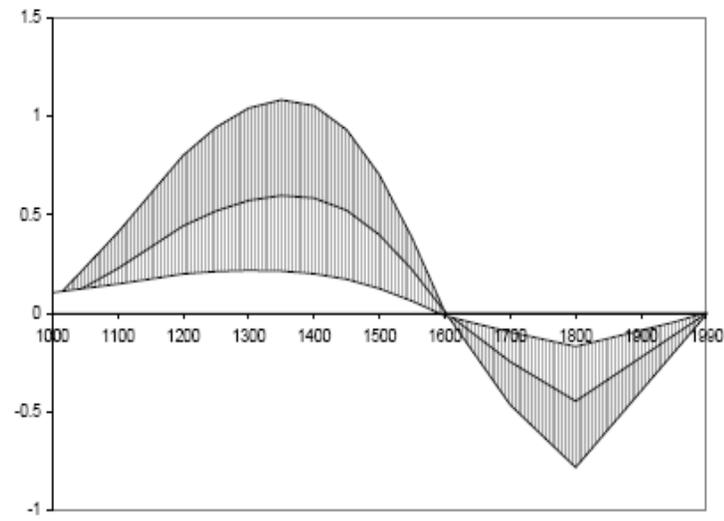
HANSON (2 X CO₂ – 1 X CO₂)



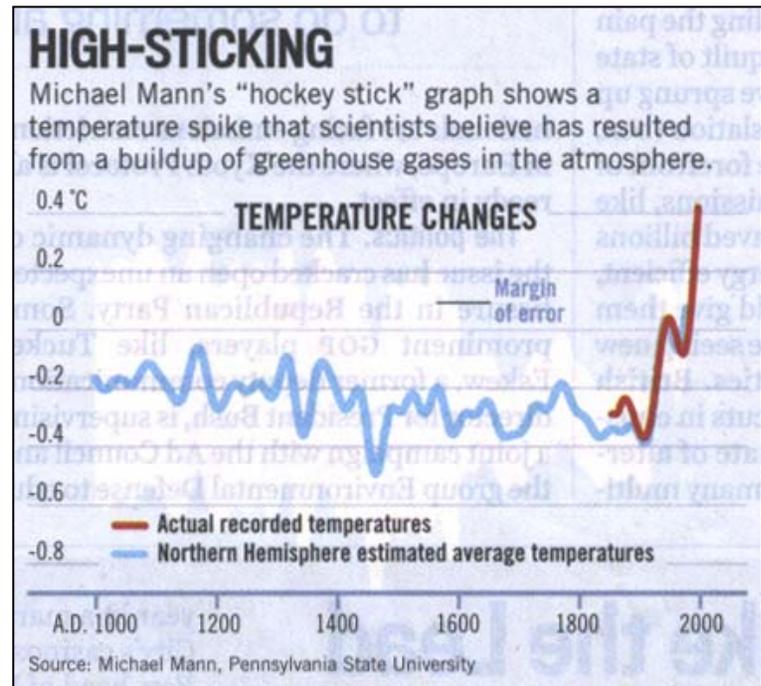




World Climate History According to IPCC in 1990.



World Climate History after AD1,000 according to ground borehole evidence. Source: Huang et al. (1998)



IPCC (III)

Michael Crichton (2004) Comment on human-induced global warming

“Now we are engaged in a great new theory, that once again has drawn the support of politicians, scientists, and celebrities around the world. Once again, the theory is promoted by major foundations. Once again, the research is carried out at prestigious universities. Once again, legislation is passed and social programs are urged in its name. Once again, critics are few and harshly dealt with.

Once again, the measures being urged have little basis in fact or science. Once again, groups with other agendas are hiding behind a movement that appears high minded. Once again, claims of moral superiority are used to justify extreme actions. Once again, the fact that some people are hurt is shrugged off because an abstract cause is said to be greater than any human consequences. Once again, vague terms like *sustainability* and *generational justice* – terms that have no agreed definition – are employed in the service of a new crisis.”

RECOMMENDATION

**IT IS UNWISE TO FORCE A
REDUCTION IN GLOBAL
FOSSIL-FUEL PRODUCTION
AND A WEAKENING OF
GLOBAL ECONOMIC
DEVELOPMENT AT THIS TIME
BASED ON WHAT WE KNOW
NOW.**