WEDNESDAY Dec 9th OUR LAST CLASS!

1) WHEN YOU ARRIVE: Submit these items in the separate BROWN FOLDER for your Group:
   (1) Your annotated LTL FILM COMMENTARY ROUGH DRAFT &
   (2) your PEER REVIEW CHECKLIST + SUMMARY FORM

2) THEN: Get right to work and FINISH UP the G-7 ACTIVITY Including Q #7 on plotting and comparing graphs of temperature change in parts of the world using LINK #2.
   When you finish that, check out LINKS #3 - #7 at the bottom of the G-7 Assignment webpage In D2L.

3) THEN, we'll have a short WRAP-UP PRESENTATION on Topic #14, including an update on the PARIS TALKS.

4) THEN, Final Exam pointers & practice questions

5) FINAL REMARKS & REFLECTIONS

TOPIC #14

WHERE DO WE GO FROM HERE?

p 89 in Class Notes

So what do we do about all of these impacts???

ADAPTATION & MITIGATION SOLUTIONS

POLICIES & POSSIBLE ACTIONS
to SLOW
GLOBAL WARMING . . .
& ADAPT to the warming we
can't prevent!

MITIGATION
VS
ADAPTATION ?

MITIGATION

Mitigation: intervention to reduce anthropogenic Forcing on the climate system through:

(a) strategies to reduce GHG emissions

(b) strategies to enhance GHG sinks

planting trees

ADAPTATION

ADAPTATION: Adjustments made in response to (or anticipation of) **CLIMATIC IMPACTS** in order to:

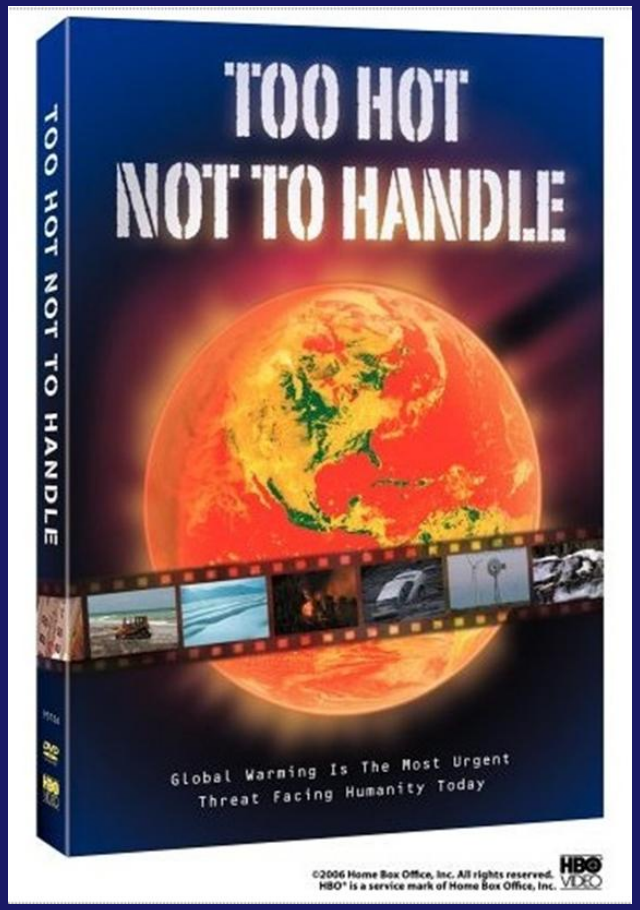
Home in Union Beach NJ after Hurricane "Sandy"

Should this house be rebuilt?

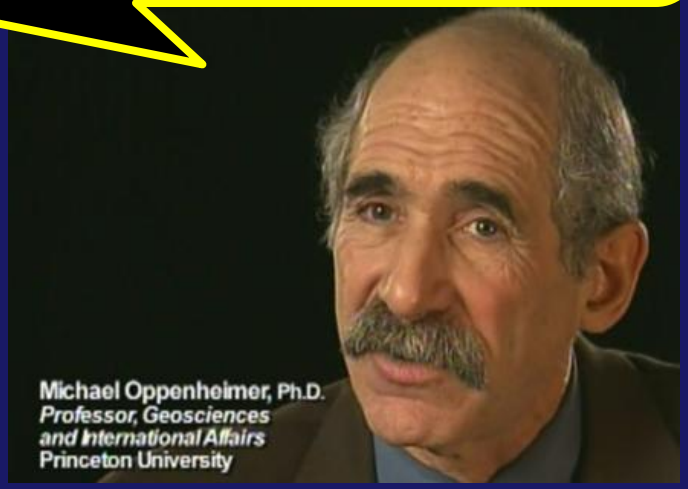
(a) Lessen or reduce harm

(b) take advantage of beneficial opportunities

Several **MITIGATION SOLUTIONS** described in last segment of:



"Let a thousand flowers bloom".

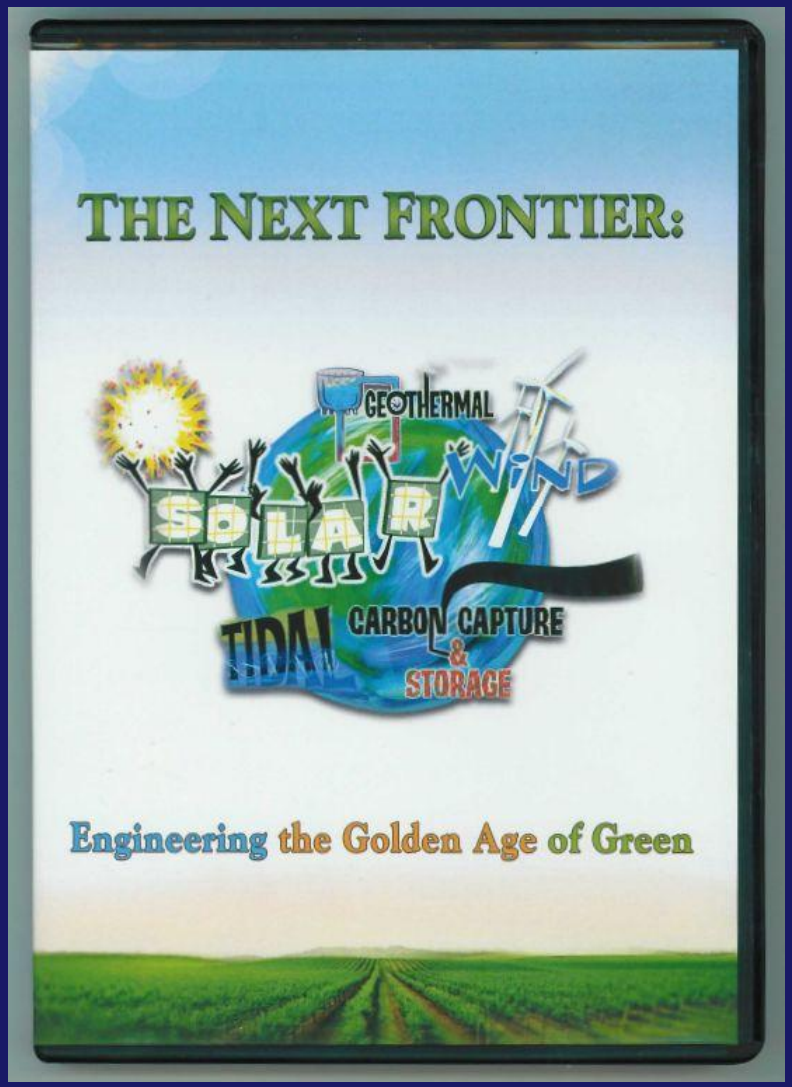


SOLAR

BIOFUELS **WIND**

SUSTAINABLE COMMUNITIES

(Portland, Oregon example)



More
MITIGATING
SOLUTIONS
in this film. . .

LOCAL MITIGATION . . .

BROOKLYN PIZZA COMPANY®

Welcome to Brooklyn Pizza Company

Brooklyn has gone Solar! The new panels generate 160,000 kWh of electricity per year. Find out how Brooklyn does its part to mitigate environmental impact.

See the PDF.

NOW 100% SOLAR POWERED!

-80,000 gal of water saved each year

-29,700 lbs of CO_2 - the biggest contributor to global warming - saved each month

-160,000 lbs of coal saved each year

In TUCSON, on 4th Avenue

MITIGATION
VS
ADAPTATION ?

We need BOTH!

“ A world civilization able
to envision God and the afterlife,
to embark on the colonization of space,
will surely find the way
to save the integrity of this magnificent planet
and the life it harbors because quite simply

it's the right thing to do,
and ennobling to our species.”

-E. O. WIlson

COP 21
PARIS TALKS
2015

https://www.youtube.com/watch?v=oo5ca1dMbEc

theguardian

Climate coalition breaks cover in Paris to push for binding and ambitious deal

Alliance representing more than 100 countries, including US, shows developed and developing world can work together, says EU climate chief

COP 21: UN climate change conference Paris

THE WALL STREET JOURNAL.

Home World U.S. Politics Economy Business Tech Markets Opinion Arts Life

WORLD

Climate Talks Show Signs of Progress

Divisions remain on help for developing countries and role of emerging economies

By GABRIELE STEINHAUSER

Updated Dec. 8, 2015 4:59 p.m. ET

PARIS—Strands of a deal on tackling climate change began to emerge Tuesday, but divisions remained on the two most contentious issues: Who will help developing countries pay for less-polluting energy generation and adapt to rising temperatures; and whether emerging economies take on larger responsibilities in the broader fight against global warming.

Business Leaders Commit to Energy Goals at Climate Conference

By STANLEY REED DEC. 8, 2015

Corporate Giants Commit to Climate, Energy Goals: Over 100 companies have pledged to reduce their emissions in line with scientific recommendations for a 2°C warming limit. The group, which includes Coca-Cola, General Mills, and Honda, collectively emits nearly 500 million tons of CO2 every year, equivalent to the annual emissions of South Africa. The project is being organized by the Science Based Targets initiative, where organizers have already approved the emissions reduction strategies of 10 companies. The diversity of the companies - spanning food to furniture, investment funds to insurers - points to the important role the business community will play in the transition to a clean energy economy. (New York Times $, InsideClimate News, Climate Home, Huffington Post)

Coke, Sony among 114 firms to cut carbon in line with 2C

Kellogg Is Finally Tackling Its Biggest Business Risk -- Climate Change

It's crunch time. And the cereal giant's not flaking out.

Alexander C. Kaufman
Business Editor, The Huffington Post

12/08/2015 05:07 pm ET | **Updated** 18 hours ago

Coca-Cola Enterprises, Ikea and Walmart were among 114 companies to commit to greening supply chains in line with science-based targets on Tuesday.

theguardian

A 60-second guide to why the Paris climate summit will succeed – video http://gu.com/p/4ehxt/stw

ABOUT
FINAL GRADES
&
THE FINAL EXAM

ABOUT THE FINAL EXAM

- **WEDNESDAY Dec 16 @ 1:00 – 3:00 pm in THIS classroom**

- **The Exam will focus mostly on material since the Midterm Exam**
(but see the STUDY GUIDE for what you need to know from before the Midterm).

- **STUDY GUIDE WILL BE POSTED TOMORROW**

- **STUDY SESSIONS** next week **in Bannister Tree-Ring Lab Room 110** :

MONDAY: **Dec 14th 3:30 – 5:00 pm**
TUESDAY: **Dec 16th 3:30 – 5:00 pm**

ABOUT YOUR FINAL GRADE

Your current % and point total (out of 615 pts) is visible in D2L now
Not yet included in the total are:

Today's G-7(10 pts), I-4 Climate Basics Tutorial (25 pts)
Linking-to-Life Part B (75 pts), Clicker Points (20 pts)
Misc Bonus Points & the Final Exam (205 pts)

Grading on the above items is in progress and an announcement will be posted in D2L when new grades are posted. . . . . (cont.)

ABOUT YOUR FINAL GRADE (cont.)

Your final LETTER GRADE will be based on the % earned of all possible COURSE POINTS (~ 950) using the following PERCENTAGE POINT cutoffs:
A (90-100%), B (80-89%), C (70-79%), D (60-69%), E (<60%)

BORDERLINE? A final grade is considered "borderline" when it is within 1 percentage (%) point — not course point — of the cutoffs above ↑

For students with grades that are "borderline," in the final grade calculation I do a very careful evaluation of the following items to assure the correct grade has been assigned before I post the final grades:

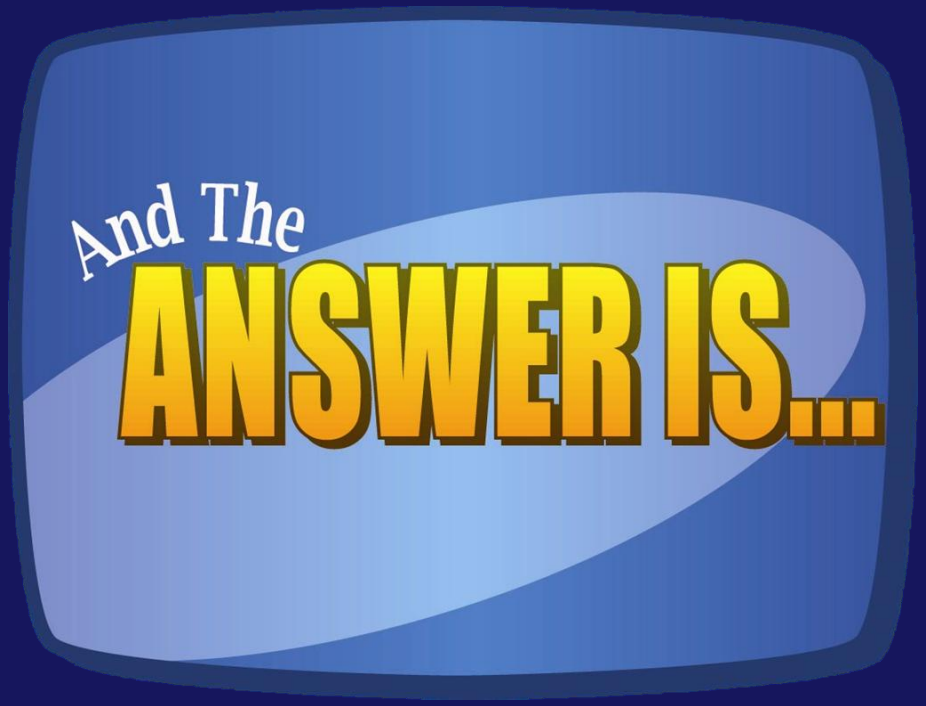
1) a review of the student's understanding of the course material as demonstrated in the Final Exam (IF- AT, write-in section & essay)

2) a review of the student's overall effort in the course

FYI – After the final grades are posted I do not "bump up" students to a higher grade, so please don't email asking me to!
All borderline cases will have already been evaluated.

FINAL EXAM STUDYING
'"JUMP START"
REVIEW

Some review from earlier in the semester
and some Q's on more recent topics . . . .



The wavelength range of infrared radiation.

What is…

1. < 0.4 micrometers
2. > 0.7 micrometers 
3. 400 – 700 nanometers
4. Longer wavelengths than microwaves

The key factor that makes certain gases act as greenhouse gases!

What is…

1. They are diatomic

2. They absorb shortwave radiation and emit longwave radiation

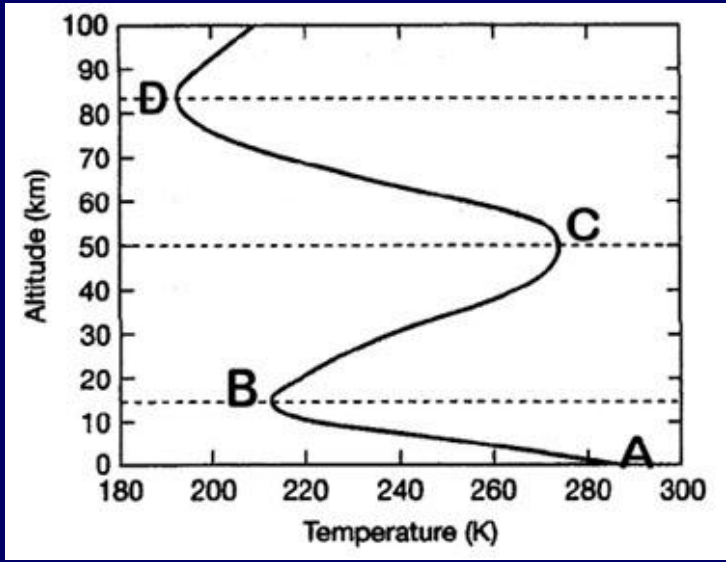
3. They easily reflect IR radiation back to the Earth's surface

4. They absorb and emit infrared radiation

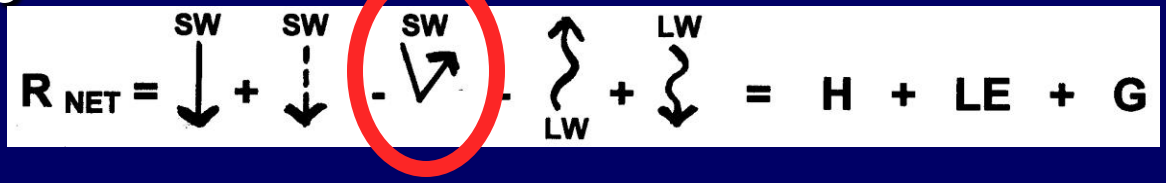
The observation that "the atmosphere is heated from below" is most evident in this layer.

What is…

1. Layer A - B
2. Layer B - C
3. Layer C - D
4. Layer D and above



The circled symbol:



What is…

1. Outgoing longwave radiation

2. Reflected infrared radiation

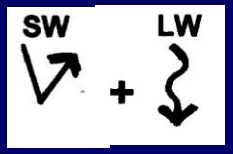
3. One of the symbols that's part of the Greenhouse Effect

4. Albedo

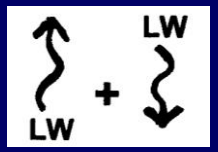
The Greenhouse effect is represented by this symbol.

What is…

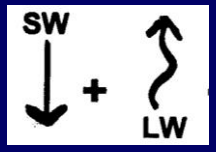
1. This one:



2. This one:



3. This one:

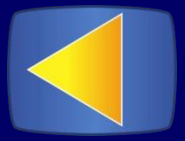


4. H + G

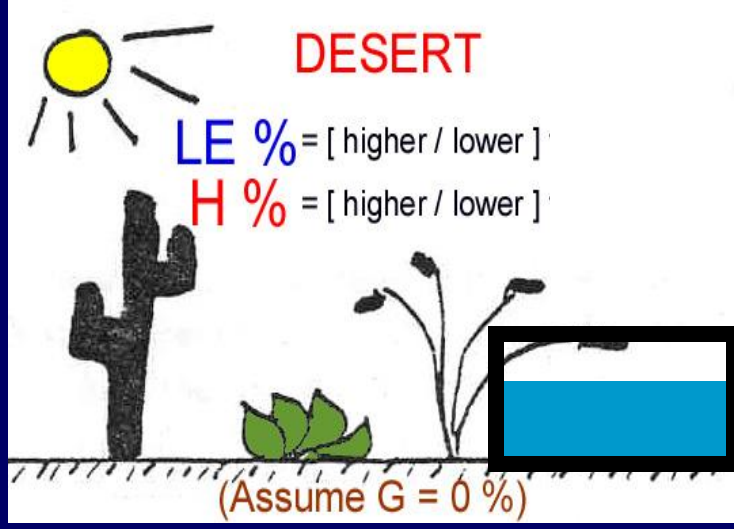
5. None of the above

Evaporation and transpiration are represented by this symbol.

What is…

1. LW
2. SW
3. H
4. LE 
5. G

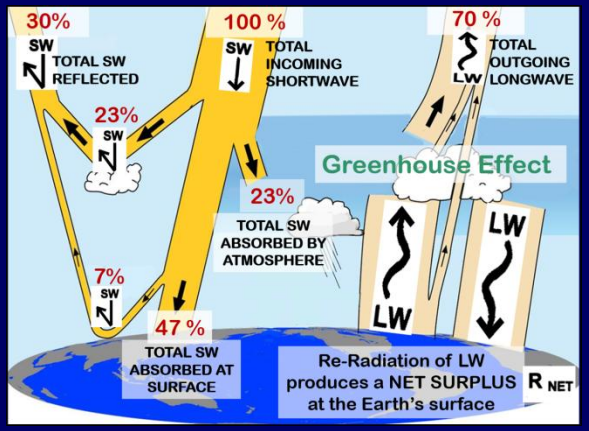
This will happen after a canal or reservoir is built in a desert.



Who is…

1. No change in H or LE
2. More energy goes into H, making it hotter.
3. More energy goes into LE, making it hotter.
4. More energy goes into LE, making it cooler.

Of these 4 choices, THIS part of the energy balance and its pathways involves the <u>MOST</u> units of energy.



<u>What is…</u>

1. **UV energy absorbed by ozone in stratosphere**

2. **Solar energy reflected back to space by clouds, atmosphere, & surface <u>combined</u>.**

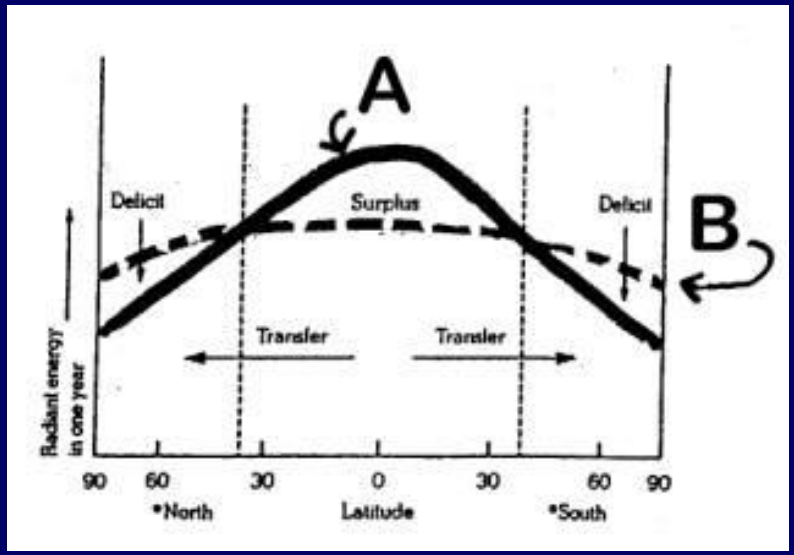
3. **IR energy radiated from the Earth's surface directly out to space**

4. **IR energy re-radiated to the Earth's surface after being absorbed in the atmosphere.**

If the Earth had NO atmosphere, this change in curve A or B would occur.

What is…

1. A moves up
2. A moves down
3. B moves up
4. B moves down



A= incoming solar shortwave radiation

B = outgoing terrestrial longwave radiation

The LEAST likely to be a climatically effective volcanic eruption with a global influence.

What is a …

1. High latitude eruption, like Mt St. Helens

2. Low latitude eruption, like Pinatubo.

3. Sulfur-rich eruption, like Tambora.

4. Highly explosive eruption ejecting material into the stratosphere, like Krakatau.

This is likely to occur during a sunspot cycle with a MAXIMUM of sunspots

What are…

1. Decreased solar brightness and cooling on Earth

2. Increased solar brightness and warming on Earth

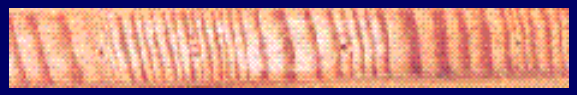
3. Glacial advances

4. More volcanic eruptions

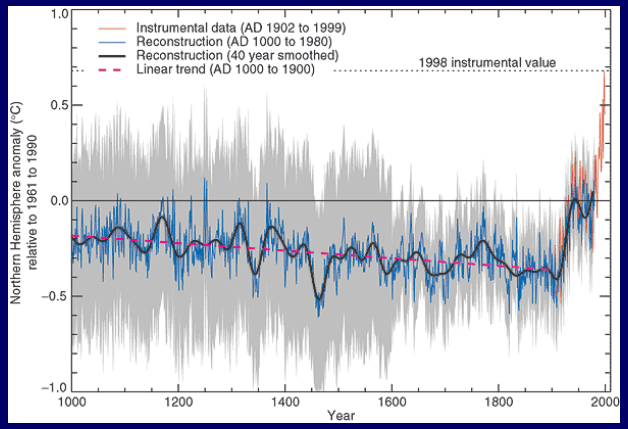
The tree ring core that represents a tree that is highly SENSITIVE to climate & good for crossdating:

What is…

1. This one: 

2. This one: 

The "Hockey Stick" diagram is evidence of this.



What is…

1. A period in the Medieval times that was warmer than the 20th century

2. The start of a global ice age – hence more hockey games!

3. The fact that proxy records (like tree rings) can estimate temperatures as accurately as thermometers

4. An unprecedented global warming trend in the 20th century pointing to an anthropogenic cause

The LIKLEY after-effect of an explosive, sulfur-rich volcanic eruption.

What is…

1. Lots of reflection of solar SW by ash many weeks after the eruption

2. Stratospheric COOLING and tropospheric WARMING

3. Stratospheric WARMING and tropospheric COOLING

4. A decreased Greenhouse Effect

What ozone does in the troposphere vs. stratosphere.

What is…

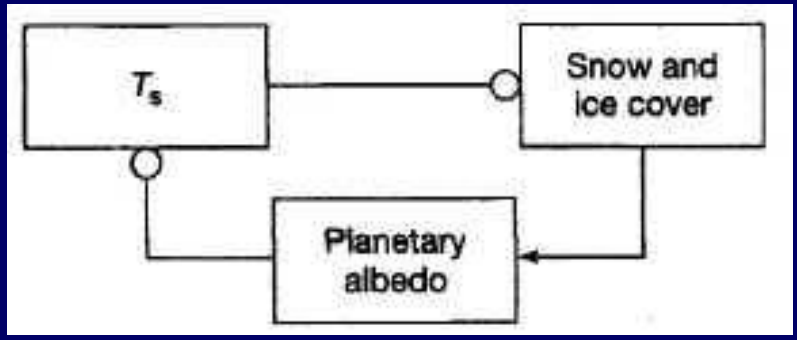
1. Ozone absorbs IR in the troposphere (acting as a GHG) and absorbs harmful UV in the stratosphere (NOT acting as a GHG).

2. Ozone is "good" ozone in the TROPOSPHERE and "bad" ozone in the STRATOSPHERE

3. The Ozone Hole in the stratosphere allows more SW radiation to reach the Earth's surface and this is a DIRECT cause of global warming in the troposphere.

4. None of the above

What this feedback loop will lead to.



What is…

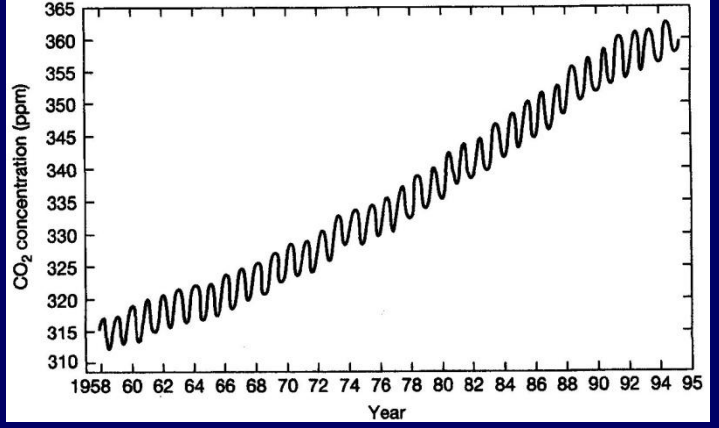
1. A self-regulated return to an equilibrium state

2. An ice age followed by a warm period.

3. A self-amplifying change in the Earth's surface temperature

4. A runaway Greenhouse Effect!

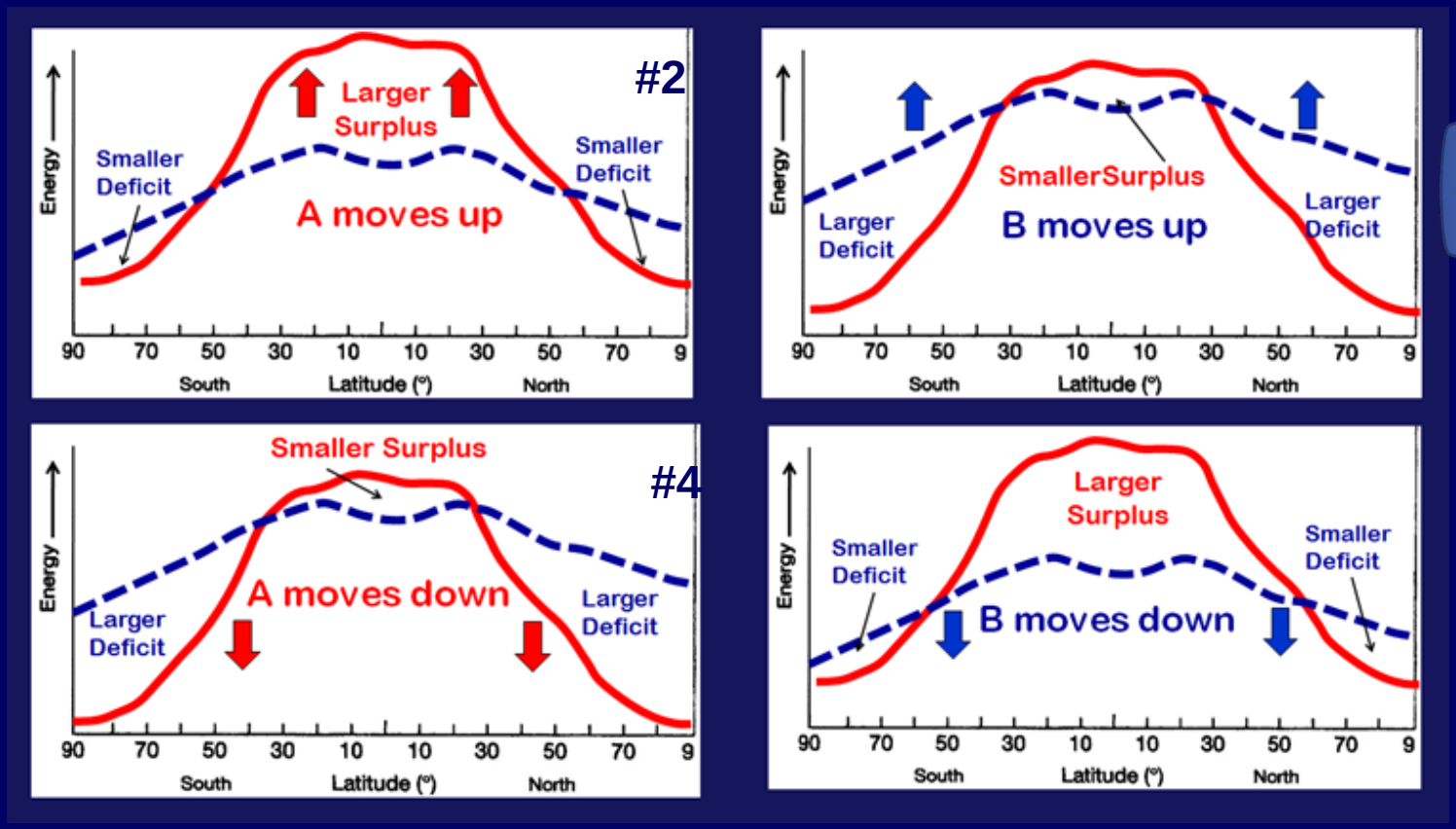
This is illustrated by the Keeling Curve.



What is…

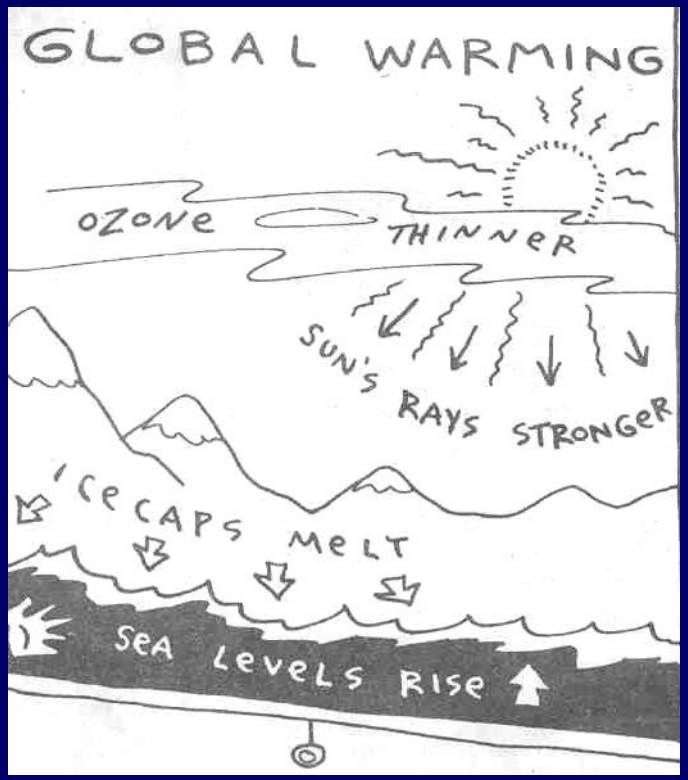
1. Quasiperiodic variations with an upward trend
2. Increasing variance with a constant mean
3. A step change with an abrupt jump
4. The “breathing” of the Southern Hemisphere forests.

POSSIBLE MULTIPLE CHOICE QUESTION:



Which of these four graphs best depicts how the energy balance would be different if the Earth had a **WEAKER Greenhouse Effect** than the one we have now ?

POSSIBLE ESSAY QUESTION:



MORE practice Q's will start off each STUDY SESSION . . .

Plus the Q's (with answers) will be posted in D2L

a) WHY is the cartoon's depiction of thinner ozone as the principle cause of global warming INCORRECT?

b) WHAT IS the principle cause for anthropogenically produced global warming (according to the IPCC scientists)?

c) HOW -- if at all -- IS ozone linked to global warming?

STUDY GUIDE ESSAY PRACTICE . . .

SOME IMPORTANT WRAP-UP POINTS

SPECIAL THANKS TO YOUR TA's

Who guided the class behind the scenes, tutored all who came in for help, and put in hour upon hour to grade fairly and constructively

Diana Zamora-Reyes

The class couldn't function without them!

Ryan Lee

Your PRECEPTORS also deserve

HUGE THANKS

for advocating for you ALL SEMESTER,
for helping you in Study Sessions,
and for providing weekly feedback
throughout the semester
to improve the class!

WHERE DO WE GO FROM HERE?

KEEP LEARNING

TAKE ACTIONS

GET INVOLVED & ADVOCATE !

WHAT CAN I DO??

- **VOTE** for those who will promote good **POLICY** (economic and environmental) to produce major change

- Be a **GLOBAL CHANGE SAVVY CONSUMER**

- Make **INDIVIDUAL CHANGES** in your own life

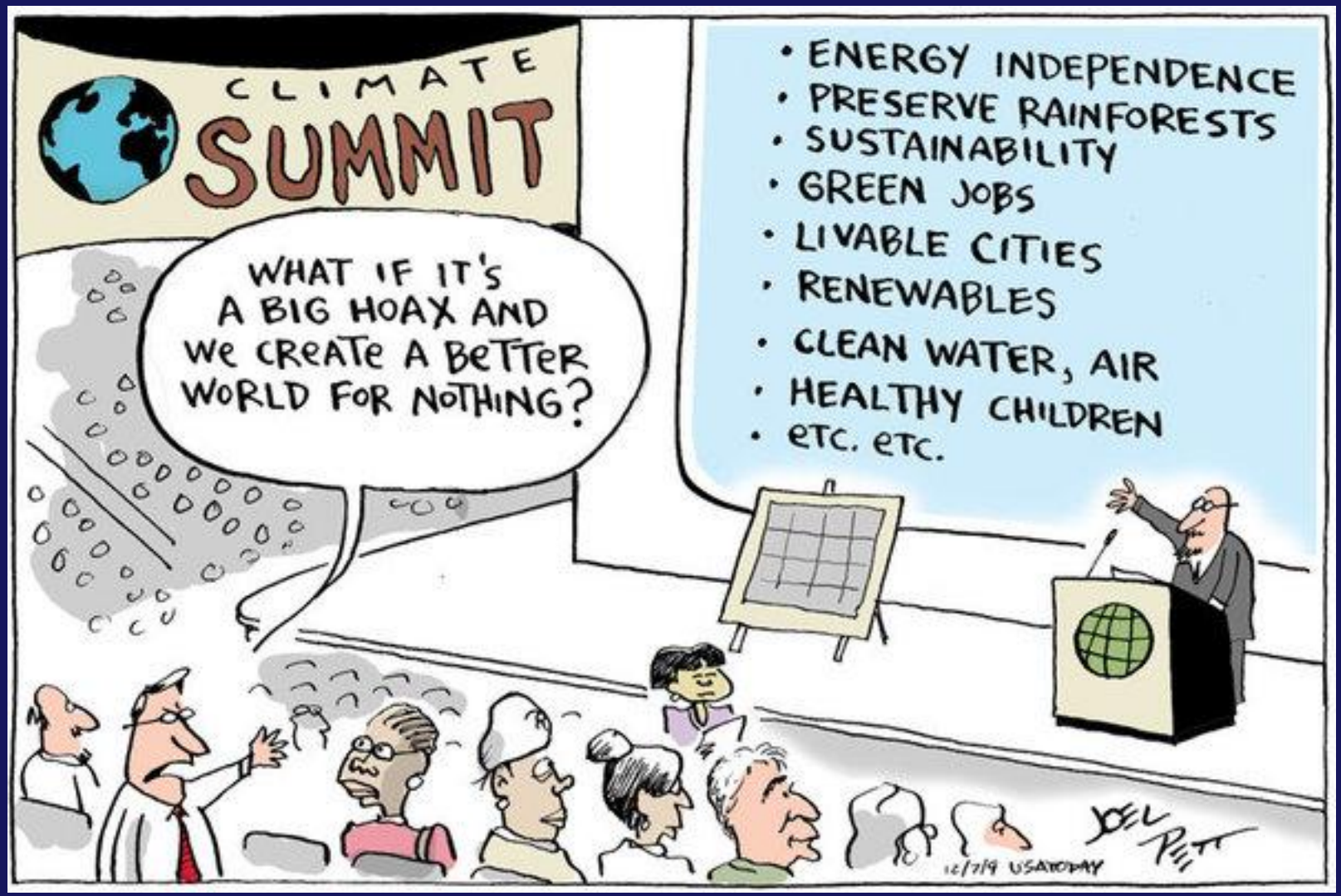
- **INSPIRE OTHERS** to WAKE UP to the “ALARM”

- Think about the **LONG TERM** – not just NOW

- Foster **COMPASSION** that leads to **ACTION** for those **MOST VULNERABLE** to Global Climate Change

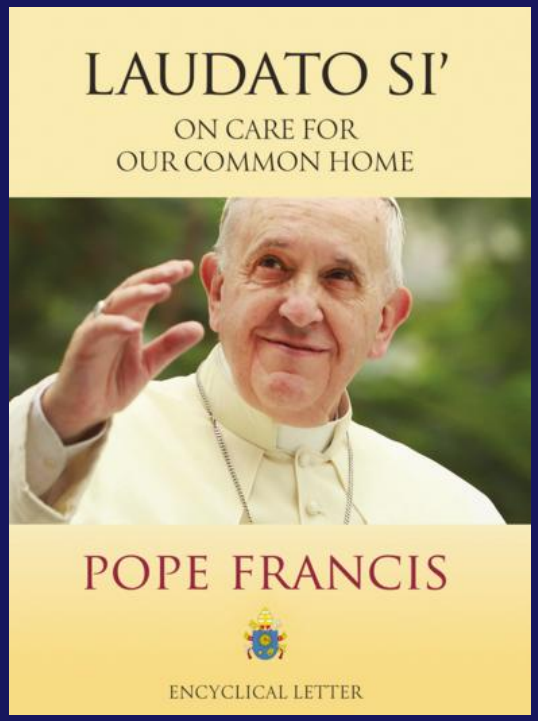
PERSONAL REMARKS

FROM Dr H



LINKING TO LIFE . . .

LINKING TO HEARTFELT VALUES



http://w2.vatican.va/content/francesco/en/encyclicals/documents/papa-francesco_20150524_enciclica-laudato-si.html

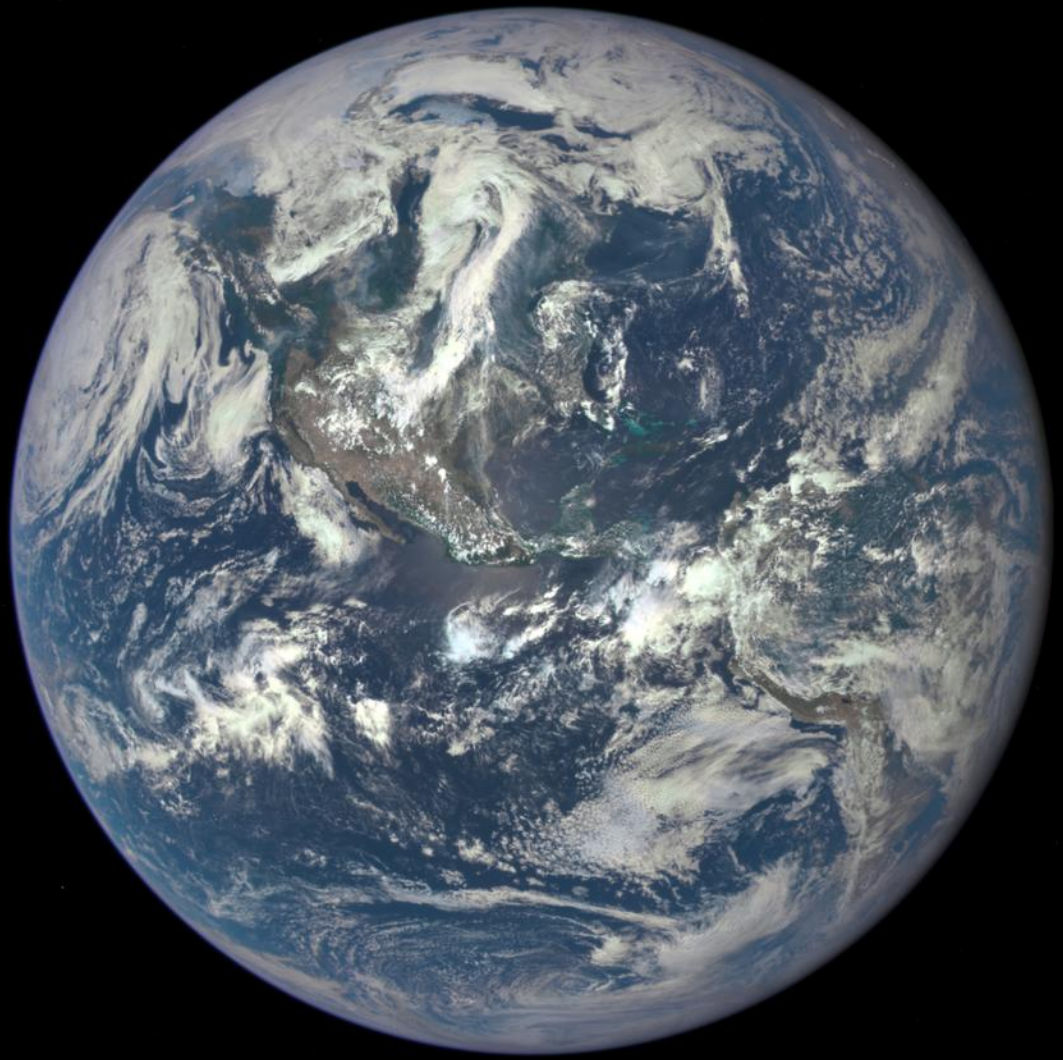
“On Care For Our Common Home”

“I WISH TO ADDRESS EVERY PERSON
LIVING ON THIS PLANET.”

Urgent appeal for
a NEW DIALOGUE about
“how we are shaping
the future of the planet”

Immensity and urgency of
THIS CHALLENGE . . .

To close . . . . a MESSAGE from the film **“HOME”**



STUDY HARD!

See you next week at the Final Exam in THIS CLASSROOM

I'm rooting for you! - Dr H