

Thursday Dec 4th

**TOPIC #14 IMPACTS & ISSUES Wrap Up &
The G-6 Bristlecone Pine Activity**

SIT WITH YOUR GROUP TODAY

ANNOUNCEMENTS:

LINKING-TO-LIFE PART C – Project SLIDE & REPORT

Slide: Due Tue Dec 9 in the dropbox before class next Tue

Report: Due Wed Dec 10 in the dropbox before Midnight

**Your last RQ (RQ-9) will be posted next week and
will be due anytime before the Final Exam**

Our FINAL EXAM is on:

**THURSDAY Dec 18th @ 10:30 am – 12:30 pm
in this CLASSROOM (note the 10:30 am start time!)**

**The FINAL EXAM Study Guide will be posted by the end of next week
and Study Sessions will be held during the Exam Week (day + time TBA)**

ABOUT THE FINAL EXAM . . .

THURSDAY DEC 18th 10:30 am -12:30 pm

IN THIS CLASSROOM ← NOTE earlier start time!!

(Sorry, no options to take it earlier!)

- **Worth 105 pts:** about 25 multiple choice Q's, plus short answer, make-a-sketch, & short essay Q's
- Q's will focus on material since the MIDTERM EXAM, but some concepts will carry over (these will be spelled out on Study Guide)
- **STUDY GUIDE with practice questions** will be provided next week (similar to guide for Midterm Exam) . . . plus some practice questions in class next Tuesday.
- **PRECEPTORS & TAs** will hold **STUDY SESSIONS** during Exam Week – day & time to be announced later

LINKING-TO-LIFE PART C “DELIVERABLES”

Some pointers for your Slide for next Tuesday’s Class:

- Be sure you have all the items in the “Deliverables” Checklist clearly shown on your slide (incl your Name & Group #)
- Be sure any images on your slide are visible on both Mac and PC computers (may submit your ppt slide plus a PDF copy, just to be safe)
- Submit **only ONE (1) slide**, with **NO animations** on it!
- Have your slide **in the DROPBOX before class** so it can be inserted into the “BEST GROUP SLIDE PPT SHOW” if yours is chosen!
- Remember to **bring a copy of your slide** (on paper, on a laptop, or on another device) so you can share it with your group

Before submitting your FINAL SLIDE, double check it to be sure you’ve addressed all the items spelled out in the GRADING RUBRIC that is now POSTED IN THE LTL PART C DROPBOX

LTL Part C SLIDE RUBRIC:

Criteria	Truly Exceptional	Very Good	Average	Below Average	Marginal	Unacceptable
Purpose & Motivation stated	5 points	4 points	3 points	2 points	1 point	0 points
GC Connection: connection to course topics	3 points	2.5 points	2 points	1 point	0.5 points	0 points
GC Connection: illustration of connection	2 points	2 points	1.5 points	1 point	0.5 points	0 points
GC Connection: overall quality	4 points	3 points	2 points	1 point	0.5 points	0 points
What & How: what data/info looked at	5 points	4 points	3 points	2 points	1 point	0 points
What & How: what was done with info	5 points	4 points	3 points	2 points	1 point	0 points
What & How: use of phrase, diagram, table or graphic	3 points	2.5 points	2 points	1.5 points	1 point	0 points
What & How: overall quality	4 points	3 points	2 points	1 point	0.5 points	0 points
Conclusion/Bottom Line: stated	3 points	2.5 points	2 points	1.5 points	1 point	0 points
Conclusion: clear, compelling	2 points	1.5 points	1 point	0.5 points	0.5 points	0 points
Slide: overall quality & effort	4 points	3 points	2 points	1 point	0.5 points	0 points
Overall Score	Truly Exceptional 35 or more	Very Good 28 or more	Average 21 or more	Below Average 14 or more	Marginal 7 or more	Unacceptable 0 or more

Use the rubric to “grade yourself” to check that you have included all the required parts and have done them well!

LINKING-TO-LIFE PART C “DELIVERABLES”

Some pointers for your Project Report:

- Be sure you have all the items in the “**Deliverables**” Checklist in your report. **USE THE ORGANIZATIONAL HEADINGS PROVIDED** (to aid the graders!) You may add **subtitles** to “personalize” your report, e.g.:

Title: *Too Many Catalogs, Too Few Trees*

Purpose & Motivation: *Reducing my Footprint by Reducing Catalogs*

Connection to Global Change: *Catalogs Contribute to Carbon Emissions*

What I Did: *Researching My Choices*

What I Learned: *Reducing Catalogs Saves More than Just Trees!*

The Bottom Line: *"Catalog Choice" Gives Me a Choice*

- Be sure you **EXPLAIN** and **DOCUMENT** where and how you got your information and what you did, plus your “**BOTTOM LINE**” conclusion.
- All your **sources and references** should be listed in the **REFERENCE LIST** using a standard format (see posted directions)
- **Addressing each of the HEADINGS sections** is more important than the number of pages. Don't obsess over page #s, obsess over **GOOD CONTENT** and use that to determine your report's length (within reason)

Some pointers for your **Project Report (cont.)** . . .

Before submitting your **FINAL REPORT**, double check it to be sure you've addressed all the items spelled out in the **GRADING RUBRIC** that is now **POSTED IN THE LTL PART C DROPBOX . . .**

Criteria	Truly Exceptional	Very Good	Average	Below Average	Unacceptable
Purpose & Motivation explained	5 points Purpose & motivation explained clearly, thoroughly, and in a compelling manner	4 points Purpose & motivation explained clearly and adequately -- but could be more thorough	3 points Purpose & motivation addressed adequately, but lack clarity and/or thoroughness	2 points Purpose and/or motivation not fully addressed or explained	0 points No purpose and/or motivation statement
GC Connection: topic(s) listed by name and #	4 points Course topic or topics related to project purpose listed by name and # and connection accurately stated	3 points Course topic or topics related to project purpose listed by name and #	2 points Course topic or topics listed by name and /or # but connection is unclear	1 point Course topic listed by connection but is inaccurate or not obvious	0 points No course topics or #'s listed or indicated
GC Connection: connection of topic to project explained	5 points Effectively, thoroughly, and accurately explains how the GC course topic(s) specifically connect(s) to the project purpose, including details and specifics.	4 points Accurately explains how the GC course topic(s) specifically connect(s) to the project purpose	3 points Explains how the GC course topic(s) specifically connect(s) to the project purpose but not clearly or with some inaccuracies	2 points GC course topic(s) mentioned, but not explained well or at all.	0 points No explanation

(See Dropbox for entire LTL Part C REPORT Rubric & **“GRADE YOURSELF!”**)

TOPIC # 14
CLIMATE CHANGE IMPACTS &
CHOICES (cont.)

MITIGATION & ADAPTATION
WRAP UP . . .

Class Notes pp 95

**“ 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



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

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

(a) Lessen or reduce harm:



Home in Union Beach NJ after "Hurricane Sandy"
Should this house be rebuilt?

(b) take advantage of beneficial opportunities:



**MITIGATION
VS
ADAPTATION ?**

We need BOTH!

Many **MITIGATION SOLUTIONS** described in . . .

“Let a thousand flowers bloom”.

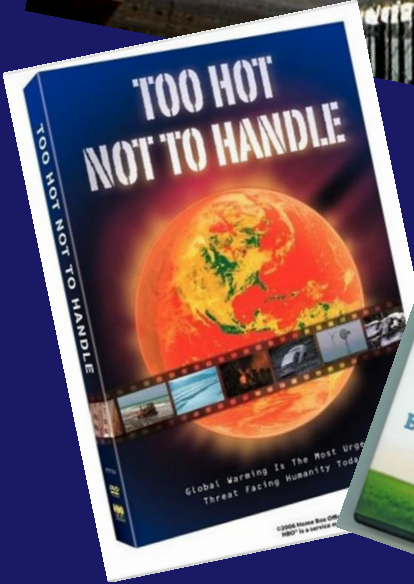
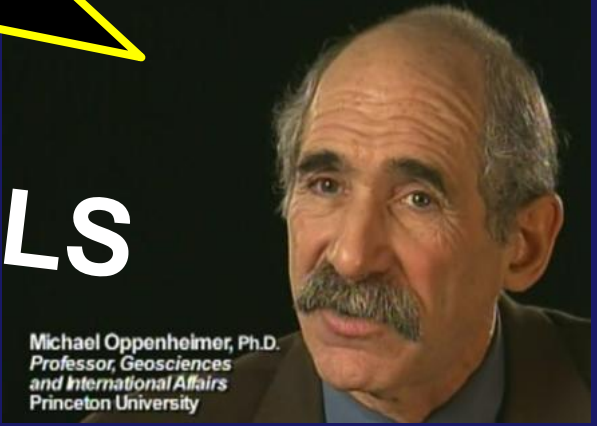
SOLAR

BIOFUELS

ELECTRIC CARS

WIND

SUSTAINABLE COMMUNITIES



. . . and other films

Portland, Oregon example . . .
What about Tucson? Phoenix?
Your home town?

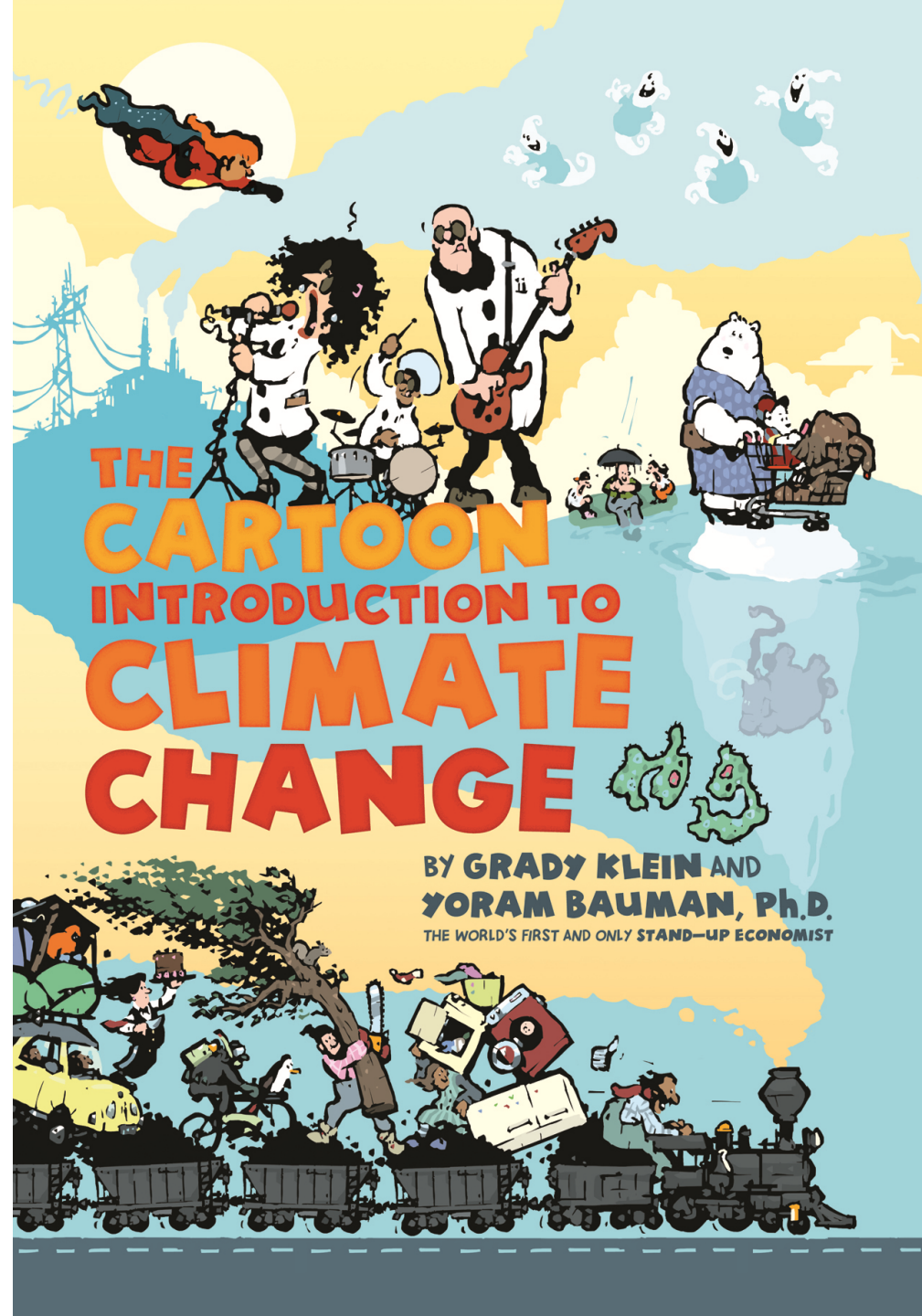
Then in class, Dr H went through several slides from this book . . . See RQ-9 when it is posted in D2L next week for the material covered.

This PPT material is provided for non-commercial education purposes only.

Please support the authors by buying *Cartoon Climate Change* (and/or *Cartoon Economics*) from your favorite bookstore. Comedy videos are at standupeconomist.com.

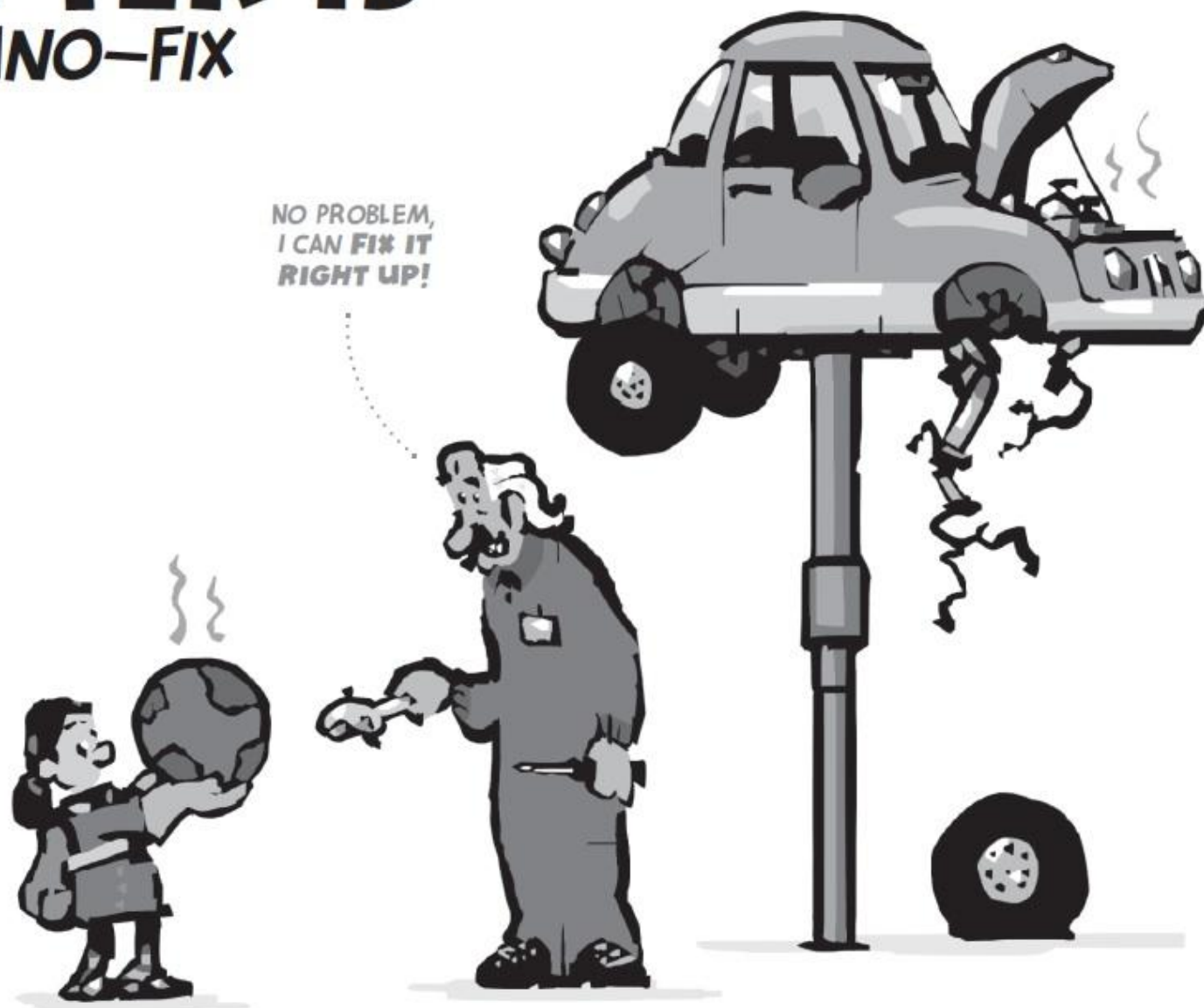
Please show this slide to identify the artwork and the artists.

© Yoram Bauman and Grady Klein



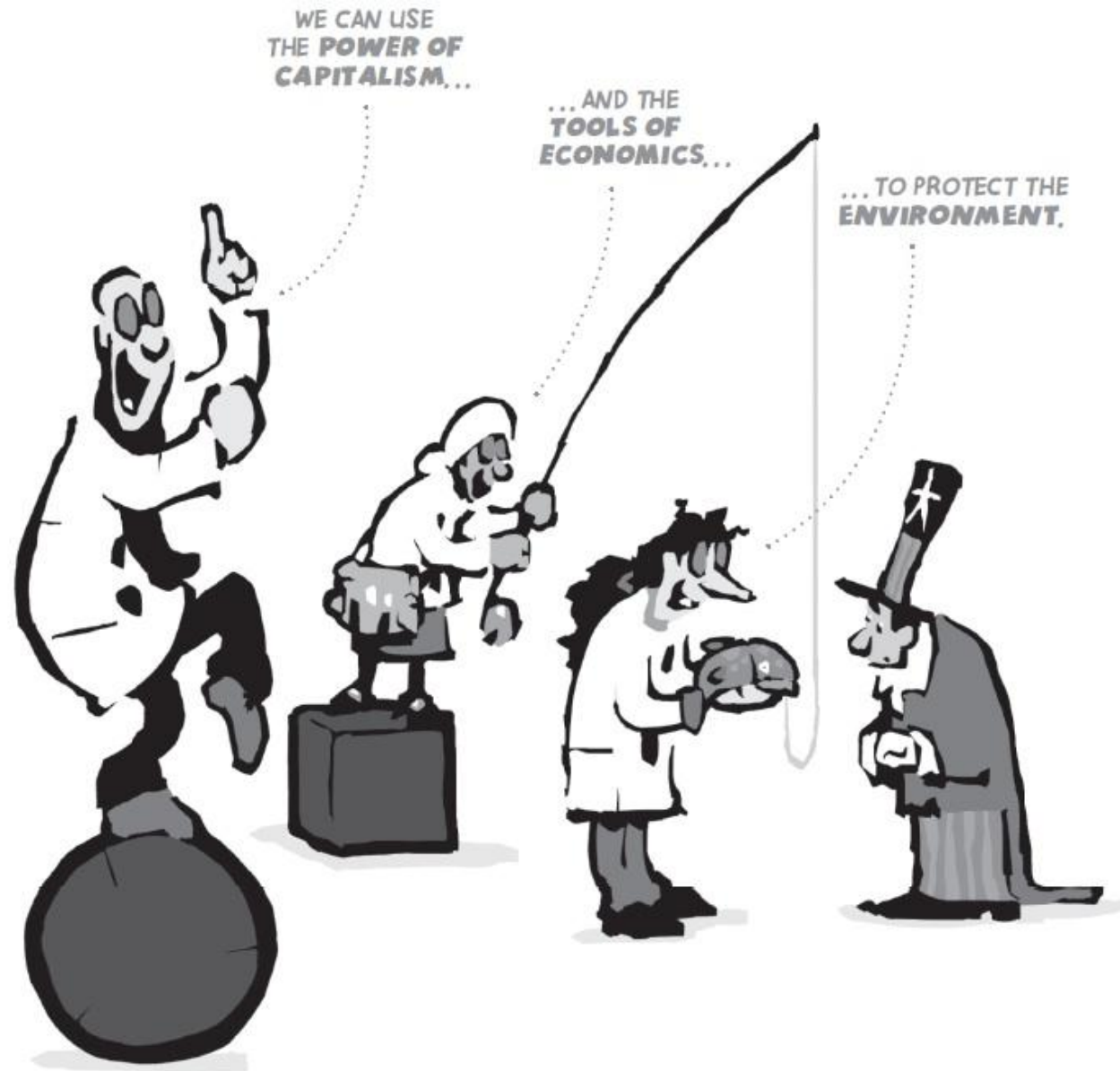
CHAPTER 13

TECHNO-FIX



CHAPTER 14

PUTTING A PRICE ON CARBON



CHAPTER 15

BEYOND FOSSIL FUELS

WE NEED TO GET
**BEYOND FOSSIL
FUELS!**

OKAY, THERE'S
**DEFORESTATION,
AND METHANE,
AND SF₆, AND...**



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

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

(a) Lessen or reduce harm:



Home in Union Beach NJ after "Hurricane Sandy"
Should this house be rebuilt?

(b) take advantage of beneficial opportunities:



POSSIBLE PATHS OF FUTURE GLOBAL WARMING

Past observed
surface
temperature
changes

Estimated future
temperature
trajectories

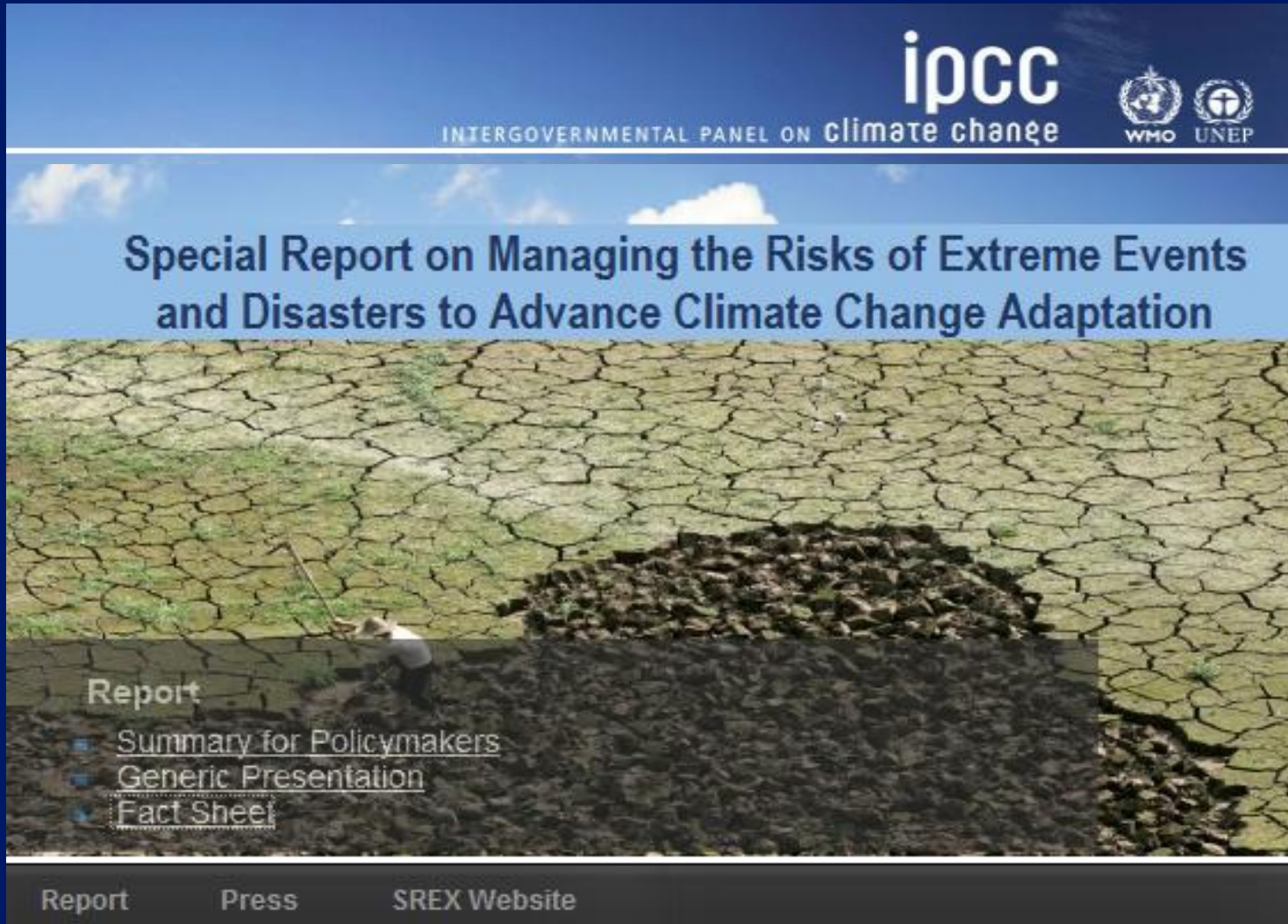
Estimated average
temperature rise plus
lowest and highest
projections for three

“This means that we will have no choice but to ADAPT to a change in climate”

- even if our mitigation actions place us on a low emissions pathway or . . .
- even if emissions are stopped entirely (which would be impossible)



IPCC SPECIAL REPORT on ADAPTATION:



The image shows the cover of the IPCC Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. The background is a photograph of a severely drought-stricken landscape with cracked, parched earth. A person is visible in the lower-left foreground, using a long-handled tool to dig for water in a small, dark, muddy pool. The sky is blue with some light clouds.

ipcc
INTERGOVERNMENTAL PANEL ON Climate change

WMO UNEP

Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation

Report

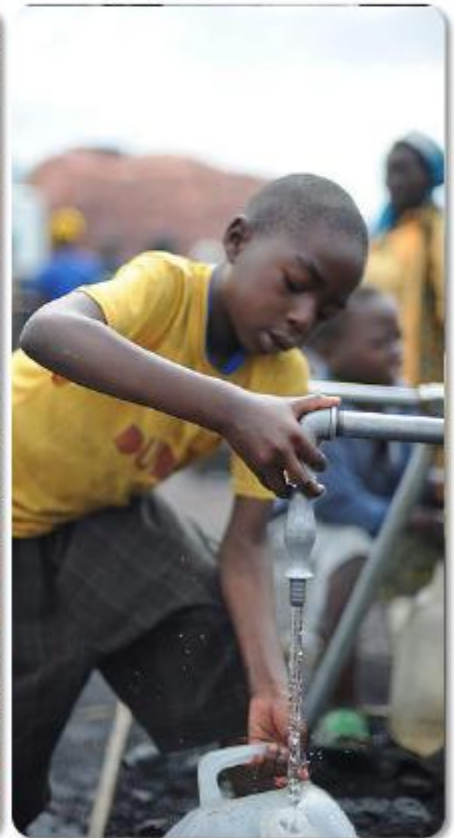
- [Summary for Policymakers](#)
- [Generic Presentation](#)
- [Fact Sheet](#)

Report Press SREX Website



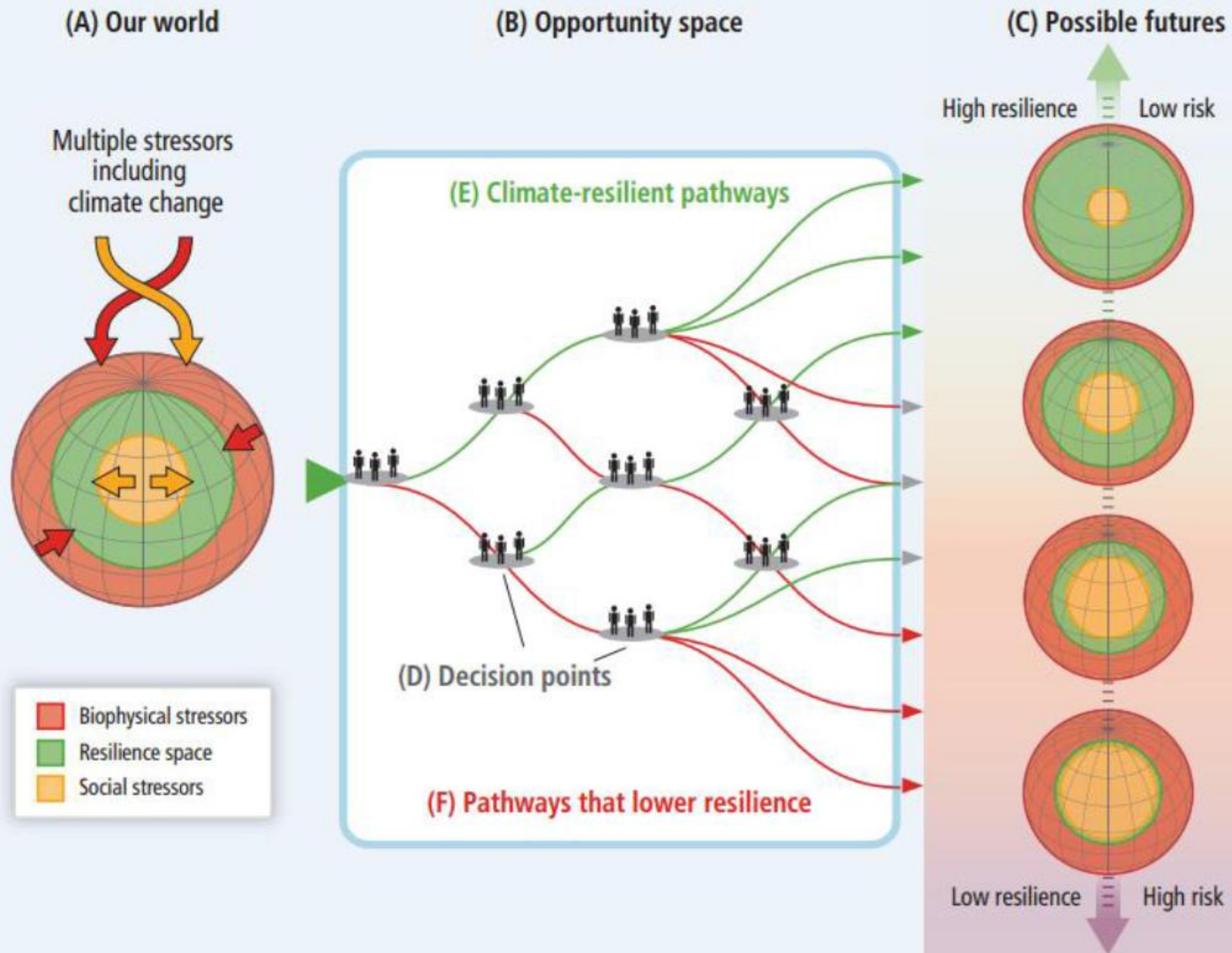
- **Changes in climate vary across regions**
- **Each region has unique vulnerabilities & exposure to hazards**
- **Effective adaptation & risk management must address BOTH exposure & vulnerability of a region**

There are strategies that can help **manage disaster risk now** and also help improve people's livelihoods and well-being



The most effective strategies offer **development benefits** in the relatively near term and **reduce vulnerability** over the longer term

HUGE AMOUNTS OF “OPPORTUNITY SPACE” EXIST FOR ADAPTATION . . .





Finding Synergies between
Adaptation and Mitigation



Preparing for transformational
change and weather and climate
extremes



Managing risk in a complex



THE UNIVERSITY OF ARIZONA®



Center for **Climate
Adaptation Science
and Solutions**

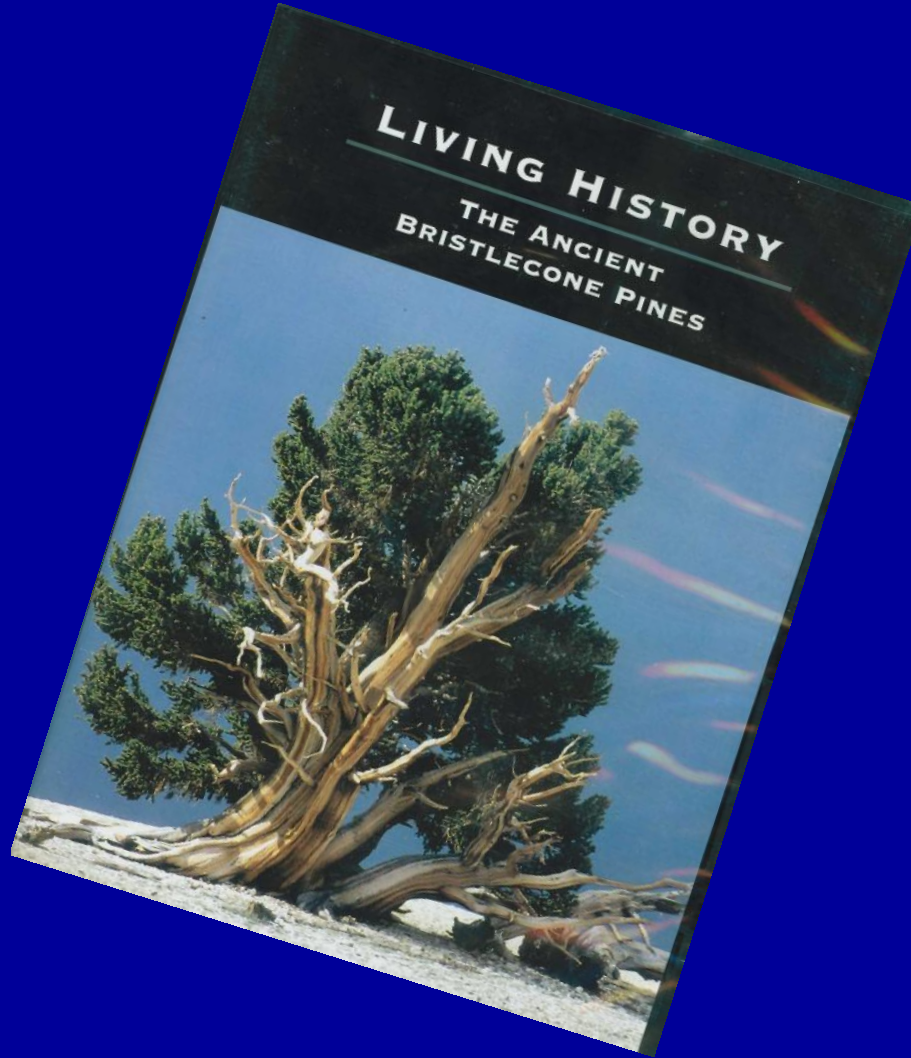
<http://www.ccass.arizona.edu/>

nce
king

**MITIGATION
VS
ADAPTATION ?**

We need BOTH!

SHORT VIDEO BREAK:



And now . . .

**G-6 DOING SCIENCE
with TREE-RINGS**



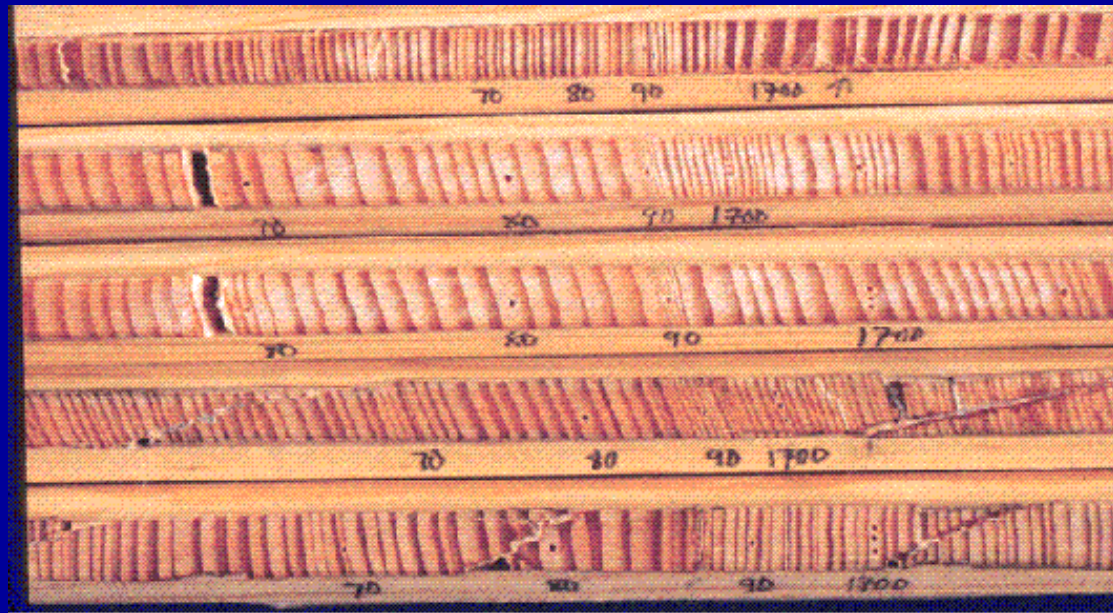
**With the
Amazing
Bristlecone
Pines!**



OK, so we extract
the tree-ring cores with an
increment borer

THEN WHAT?

We compare one
core to another
and **MATCH THE
PATTERNS** by
lining up the rings
of the really
stressful years.

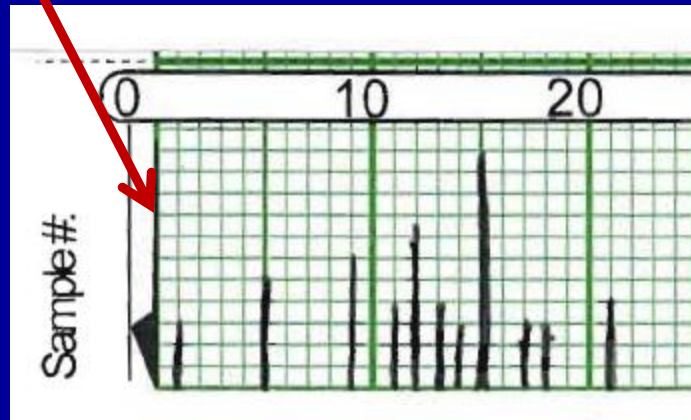


To do this we use . . .



SKELETON PLOTS!

= a graph-paper plot of the tree's **most stressful years** plotted for a sampled core:



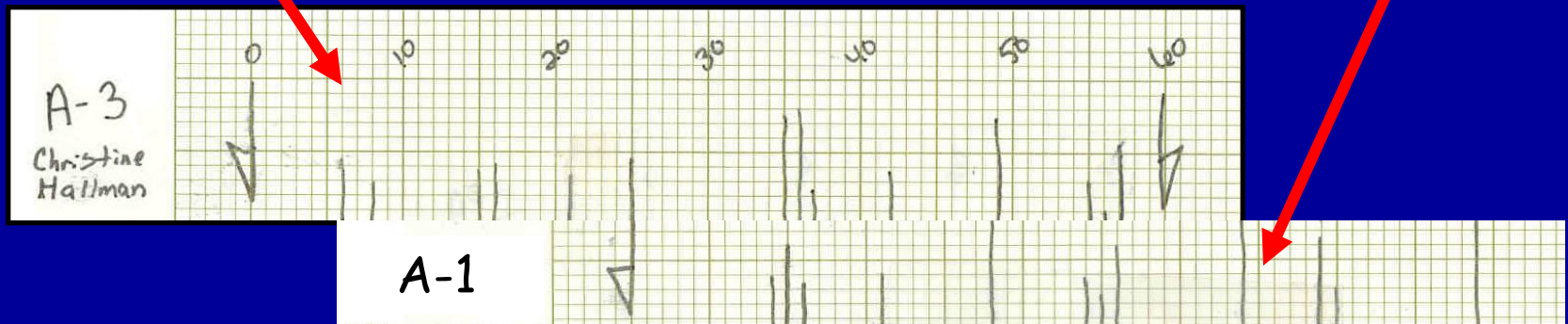
= The **LONGEST LINES** represent the most **NARROW RINGS** in the core

(only the narrow rings are plotted)

Pattern Matching:

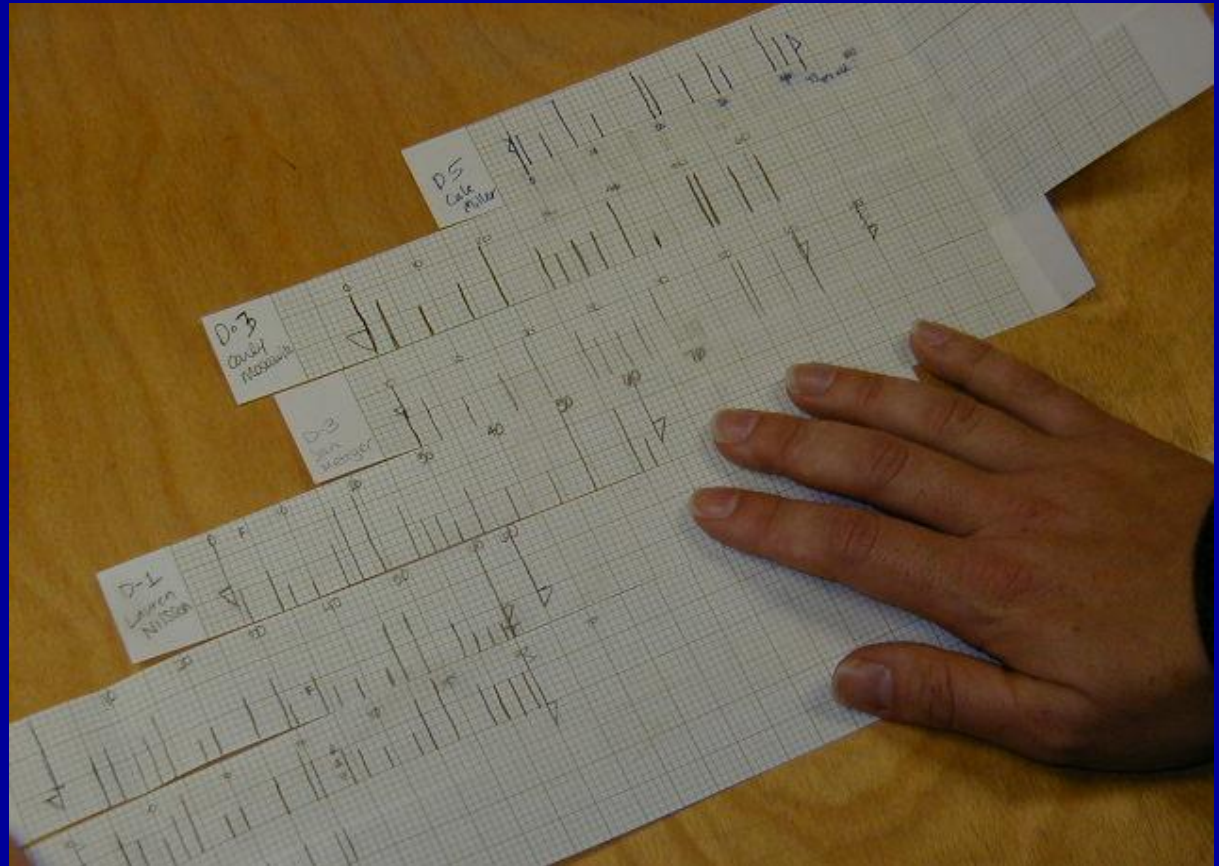
Narrow rings on skeleton plots can be **MATCHED** from one core to another:

Skeleton Plot of Tree-Core A-3



Skeleton Plot of Plot of Tree-Core A-1

Multiple
skeleton plots
can then be
combined to
make a
**COMPOSITE
PLOT** of all
cores from a
site:

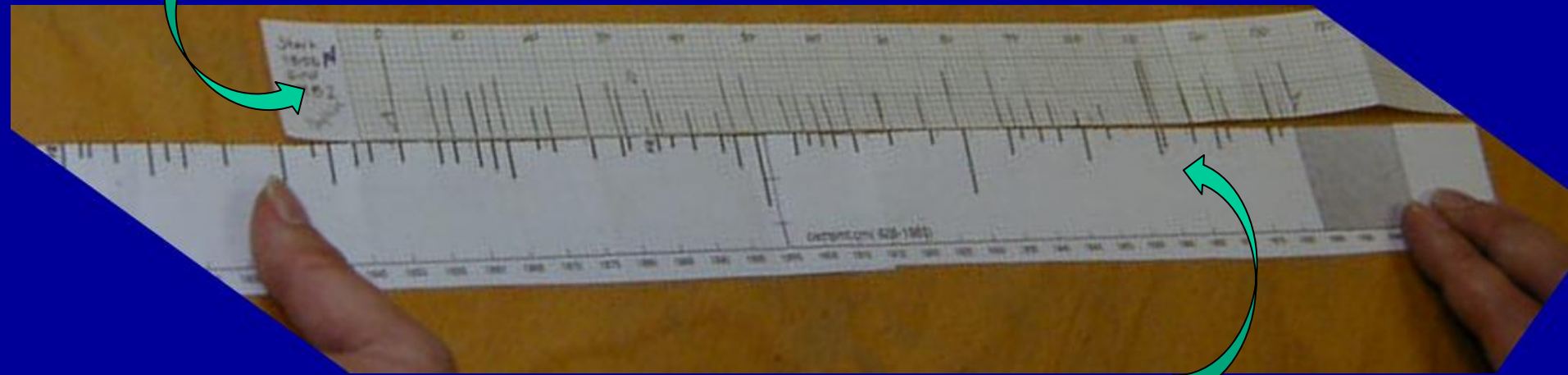


By doing this we can make a
MASTER SKELETON PLOT for a site or
region and add calendar dates →

A site or region's
Master Skeleton Plot

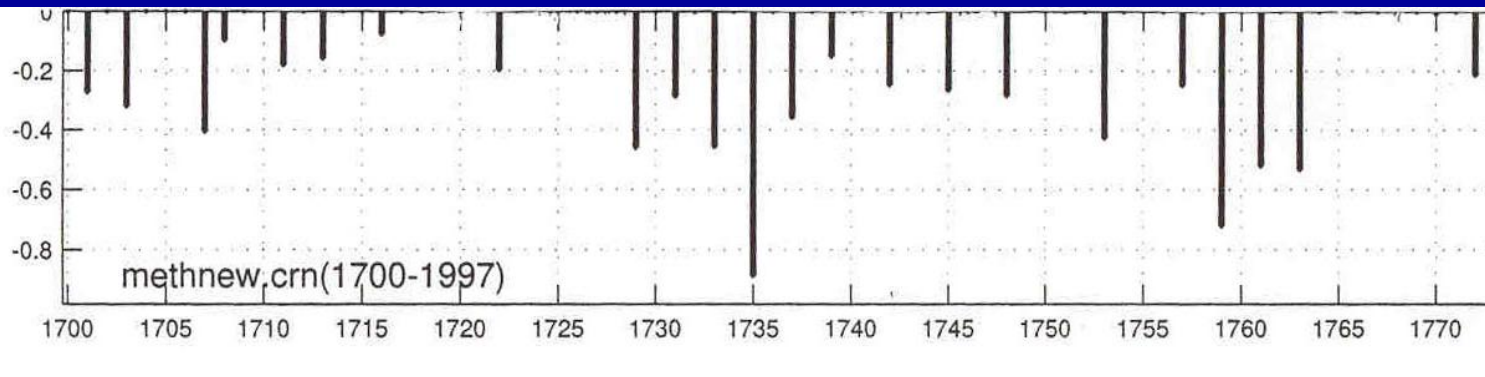
is used to assign dates to newly
collected and undated tree-ring samples

Skeleton Plot of undated core



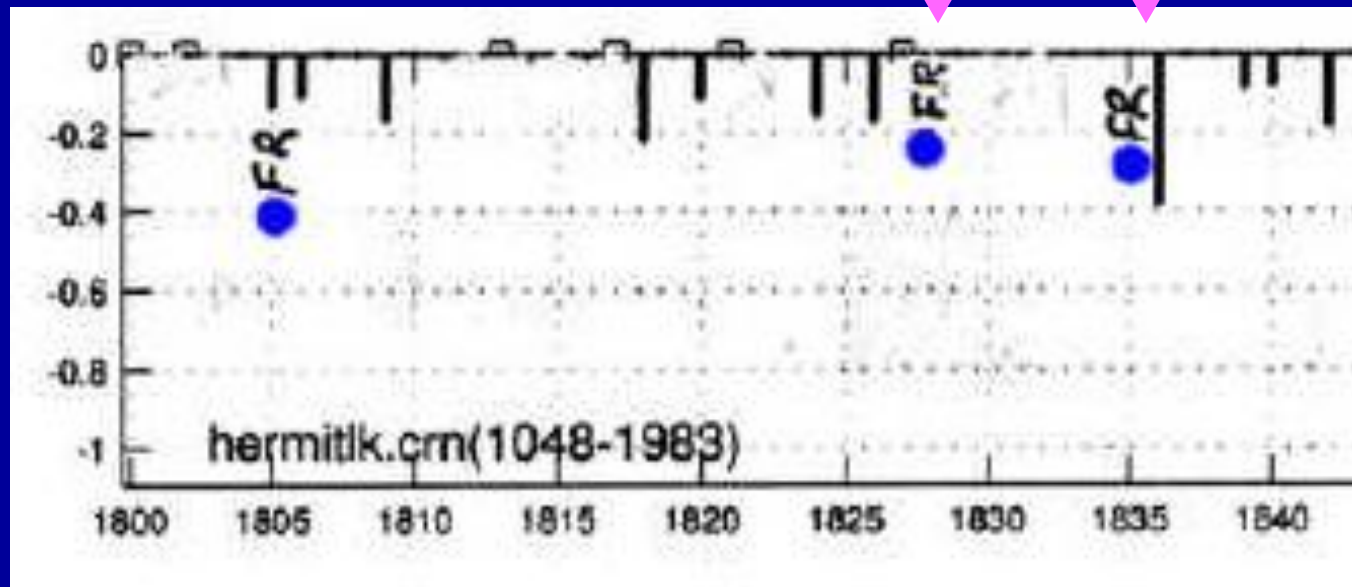
Master Chronology Skeleton Plot

→ In today's assignment you will work with **SKELETON PLOT MASTERS** for 5 different tree-ring sites in western United States →



On a **MASTER** we know the **ACTUAL CALENDAR DATES** for all the years with really narrow rings

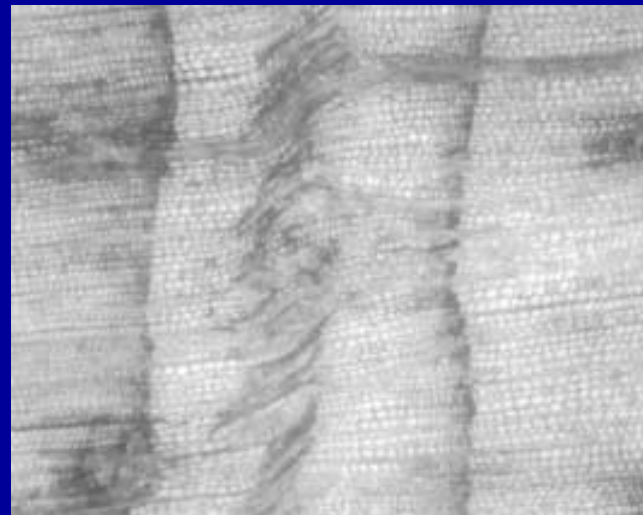
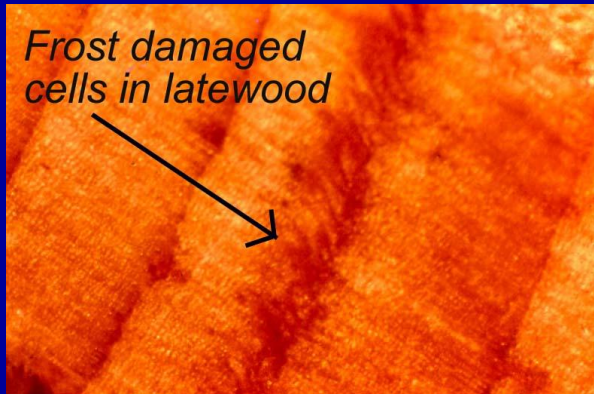
also on the Skeleton Plot Masters
you will find
“FROST RING YEARS” marked!



FR = frost ring year

FROST RINGS

Permanent wood damage in cells, due to freezing & expansion of intercellular water, can be useful for pattern matching & crossdating!



Produced by a severe freeze occurring DURING the tree's growing season

2 nights $< -5^{\circ}\text{C}$
intervening day 0°C

Bottom of p 100

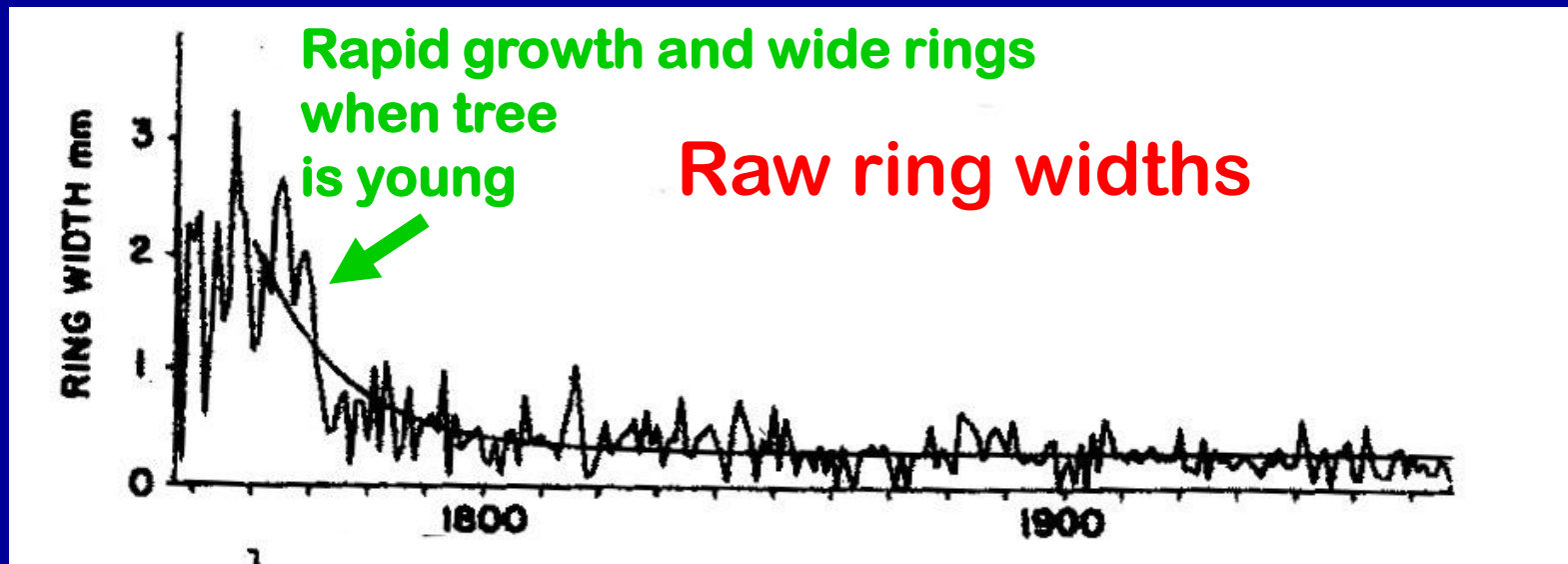
→ Today you will also work with another kind of graph:

a **TREE-RING WIDTH PLOT . . .**



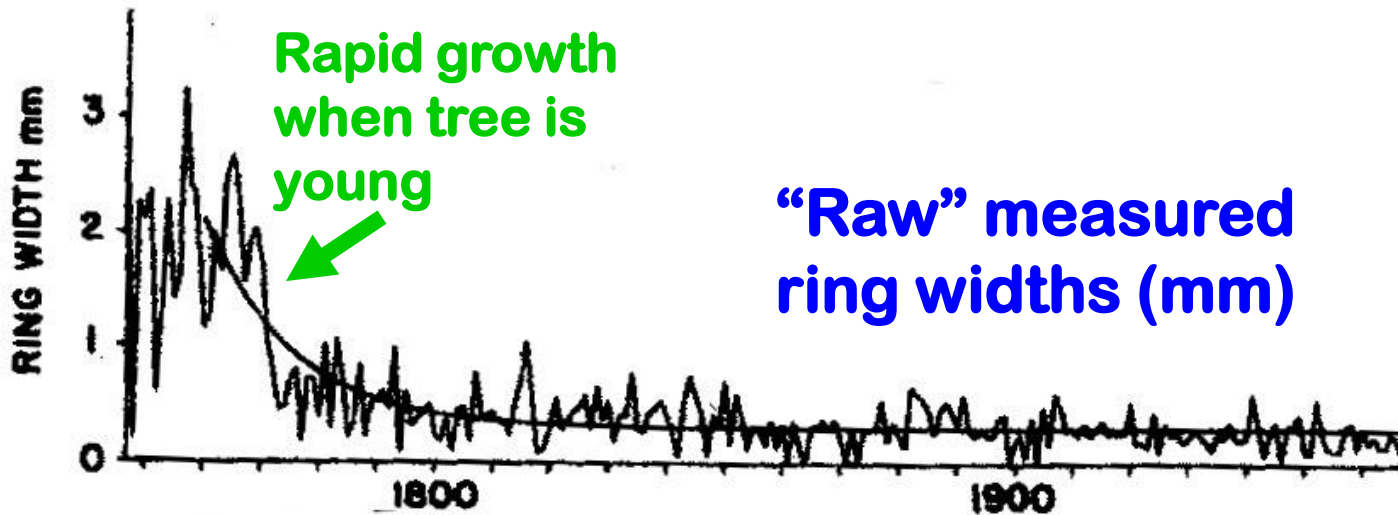
TREE-RING WIDTH PLOT

= a time series plot of the ring widths in a tree for each year



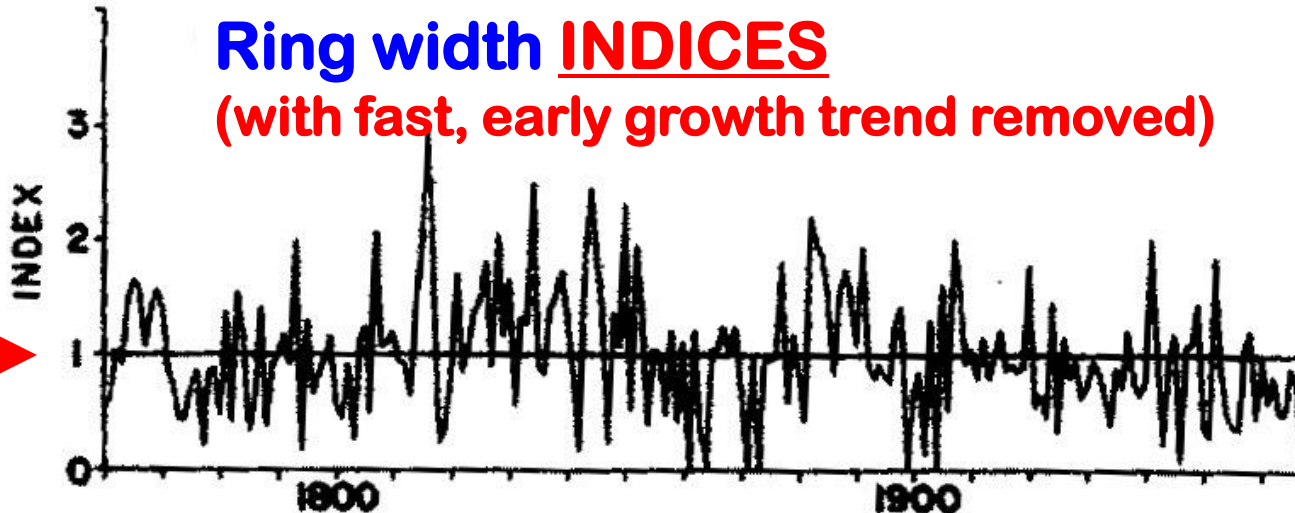
Time Series Plot of Measured Ring Widths for each year's growth

TREE-RING WIDTH PLOT



Ring width INDICES
(with fast, early growth trend removed)

index of
1 = mean



RING WIDTH CHRONOLOGY in “INDEX” format

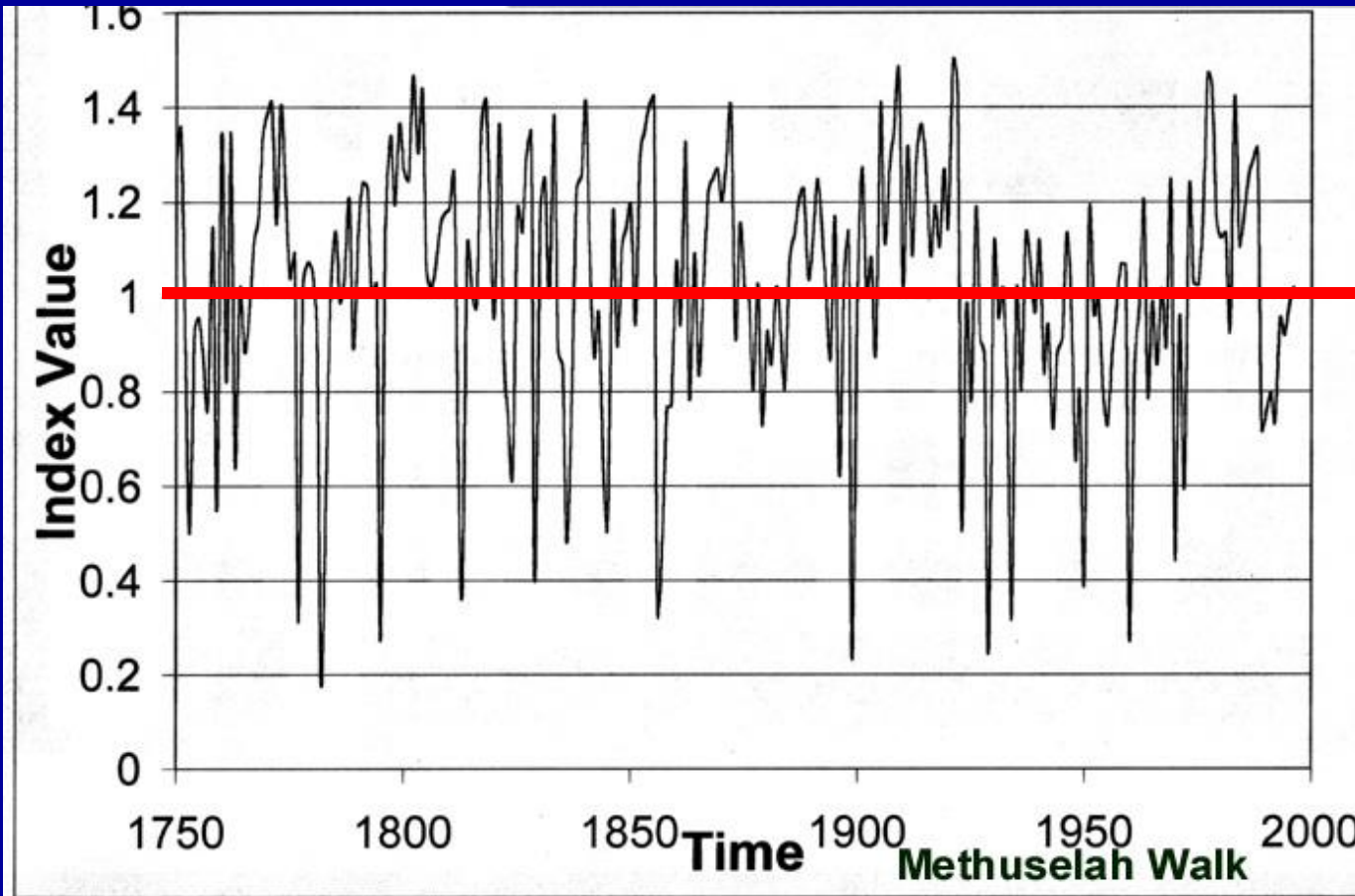
index of 1.0 = chronology's mean width

Ring-Width Indices

for each site

A Ring Width Index = a departure of growth for any one year compared to average growth.

Index of 1.0 = average or normal growth.



↑
**WIDE
RINGS
> 1.0**

↓
**NARROW
RINGS
< 1.0**



G-6 The Bristlecone Pine (BCP) Activity

pp 105-108

**in the CLASS NOTES
APPENDIX**

Doing Science with Tree Rings . . .

1. FORMULATE A QUESTION

based on previous work, field observations, etc.

2. DEVELOP HYPOTHESES

must be “testable” with data

3. COLLECT DATA

process, compile, analyze it

4. TEST HYPOTHESES

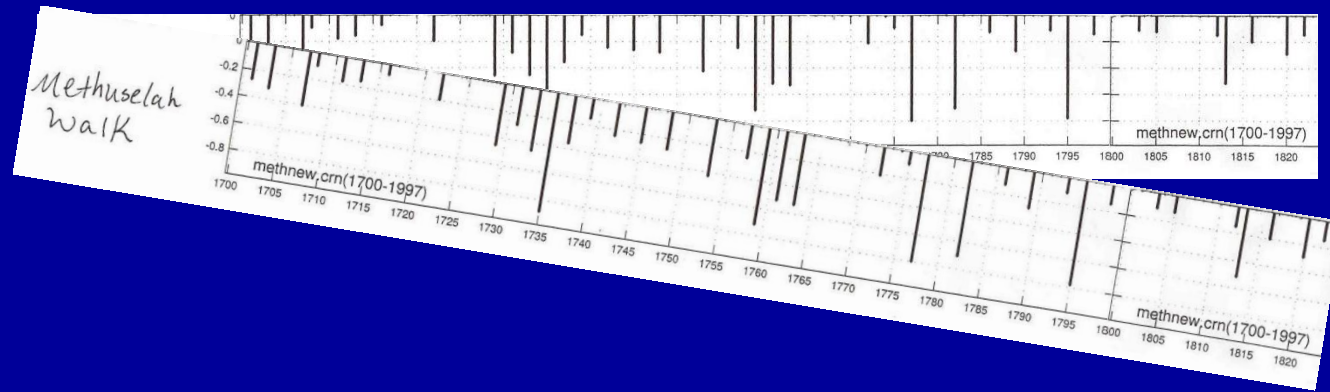
be open-minded but skeptical;
may need to be open to “multiple
working hypotheses”

5. DRAW CONCLUSIONS

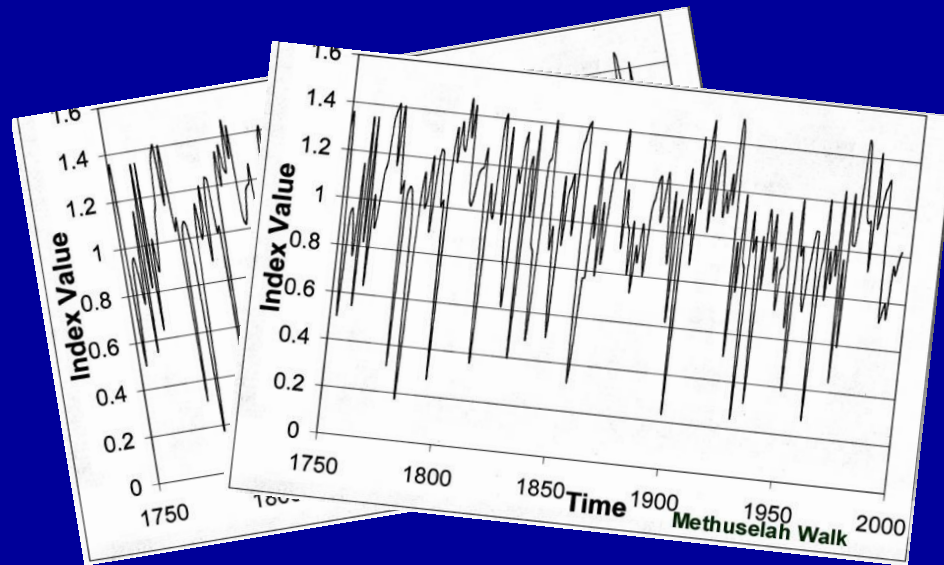


THE AVAILABLE DATA:

1) SKELETON PLOTS MASTER of each site



2) Ring Width "INDEX" PLOTS of each site

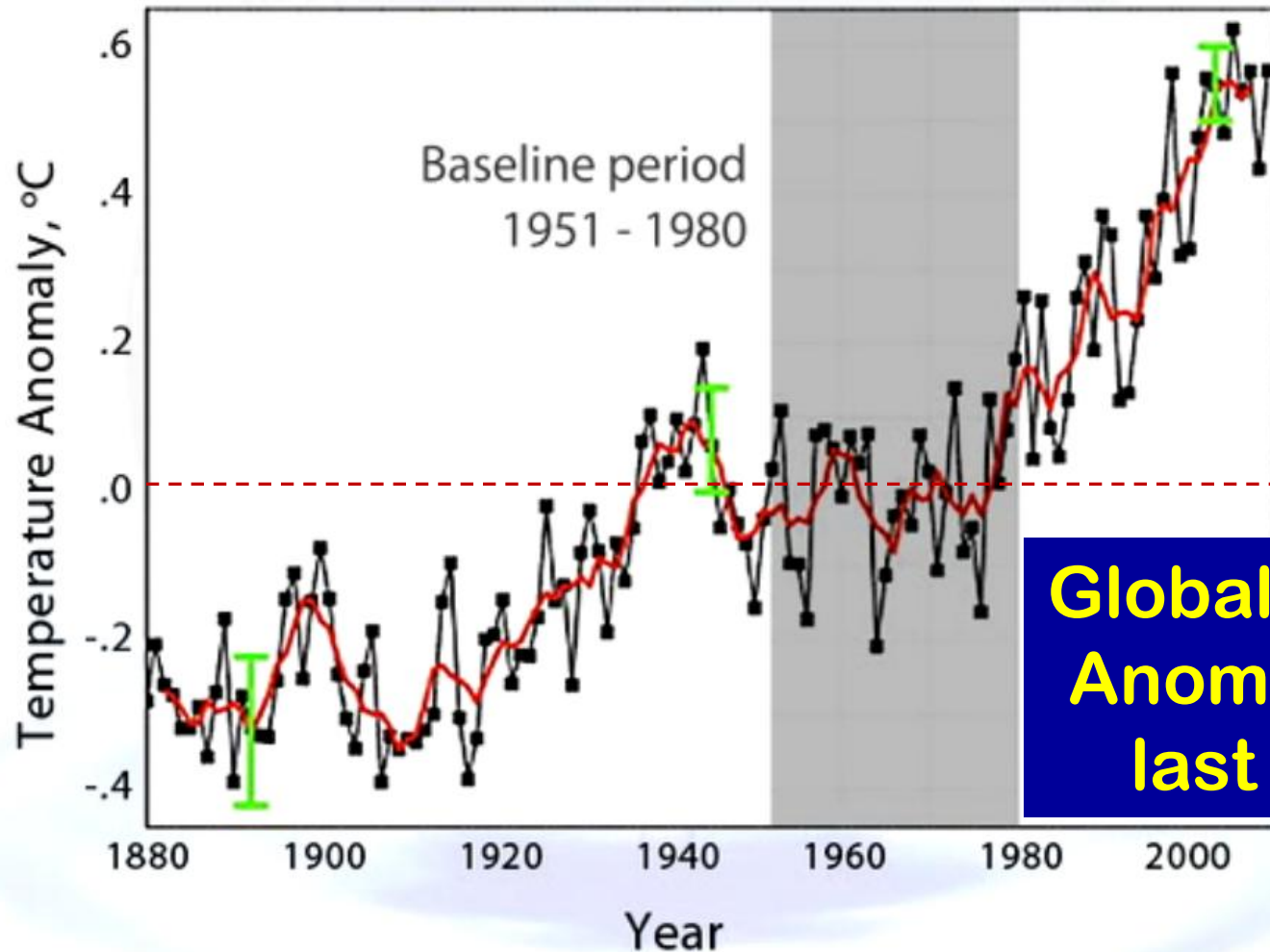


WHAT DO YOU NEED TO KNOW TO COMPLETE THE ASSIGNMENT?

To answer Q's about possible causes for variations in the BCP ring widths (e.g., global warming or cooling, etc.) we need to know the following:

- What the graph of **GLOBAL TEMPERATURE variations** looks like over time (to link the growth to recent GLOBAL WARMING)
- Possible **causes for FROST RINGS** in BCP
- What else besides climate might **enhance or suppress growth** in the trees

Global Surface Temperature Anomaly

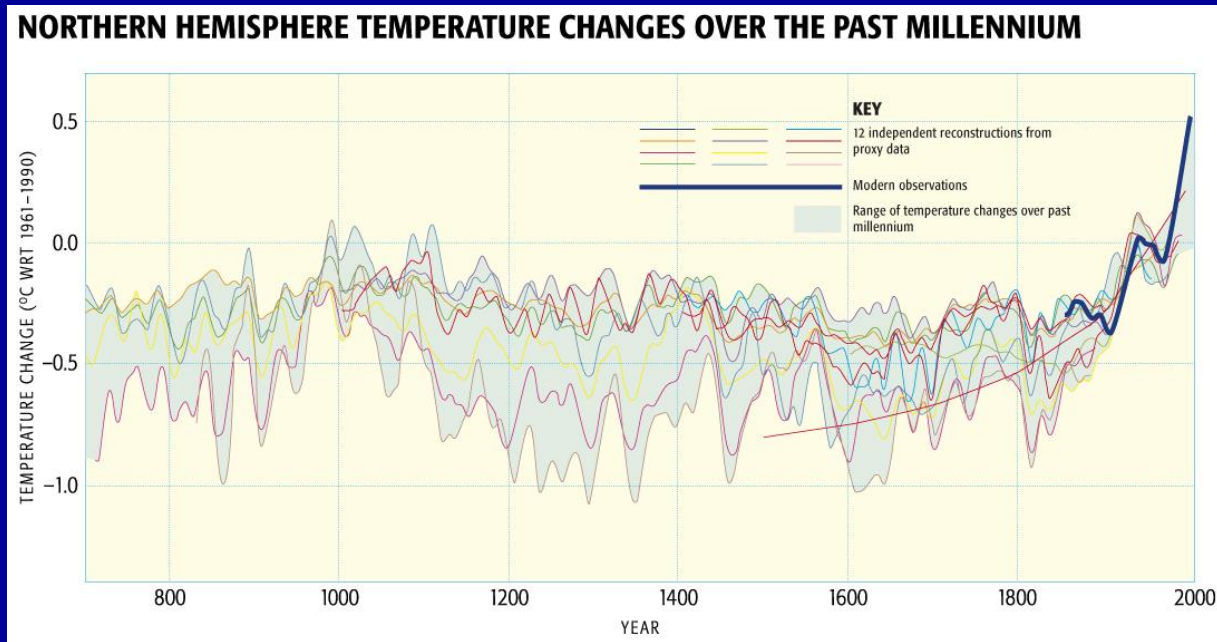
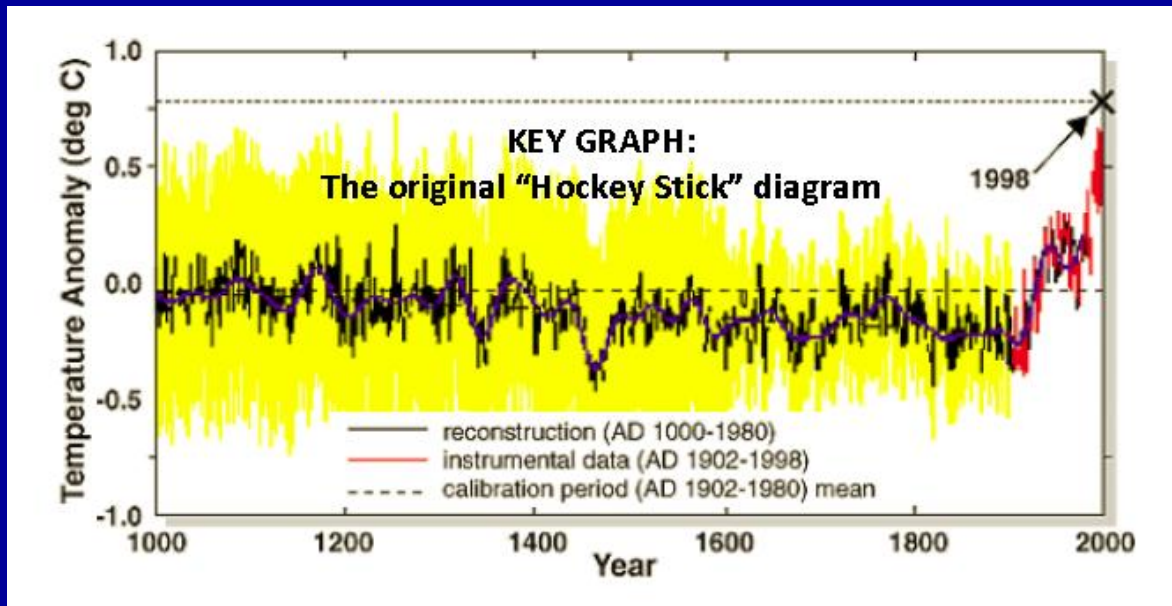


**Global Temperature
Anomalies over the
last 120+ years**

Credit: NASA, Goddard Institute for Space Studies <http://data.giss.nasa.gov/gistemp/graphs/>

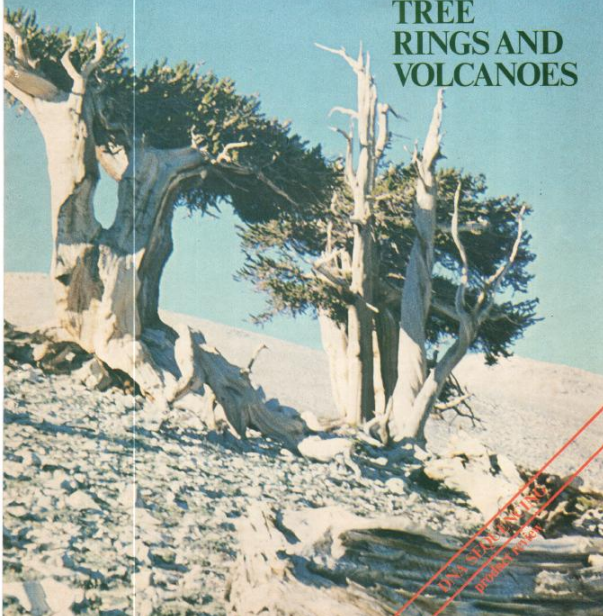
(From the I-1 Climate Basics Tutorial)

N. Hemisphere Temperature Anomalies over the last 1000+ years



Graphs from p 88 in CLASS NOTES & p 47 of Dire Predictions

TREE RINGS AND VOLCANOES



Possible cause of FROST RINGS in Bristlecone Pine:

Printed from Nature, Vol. 307, No. 5946, pp. 121-126, 12 January, 1984

© Macmillan Journals Ltd., 1984

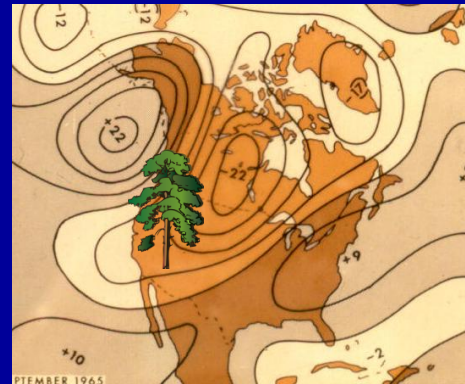
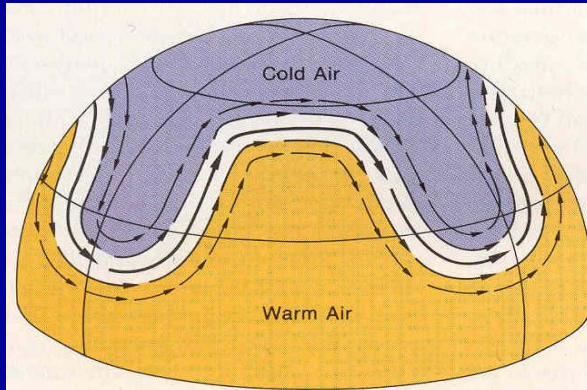
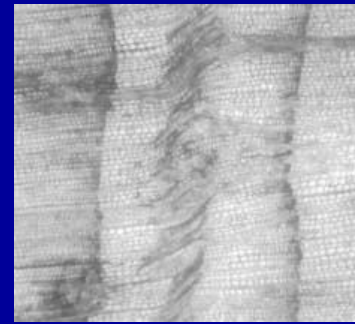
Frost rings in trees as records of major volcanic eruptions

Valmore C. LaMarche Jr* & Katherine K. Hirschboeck†

* Laboratory of Tree-Ring Research and † Department of Geosciences, University of Arizona, Tucson, Arizona 85721, USA

New data about climatically-effective volcanic eruptions during the past several thousand years may be contained in frost-damage zones in the annual rings of trees. There is good agreement in the timing of frost events and recent eruptions, and the damage can be plausibly linked to climatic effects of stratospheric aerosol veils on hemispheric and global scales. The cataclysmic proto-historic eruption of Santorini (Thera), in the Aegean, is tentatively dated to 1628–26 BC from frost-ring evidence.

The VOLCANO- FROST RING CONNECTION:



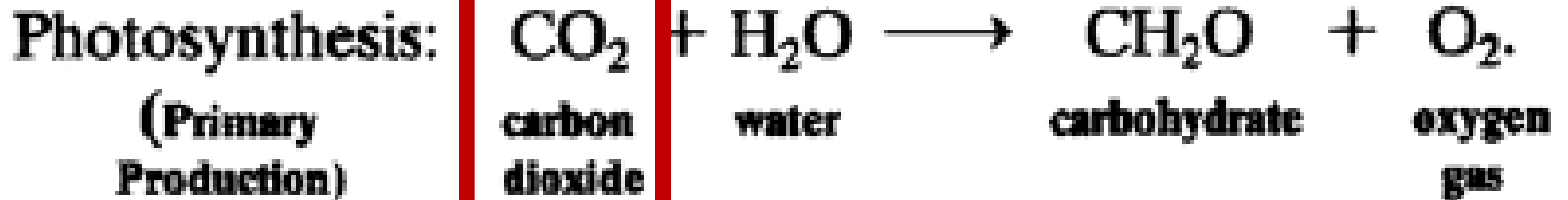
**SOME MAJOR
VOLCANIC
ERUPTIONS
OF THE PAST
250 YEARS:**

Laki (Iceland)	1783
El Chichon? (Mexico)	1809
Tambora (Indonesia)	1815
Cosiguina (Nicaragua)	1835
Krakatau (Indonesia)	1883
Agung (Indonesia)	1963
El Chichon (Mexico)	1982
Mt Pinatubo (Philippines)	1991

**Global cooling can occur for up to 3
years after the eruption**

And . . .

THE ROLE OF CO₂ IN TREE GROWTH!



REVIEW: p 83 in Class Notes

So here we go

**First, we'll visit the data
collection sites.**



Tour of the 5 Bristlecone Pine Sites

Map is on p 105

→ Key info is already
filled in on the
Table on p 106

OBSERVATION TABLE (p 106 of Class Notes)

VARIABLES <small>(NOTE: A variable is something that varies from site to site or from time to time at one or more sites)</small>	SITE-to-SITE COMPARISON TABLE				
	Sheep Mt Core ID = C	Campito Mt Core ID = D	Methuselah Walk Core ID = B	Almagre Mt Core ID = E	Hermit Lake Core ID = A
Geographic Location	White Mountains near Bishop, California	White Mountains near Bishop, California	White Mountains near Bishop, California	Front Range of the Colorado Rockies	Front Range of the Colorado Rockies
Elevation	3475 m (~11,500 ft)	3400 m (~11,000 ft)	2805 m (~9200 ft)	3536 m (~11,600 ft)	3657 m (~12,000 ft)
Upper or Lower Forest Border?	upper	upper	lower	upper	upper
Moisture- or Temperature- sensitive?	temperature	temperature	moisture	temperature	temperature
Rock/ soil type	dolomite	sandstone	dolomite	granite	sandstone
<i>Complete the rest of the site-to-site observations (below) based on our in-class discussion</i>					
# of frost rings in entire record:					
Any differences in # of frost rings over time?					
Describe any trends in the time series of the ring width indices:					
Describe any pre- & post 1900 differences:					
Describe any other interesting things you noticed about any of the sites:					

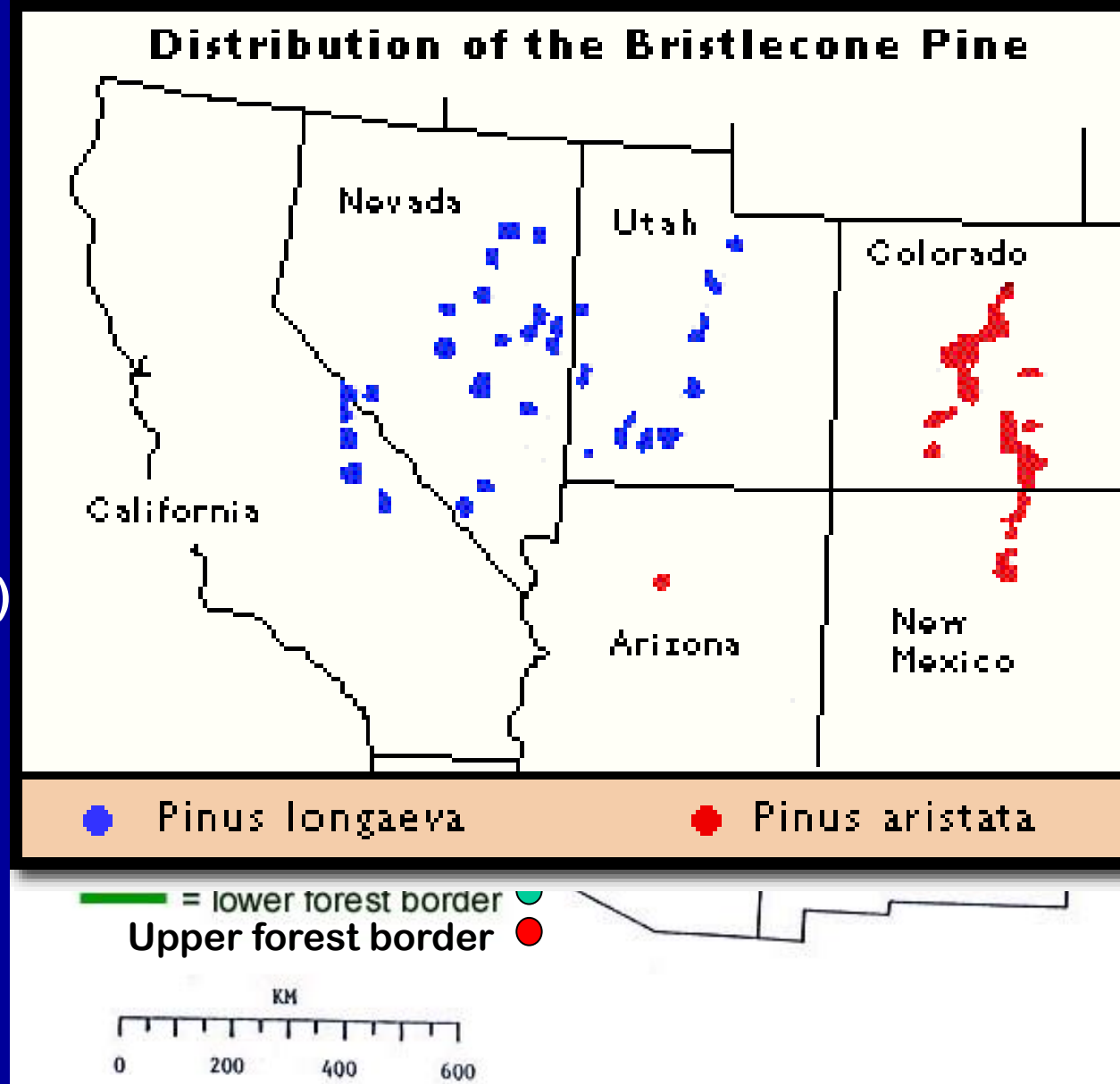
TREE-RING SITE MAP

All are
Bristlecone
Pine sites

SITE NAME (abv)

Sheep Mt (SHP)
Campito Mt (CAM)
Methuselah Walk (MWK)
Almagre Mt (ALM)
Hermit Lake (HER)

Map is on
p 105 in
Class Notes





Upper & Lower Forest Border:



Temperature-sensitive and
Precipitation-sensitive Trees

Take notes
p 106 Table

SITE 1 (SHP) SHEEP MT, Inyo Range, California

- In the White Mountains near Bishop, California
- Elevation - 3475 meters (~11,500 ft)
- Rock type - dolomite



see
p 106 Table

SHEEP MT



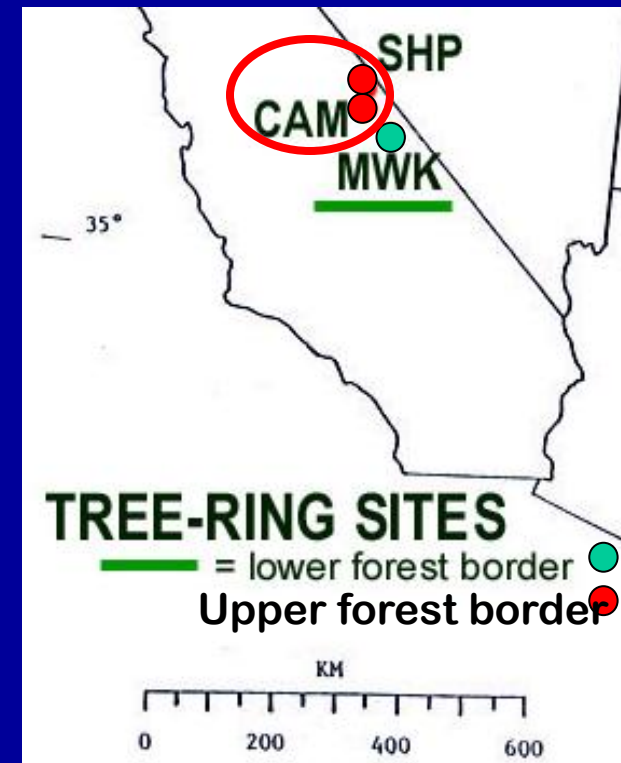
SHEEP MT



SITE 2 (CAM) CAMPITO Mt

- White Mts. Near Bishop California
- Elevation - 3400 meters (~11,000 ft)
- Rock type - sandstone

see
p 106 Table



CAMPITO MT



CAMPITO MT



SITE 3 (MWK) METHUSELAH WALK

- In White Mts near Bishop California
- Elevation - 2805 meters (~ 9,200 ft)
- Rock type - Dolomite

see
p 106 Table



METHUSELAH WALK



METHUSELAH WALK

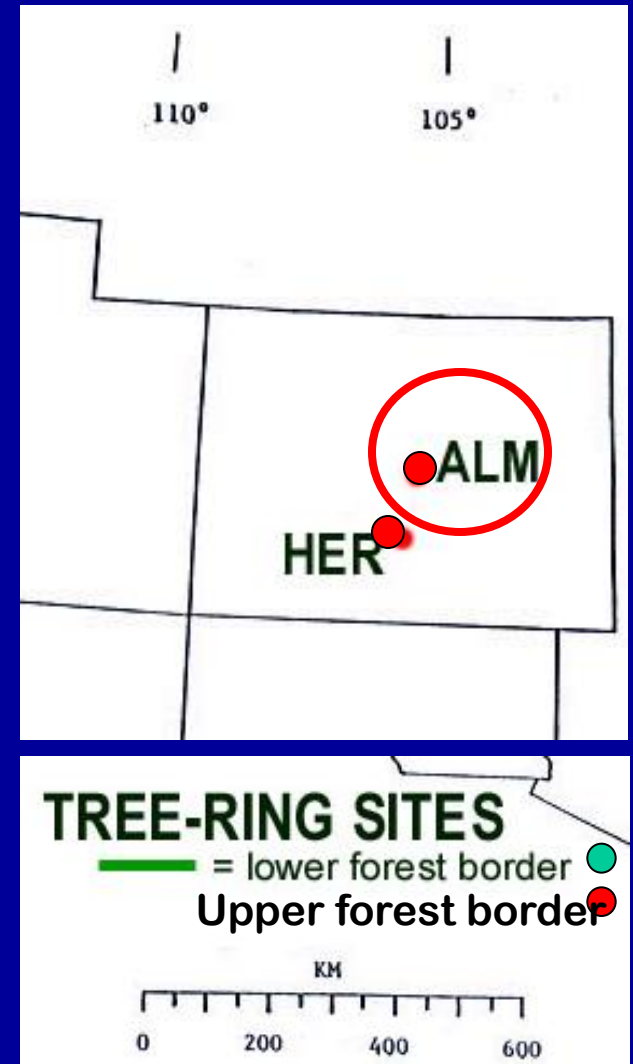


SITE 4 (ALM)

Almagre Mt

- located in the Front Range of the Colorado Rockies
- Elevation - 3536 meters (~11,600 ft)
- Rock type - granite

see
p 106 Table



ALMAGRE MT



ALMAGRE MT



Photo by Don Graybill

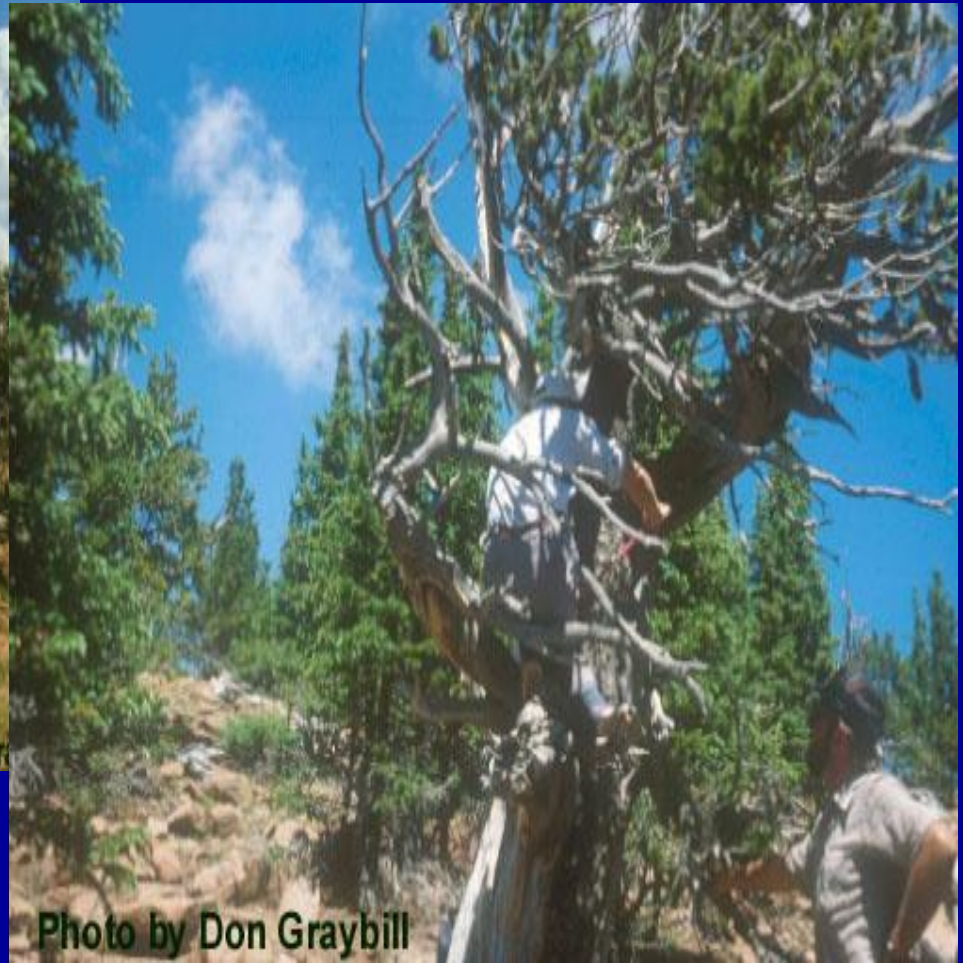


Photo by Don Graybill

SITE 5 (HER) HERMIT LAKE

- located in the Front Range of the Colorado Rockies
- Elevation – 3657 meters (~ 12,000 ft)
- Rock type - sandstone



see
p 106 Table

HERMIT LAKE





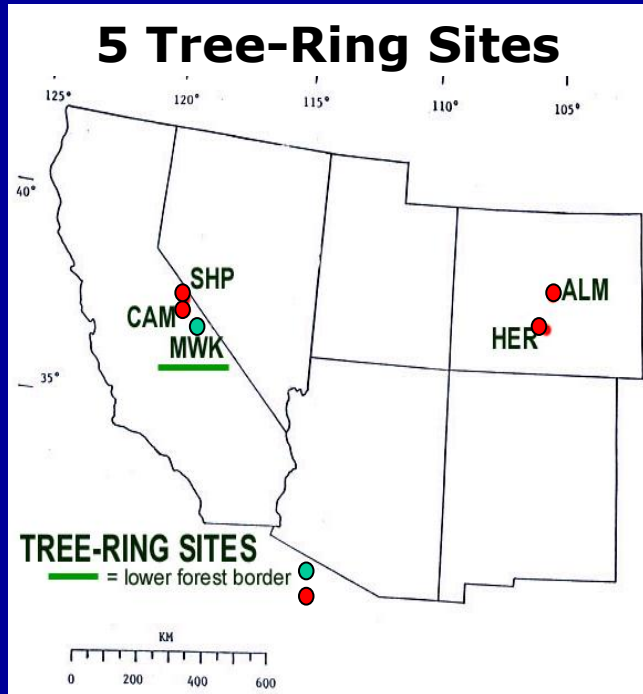
Photo by Don Graybill



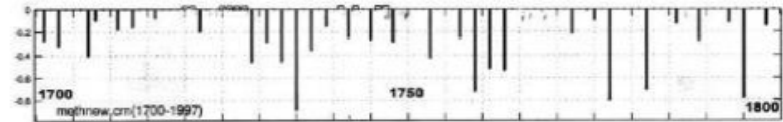
Photo by Don Graybill

HERMIT LAKE

THE DATA:

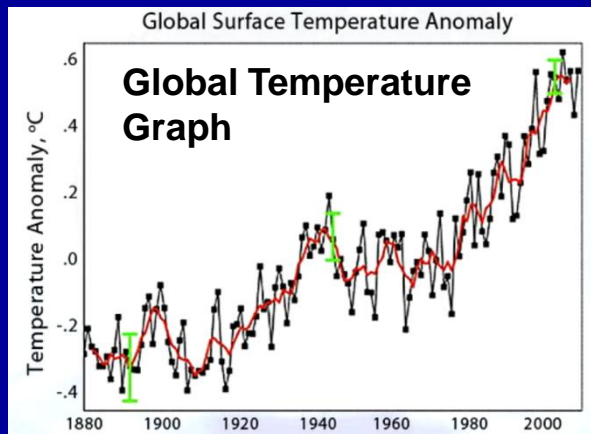
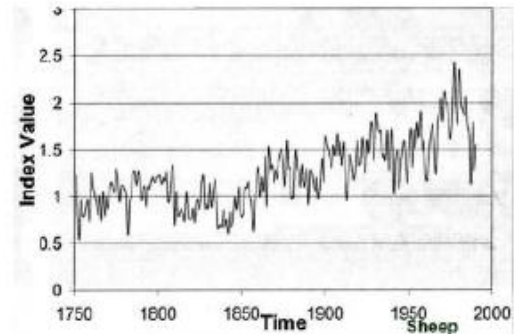


Skeleton Plot Masters:



(Some of the Skeleton Plots have **FR** for **FROST RING** marked in certain years.)

Ring Width Indices Plots:



SOME MAJOR VOLCANIC ERUPTIONS OF THE PAST 250 YEARS:

Laki (Iceland)	1783
El Chichon? (Mexico)	1809
Tambora (Indonesia)	1815
Cosiguina (Nicaragua)	1835
Krakatau (Indonesia)	1883
Agung (Indonesia)	1963
El Chichon (Mexico)	1982
Mt Pinatubo (Philippines)	1991

STEP #1 FILL IN THE REST OF THE TABLE:

One student (or a pair of students) works on each site ...

VARIABLES <small>(NOTE: A variable is something that varies from site to site or from time to time at one or more sites)</small>	SITE-to-SITE COMPARISON TABLE				
	Sheep Mt Core ID = C	Campito Mt Core ID = D	Methuselah Walk Core ID = B	Almagre Mt Core ID = E	Hermit Lake Core ID = A
Geographic Location	White Mountains near Bishop, California	White Mountains near Bishop, California	White Mountains near Bishop, California	Front Range of the Colorado Rockies	Front Range of the Colorado Rockies
Elevation	3475 m (~11,500 ft)	3400 m (~11,200 ft)	2805 m (~9200 ft)	3536 m (~11,600 ft)	3657 m (~12,000 ft)
Upper or Lower Forest Border?	upper	upper	lower	upper	upper
Moisture- or Temperature- sensitive?	temperature	temperature	moisture	temperature	temperature
Rock/ soil type	dolomite	sandstone	dolomite	granite	sandstone
<i>Complete the rest of the site-to-site observations (below) based on our in-class discussion</i>					
# of frost rings in entire record:					
Any differences in # of frost rings over time?					
Describe any trends in the time series of the ring width indices:					
Describe any pre- & post 1900 differences:					
Describe any other interesting things you noticed about any of the sites:					

Skeleton Plots

Ring width Indices

Then “swap data” so everyone has the table filled out!

STEP #2 ANALYZE & DISCUSS SITE-TO-SITE COMPARISONS

(Based on your group's completed table)

VARIABLES <small>(NOTE: A variable is something that varies from site to site or from time to time at one or more sites)</small>	SITE-to-SITE COMPARISON TABLE				
	Sheep Mt Core ID = C	Campito Mt Core ID = D	Methuselah Walk Core ID = B	Almagre Mt Core ID = E	Hermi Lake Core ID = A
Geographic Location	White Mountains near Bishop, California	White Mountains near Bishop, California	White Mountains near Bishop, California	Front Range of the Colorado Rockies	Front Range of the Colorado Rockies
Elevation	3475 m (~11,500 ft)	3400 m (~11,200 ft)	2805 m (~9200 ft)	3536 m (~11,600 ft)	3657 m (~12,000 ft)
Upper or Lower Forest Border?	upper	upper	lower	upper	upper
Moisture- or Temperature- sensitive?	temperature	temperature	moisture	temperature	temperature
Rock/ soil type	dolomite	sandstone	dolomite	granite	sandstone
<i>Complete the rest of the site-to-site observations (below) based on our in-class discussion</i>					
# of frost rings in entire record:					
Any differences in # of frost rings over time?					
Describe any trends in the time series of the ring width indices:					
Describe any pre- & post 1900 differences:					
Describe any other interesting things you noticed about any of the sites:					

WHAT DO YOU NOTICE??

Which sites are similar, which are different?

What could be causing the similarities and differences?

Are there any TRENDS?

What could be causing them?

Etc., etc.

STEP # 3 HYPOTHESIS TESTING

pp 107 & 108

A hypothesis must be stated in a way that can be tested by the available data.

Hypothesis #1 – Is stated for you → test it!

**Hypothesis #2 – Needs more data to test it
What kind of data?**

**Hypothesis #3 – You will construct it . . .
on FROST RINGS!**

ARIZONA  WILDCATS

**GO CATS!
Beat the Ducks**

AGAIN!!!!