Behavioral Engagement Related to Instruction (BERI)

Version 1

PhysPort
Supporting physics teaching with research-based resources

Developed by: Erin S. Lane and Sara E. Harris
Format: Observation protocol
Duration: N/A minutes
Focus: Interactive teaching
Level: Graduate, Upper-level, Intermediate, Intro college, High school, Middle school

How to give the test

- Prior to conducting a classroom observation, obtain a printed copy of the instructor's notes or lesson plan.
- At the beginning of the class, the fills out a coversheet that contains general information and notes about the class.
- For a large lecture room, randomly choose a spot in the classroom where you are sitting in the row directly behind the students being observed and at an angle so that the students were still within your sight line. For alternative classroom settings, the number of students or observers' position may have to be adjusted so that all students in the observation group can be adequately see.
- Using the engaged and disengaged behaviors shown under Example Questions, cycle through each of the 10 students in sequence and for each student recorded "E" for engaged, "D" for disengaged, and "U" for uncertain. Uncertain is most often used when the view of the students is obstructed.
- It takes approximately 3 to 10 seconds to gauge the level of engagement of each student, with a 10-student cycle taking approximately one minute to complete. Don't record the specific behavior of each individual; rather, for each 10-student cycle record one observation point (e.g., "8/10 students engaged") with a time stamped at the start of the cycle.
- Once the class starts, record observation points directly onto the copy of the instructor's notes in the section corresponding to what is being covered. This ensures that the instructor will later be able to relate engagement with what was happening in their class at any specific time. An observation point is taken for every page of notes, for any major change in activity or content, or at 2-minute intervals depending on which time interval is shorter. Changes in the classroom activity (e.g., clicker question, in-class discussion, demonstration) or instructor behaviors (e.g., moving around the classroom, using humor or real-world examples) are recorded under each observation point.
- Instructor questions to the class and student questions to the instructor should also be documented with the following information: the section of the room in which the question/answer originated and how the interaction is followed up (e.g., entire class, subgroup of students, one student).

How to score the test

- Calculate the average student engagement score for the class including the standard error. You can also calculate the average student engagement score for specific instructional activities.
- Plot the student engagement score over time to get a sense of which classroom activities are more or less engaging.

Student Engaged and Disengaged Behaviors

During your classroom observation, use these engaged and disengaged behaviors and cycle through each of the 10 students you are observing in sequence and for each student recorded "E" for engaged, "D" for disengaged, and "U" for uncertain on the instructor notes or lesson plan provided to you by the instructor. Uncertain is most often used when the view of the students is obstructed

TABLE 1

Descriptions of student in-class behaviors that indicate they are engaged.

	Engaged
Listening	Student is listening to lecture. Eye contact is focused on the instructor or activity and the student makes appropriate facial expressions, gestures, and posture shifts (i.e., smiling, nodding in agreement, leaning forward).
Writing	Student is taking notes on in-class material, the timing of which relates to the instructor's presentation or statements.
Reading	Student is reading material related to class. Eye contact is focused on and following the material presented in lecture or preprinted notes. When a question is posed in class, the student flips through their notes or textbook.
Engaged computer use	Student is following along with lecture on computer or taking class notes in a word processor or on the presentation. Screen content matches lecture content.
Engaged student interaction	Student discussion relates to class material. Student verbal and nonverbal behavior indicates he or she is listening or explaining lecture content. Student is using hand gestures or pointing at notes or screen.
Engaged interaction with instructor	Student is asking or answering a question or participating in an in-class discussion.

TABLE 2

Descriptions of student in-class behaviors that indicate they are disengaged.

	Disengaged
Settling in/ packing up	Student is unpacking, downloading class material, organizing notes, finding a seat, or packing up and leaving classroom.
Unresponsive	Student is not responsive to lecture. Eyes are closed or not focused on instructor or lecture material. Student is slouched or sleeping, and student's facial expressions are unresponsive to instructor's cues.
Off-task	Student is working on homework or studying for another course, playing with phone, listening to music, or reading non-class-related material.
Disengaged computer use	Student is surfing web, playing game, chatting online, checking e-mail.
Disengaged student interaction	Student discussion does not relate to class material.
Distracted by another student	Student is observing other student(s) and is distracted by an off-task conversation or by another student's computer or phone.

BERI Observation Protocol Coversheet

Date of Observation: ________________________________

Course Name, Number and Section: ________________________________

Instructor(s): ________________________________

Observer's Name: ________________________________

Classroom Number: ________________________________

Estimate of class attendance: ____

Position in Class: (drawing a diagram of the class may be useful)

Notes on classroom environment: (i.e. description of space and seating arrangement, abnormal temperature, use of technology).

Brief description of instructional method: (i.e. traditional lecture mixed with clicker questions).

Notes about group of students being observed: (i.e. 5/10 are using a computer).

Example classroom observation. Numbers indicate the number of students engaged (E), disengaged (D), and uncertain (U). Observations taken at approximately one minute intervals on instructors notes/lesson plan.

START: 12:03 (my phone's time)

GOALS FOR TODAY..

TWO TOPICS..

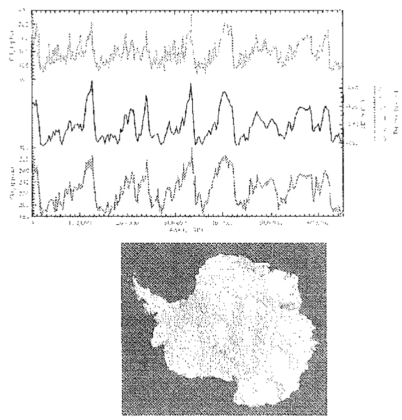
Abrupt climate changes

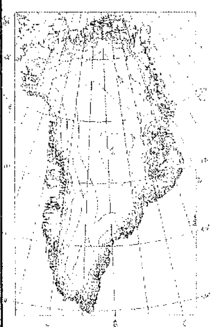
- EXPLAIN how we came to realize that climate can change abruptly
- DESCRIBE the occurrence of abrupt climate changes during the last climatic cycle and their possible causes

Climate changes during the last millennium

- DESCRIBE the various archives used to reconstruct climatic changes during the last millennium
- EXPLAIN the various factors that have influenced global climate during that historical period

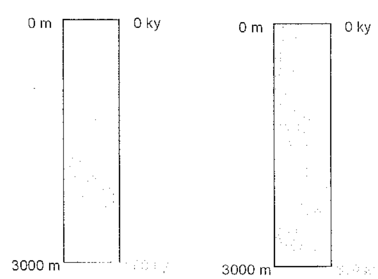
4/10 @ start (12:03pm)





Ice accumulation rates are much faster on Greenland then Antarctica.
Consequently, Greenland ice cores provide:
- a (i) longer or (ii) shorter record
- with a (iii) higher or (iv) lower resolution

A. (i) (iii)
B. (ii) (iii)
C. (i) (iv)
D. (ii) (iv)



5/10 12:04 before clicker

12:10 → 6/10

7/10 12:05 @ clicker

10/10 during clicker timer

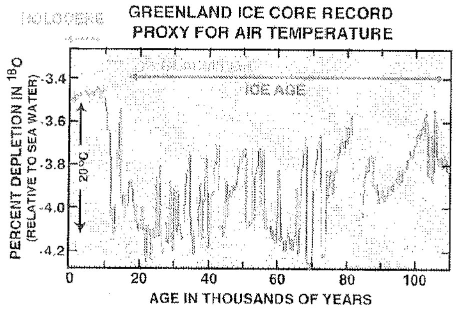
8/10 @ results (1st time)

7/10 during 2nd clicker

12:08pm 10/10 @ results (2nd time)

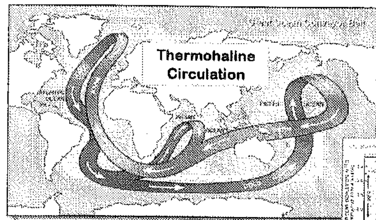
8/10 explanation 12:09

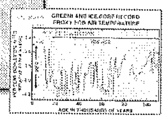
DANSGAARD-OESCHGER (DO) EVENTS



12:11 8/10

12:12 8/10





A. (i) (iii)
B. (ii) (iii)
C. (i) (iv)
D. (ii) (iv)

Could the abrupt warming events recorded in Greenland ice be a result of..?
(i) faster or (ii) slower thermohaline circulation which could be triggered by..
(iii) lower or (iv) higher salinity of North Atlantic surface water

Right before : 8/10 12:~~12~~14

During: 9/10 12:~~12~~14 -guy texting

Discussion ~~Immediately After~~ : 9/10 12:15 -guy texting

Immediately After : 9/10 12:16

student explanat'n : 8/10 12:17

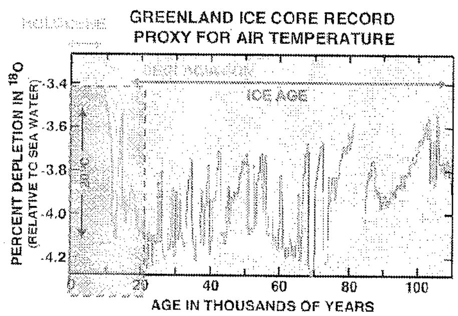
Roger " : 8/10 12:17

right after 2nd student : 8/10 12:17

12:18

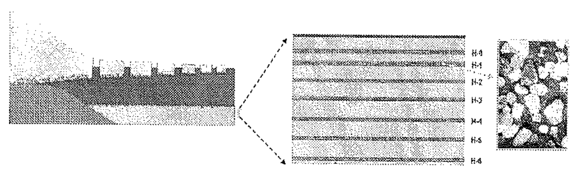
Roger again: 9/10 7/10 12:19

DANSGAARD-OESCHGER (DO) EVENTS

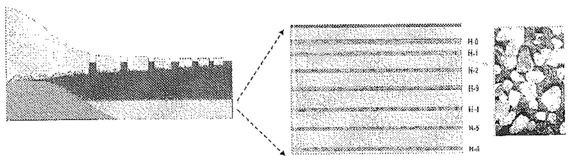


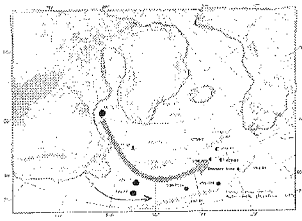
12:20 5 ~~8~~/10

- Prior to rapid warming events → massive iceberg discharge in the North Atlantic
- Documented by anomalous accumulation of "ice-rafted-debris"



12:21 6/10



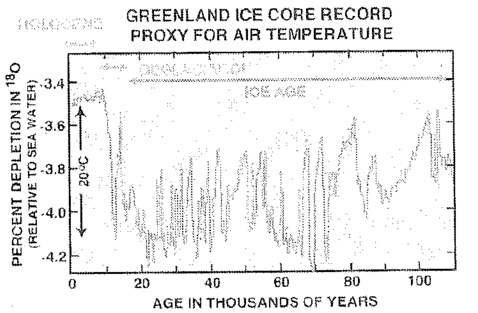


→ layers of "ice rafted debris" in North Atlantic sediments prior to the two abrupt warming events of the deglaciation (H1 and H0)
→ icebergs were melting in the North Atlantic at that time

12:22 6/10 -texting (x2)

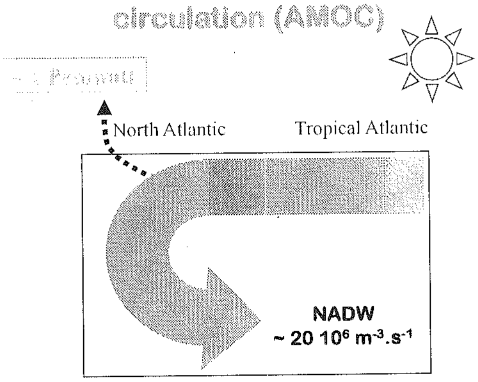
12:23 6/10

DANSGAARD-OESCHGER (DO) EVENTS

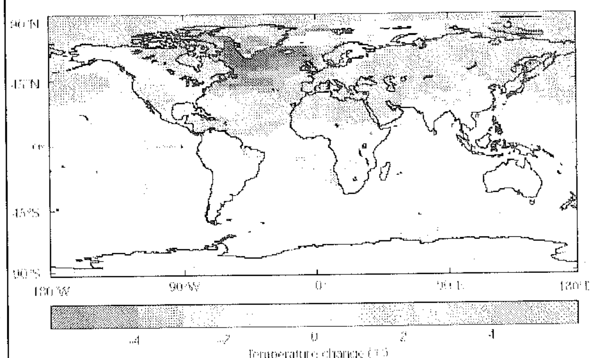


12:24 7/10

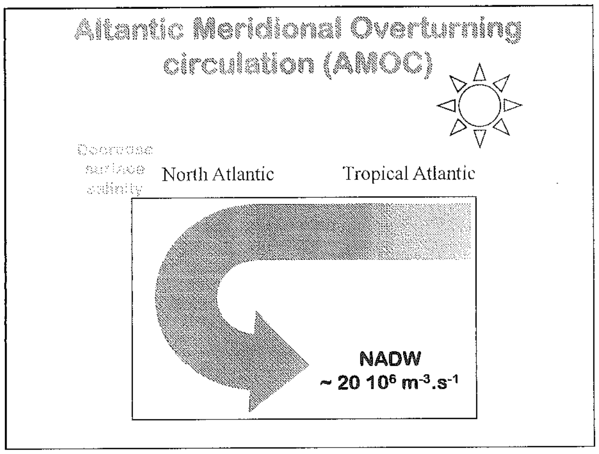
Altantic Meridional Overturning circulation (AMOC)

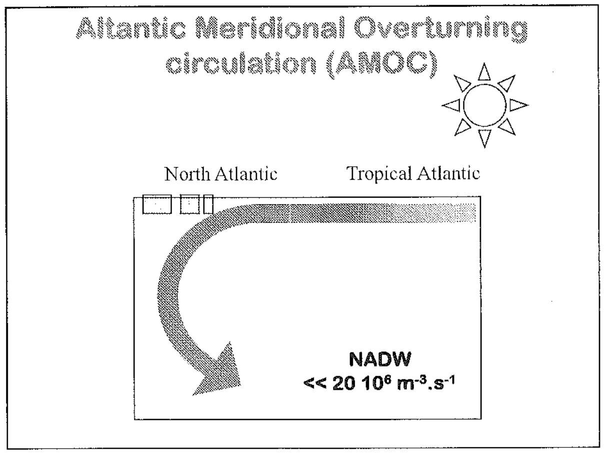


12:25 6/10

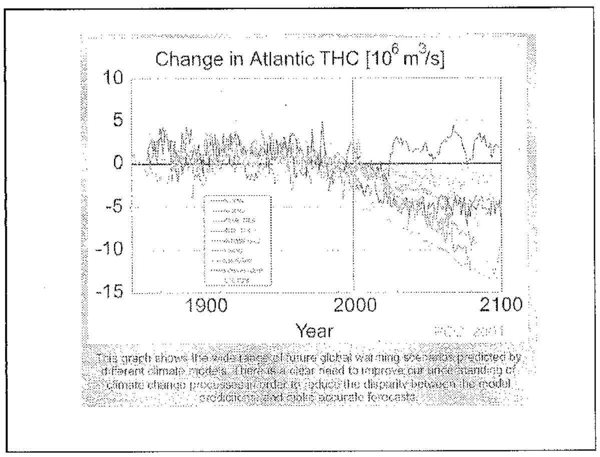


12:26 7/10 (Facebook, cell phone)

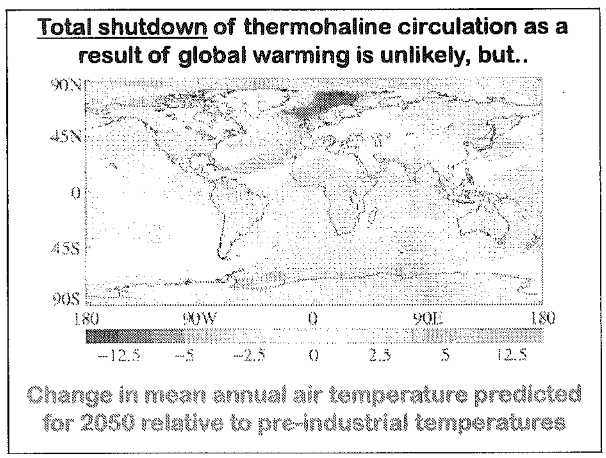




12:27 7/10

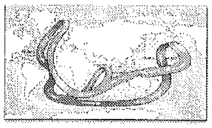


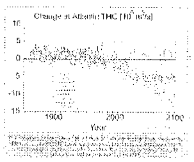
12:28 7/10



12:29 7/10

Why would global warming slow down the rate of the THC?





Because:

A. Higher temperature increases evaporation in the North Atlantic, which would increase surface salinity

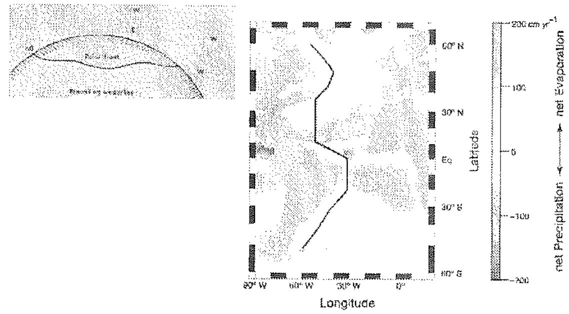
B. Higher temperature increases evaporation in the subtropical region, which result is higher precipitation at the polar front and lower salinity in surface water in the North Atlantic

C. Higher temperature decreases the strength of the gulf stream, which decrease heat transport to high latitude

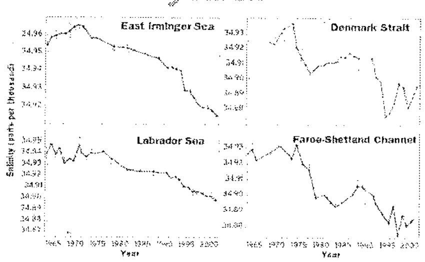
D. Higher temperature decreases the density of surface water, which makes it more difficult of produce deep water

right before: 7/10
12:30 Asking Q: 9/10
12:31 During time: 10/10
12:32 Results: 9/10
12:33 student: 9/10
12:34 #2: 10/10
Answer: 8/10
12:35 Roger: 8/10

Global warming increases evaporation in the tropics and precipitation in the subpolar regions..

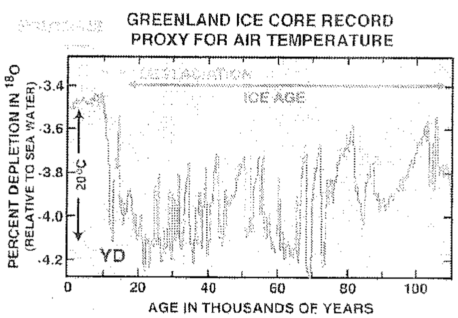


Gradual decrease in seawater salinity in the North Atlantic during the last 40 years..

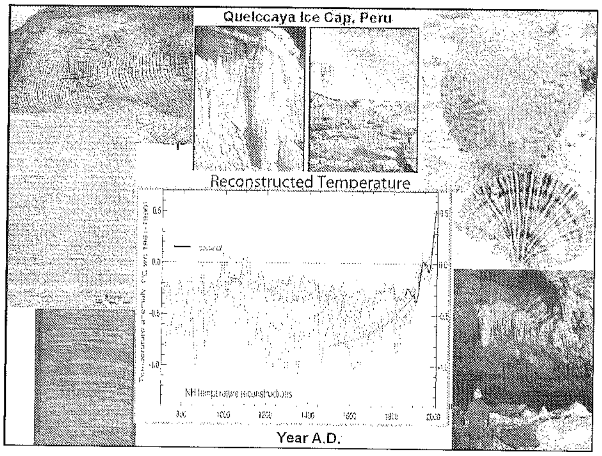


Due to global warming or part of a natural cycle?

12:36 7/10

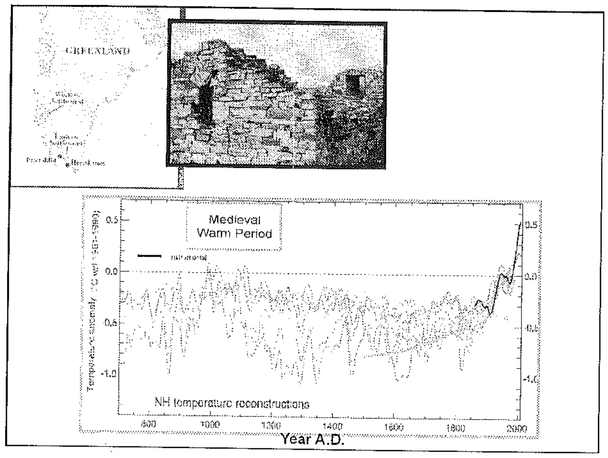


~~12:37~~ /10

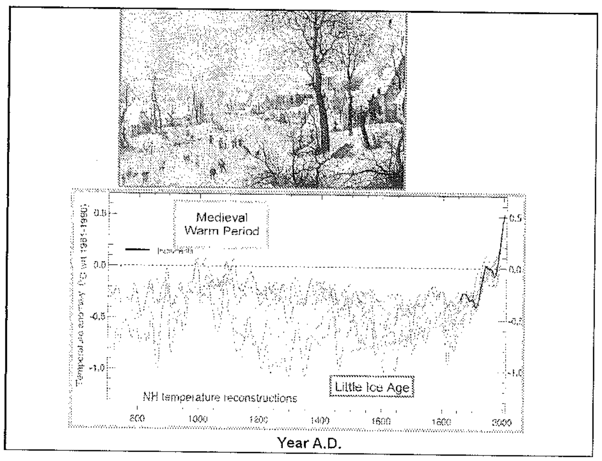


12:37 7 /10

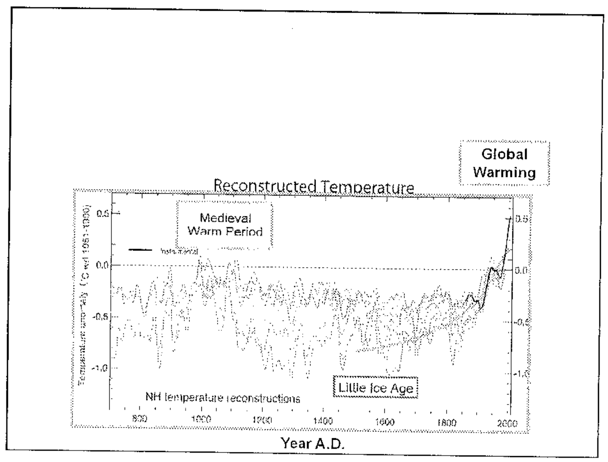
12:38 7/10



12:39: 6/10



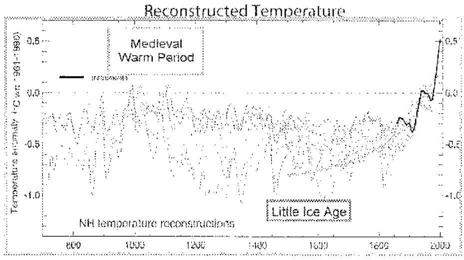
12:40 7/10



12:41 8/10 (right before a clicker)

What could be the cause(s) of these relatively small climatic variations?

Frequency of volcanic eruptions?



Asking ~~During~~ clicker: 10/10

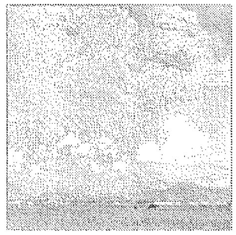
12:42 During time: 10/10

12:43 Result ~~Answer~~ : 8/10 (mixed results)

Roger (~~Answer~~): 9/10

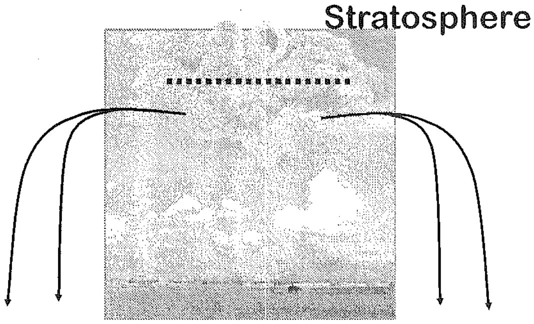
12:44 Roger (explanation): 8/10

What is the effect of volcanic

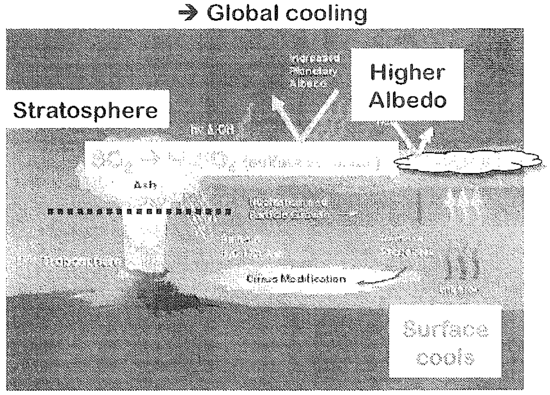


A. [illegible] because of heat released by the volcanoes
B. Global cooling because of volcanic ash in the atmosphere increases albedo
C. Global cooling because of SO_2 gas released by volcanoes in atmosphere produce sulfate particles which act a nuclei to increase cloud cover and increase albedo
D. No global effect; just regional cooling
E. No global effect; just [illegible]

.. residence time of ash in the atmosphere is short



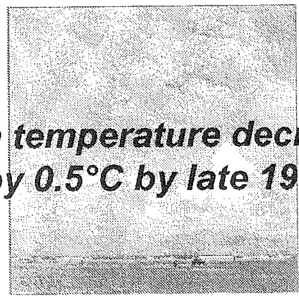
Residence time ~ 2 years →spread over the globe → Global cooling



12:45 8/10

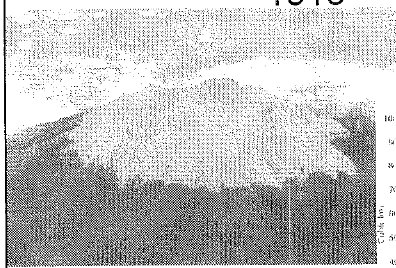
12:46 7/10

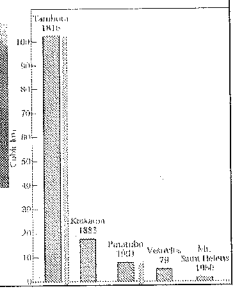
Mt Pinatubo
June 1991

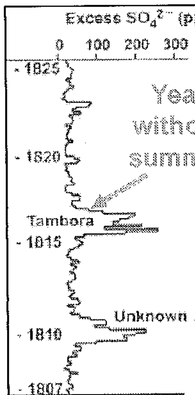


Mean temperature decreased by 0.5°C by late 1992

Mt Tambora
1815

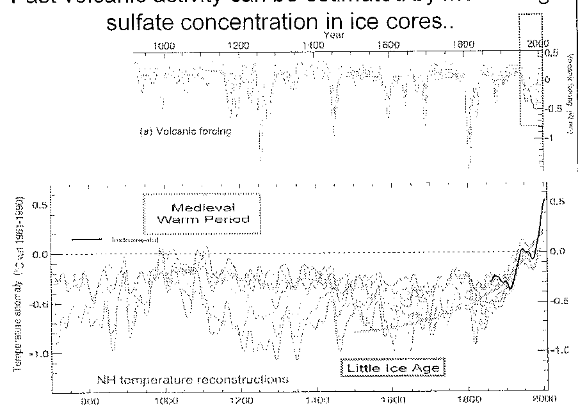






It is clearly recorded as a peak of high sulfate concentration in ice cores ...

Past volcanic activity can be estimated by measuring sulfate concentration in ice cores..



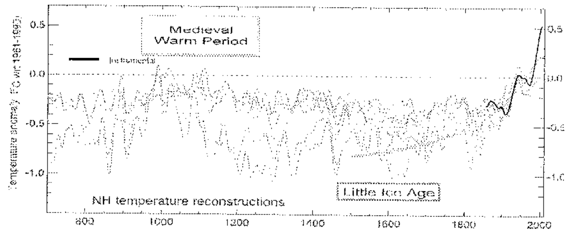
12:47 8/10

12:48 7/10

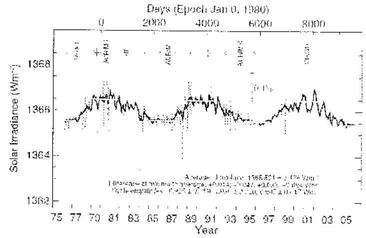
* Student Q: 9/10

Which other factor could have also contributed to temperature changes during the last millennium?

Variations in the intensity of solar radiations?



~~12:49~~

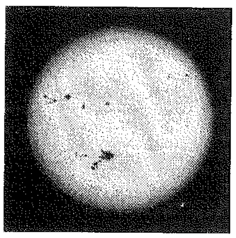


Shorter term variability: 11-year cycle

→ measured directly since 1976 by satellite (variability = 1.8 W/m^2; 0.1%)

12:49 7/10

12:50 7/10

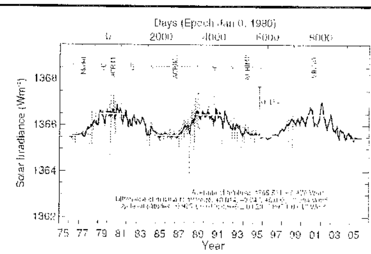


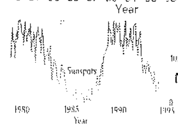
Changes in solar radiation are related to the number of sunspots appearing periodically on the surface of the sun.

A. With increasing numbers of sunspots, solar radiations: (i) increase or (ii) decrease

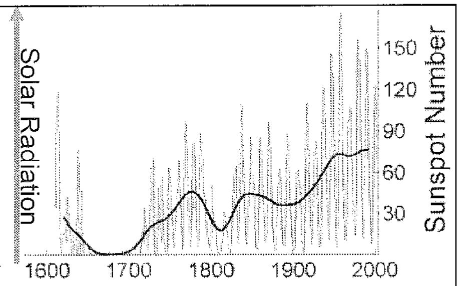
A. Radiations emitted from the sunspots themselves are: (iii) higher or (iv) lower than from the surrounding areas

A. (i) (iii)
B. (ii) (iii)
C. (i) (iv)
D. (ii) (iv)



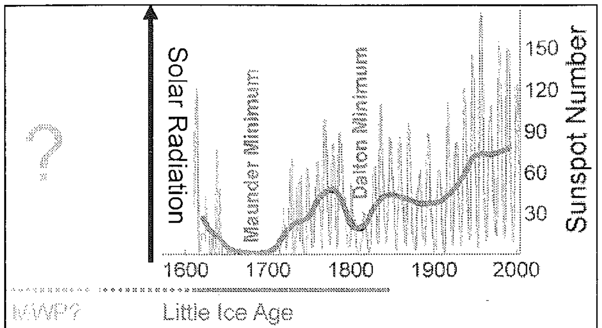


... related to the number of sunspots

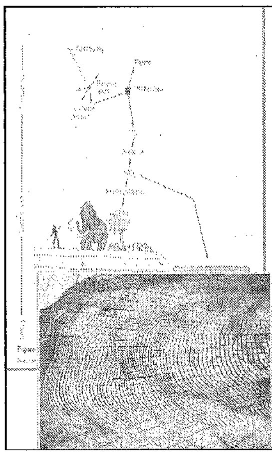


Sunspots have recorded since 1610..
→ confirmed the 11-year cycle

→ number of sunspots and thus intensity of solar radiation has changed during the past 400 years …



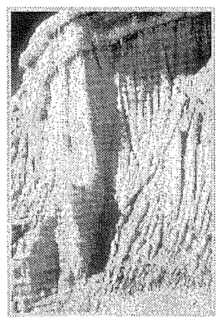
\+ change in the amplitude of the 11 year cycle
→two periods of very low sunspot number (i.e. low solar radiation)
→increase between 1900 and 1950



Cosmogenic isotopes are isotopes (^{14}C, ^{10}Be)
→ Produced in the atmosphere by the interaction between cosmic rays and nitrogen or oxygen atoms

→ After formation, ^{14}C is converted to $^{14}CO_2$ and taken up by trees

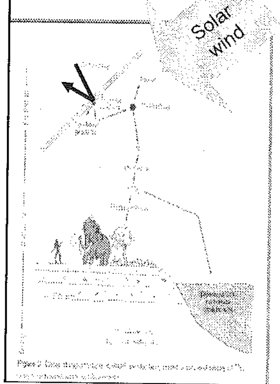
→ Variation in the ^{14}C concentration in the atmosphere can be estimated by measuring ^{14}C in tree rings



^{10}Be is produced by a similar process and removed from the atmosphere by precipitation

→ Past changes in its rate of production can be deduced by measuring ^{10}Be in ice cores

How do cosmogenic isotopes record solar radiation, if they are produced by cosmic rays coming from outer space…?



solar wind shields the Earth from cosmic rays

→when solar radiations are high

→ solar wind increases

→ ^{14}C and ^{10}Be production rates decrease

12:51 6/10

ERID: 5/10

..solar emissions were somewhat lower during the little ice age and higher during the Medieval warm interval