



Environmental Ethics and Land Management
 ENVR E-120
<http://courses.dce.harvard.edu/~envre120>

Basic Concepts of Ecology

Timothy C. Weiskel

Class - Session 2
 29 September 2005

Harvard University Extension School
 Fall Semester 2005


Who Should Take This Course?

- Anyone with an interest in the survival of the human enterprise.

What will be expected of you?

- Nothing less than the your total attention and complete devotion to the issues raised here for the rest of your life.


Will there be a test?



Tim Weiskel - 4

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Your biggest problem: Not to become distracted....

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Harvard Extension School
Faculty: J. Weiskel

SCHEDULE

Week 1: **Week 1: Climate Change**
 Coursework by: Climate Change Action Planning, Conservation Law Foundation, Massachusetts Climate Action Network, Climate Light Institute, Watershed Bank

7-14
 Coursework by: Climate Change Action Planning, Conservation Law Foundation, Massachusetts Climate Action Network, Climate Light Institute, Watershed Bank

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Special Guest Speakers:
 Henry Lohrer, President, CDSO
 David P. Thayer, Secretary of Commonwealth Department for the State of Massachusetts, Secretary of the Commonwealth

This will not always be easy....

Consider the events occurring at Harvard all the time....



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Class Research Resources and Assignments

Week 2
Basic Concepts of Ecology
 Basic Concepts of Ecology
 Basic Concepts of Ecology

"Civilizations exist by geological consent, subject to change without notice."
 Will Durant

Read and consider the following recent news items:
 Question: What, in your judgment, are the implications of these kinds of events for the future of the human enterprise? (This is a question that you will be asked to answer in your final paper.)

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Calendar

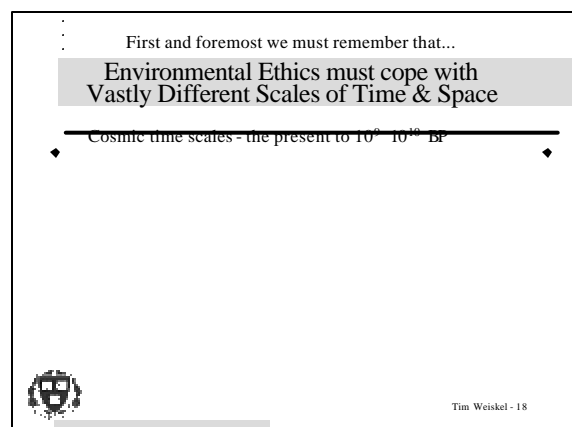
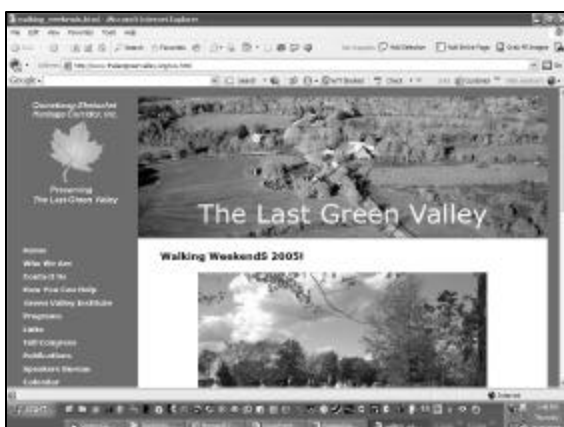
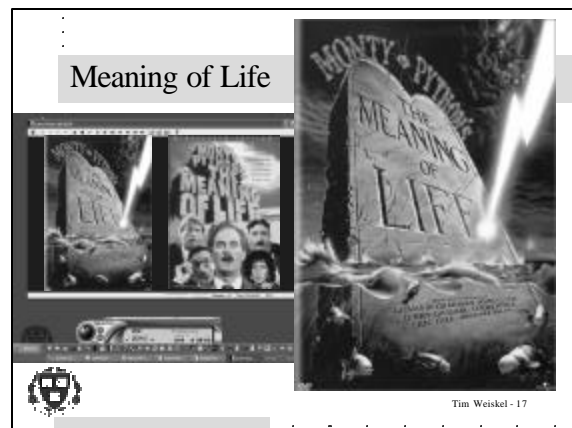
Upcoming

1881 Hours
 Program
 Result

Upcoming
 Undergraduate
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Environmental Ethics must cope with Vastly Different Scales of Time & Space

Cosmic time scales - the present to 10^9 - 10^{10} BP

- What kinds of events occur in this time frame?




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Environmental Ethics must cope with Vastly Different Scales of Time & Space

Cosmic time scales - the present to 10^9 - 10^{10} BP

- What kinds of events occur in this time frame?
- Over what spatial ranges do these conditions apply?
- What -- if anything -- is the human significance of events that occur at cosmic time and spatial scales?
- Do humans have any importance beyond very short temporal scales?




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Environmental Ethics must cope with Vastly Different Scales of Time & Space

Cosmic time scales - the present to 10^9 - 10^{10} BP

- What kinds of events occur in this time frame?
- Over what spatial ranges do these conditions apply?




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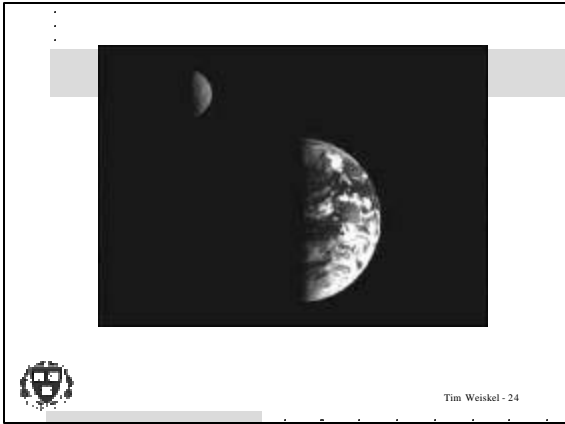
Environmental Ethics must cope with Vastly Different Scales of Time & Space

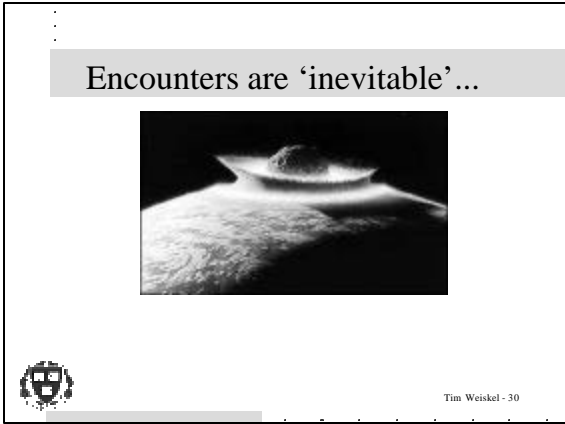
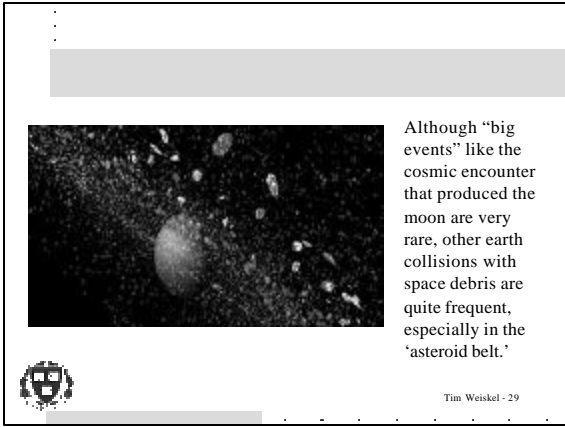
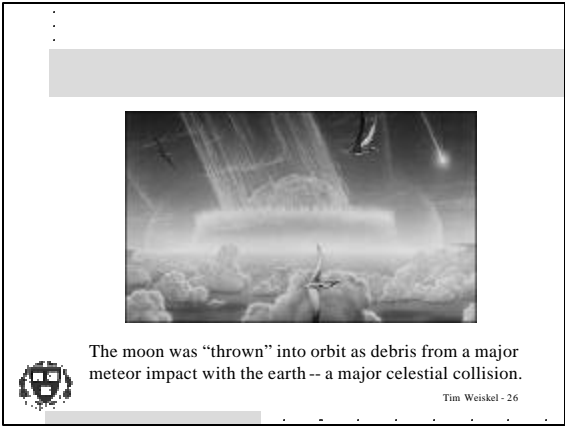
Cosmic time scales - the present to 10^6 - 10^{10} BP

- What kinds of events occur in this time frame?
- Over what spatial ranges do these conditions apply?
- What -- if anything -- is the human significance of events that occur at cosmic time and spatial scales?



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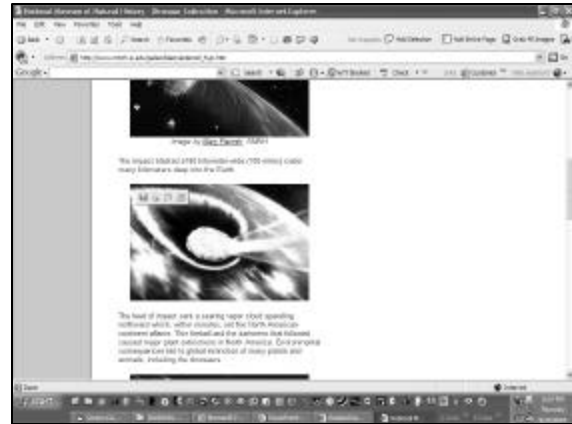


The role of comets in the history of the earth is still being discovered.

Some suggest that life itself is extraterrestrial in origin....

What are the ethical implications, if any, of this?

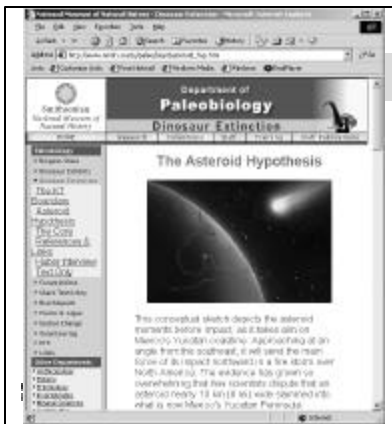
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Some cosmic events have had a big impact

Even if it turns out that life originated endogenously on Earth and only on Earth, we know that the history of life-forms has been dramatically altered by cosmic events in the past.

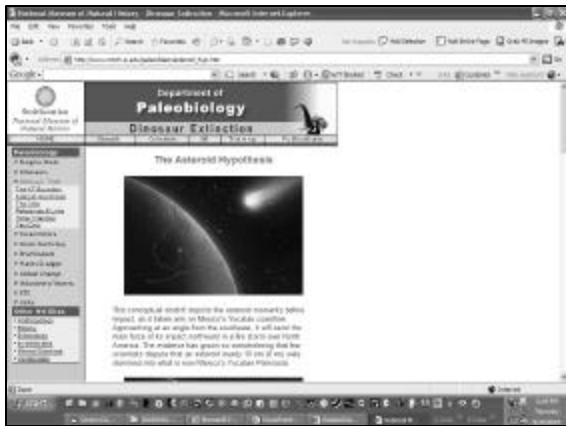
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The "Asteroid Hypothesis" is currently the leading explanation offered for the "extinction event" represented by the KT Boundary in the geological record.*

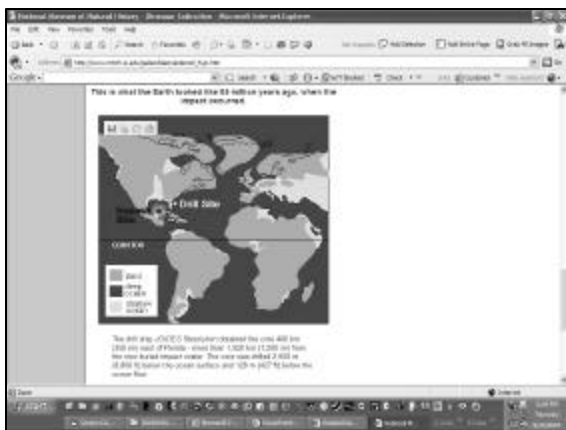
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How might cosmic events have shaped life's more recent history on Earth?

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Asteroids 'affected human evolution'

By BBC Science Correspondent
Asteroids may have affected the course of human evolution, according to new research suggesting that the impact of a meteorite could have influenced the development of our species.

Some scientists are suggesting that cosmic events may well have directly affected the evolution of the human species.

What if "we" emerged as a result of a cosmic event?

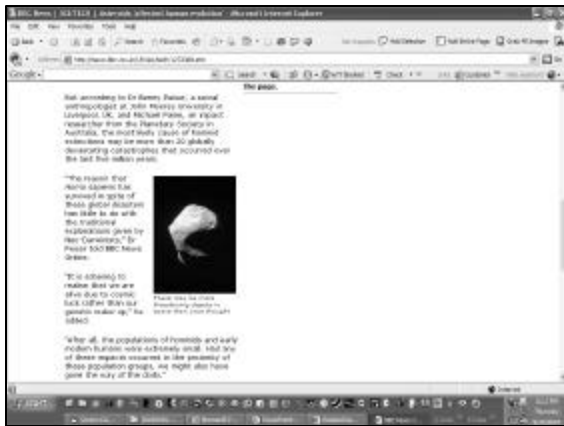
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"Extinction events" are dramatic cases on cosmic intrusions into the history of life-forms on Earth, but smaller "events" occurred as well...

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Asteroids 'affected human evolution'

By BBC Science Correspondent
Asteroids may have affected the course of human evolution, according to new research suggesting that the impact of a meteorite could have influenced the development of our species.



Whatever their role in Earth's past, asteroids and meteors appear to be an ongoing "fact of life" on Earth. There is no "escaping" them. *

In fact there is a call for new defenses to cope with them. *

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This is not just a "theoretical" problem.

Consider what happened in June 1908....

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In 1908 Earth experienced the largest explosion in "recorded history"...

.... The trouble was that it wasn't recorded by many people at all.

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Tunguska, Russia on 30 June 1908 -- (an artist's impression).

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There are now recent scientific expeditions to investigate what happened on June 30, 1908. *

Recent Events
The *Don Quixote* Mission.

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There are now recent scientific expeditions to investigate what happened on June 30, 1908. *

Recent Events
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Tim Weiskel - 58



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Recent Events
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We have other cosmic “issues”

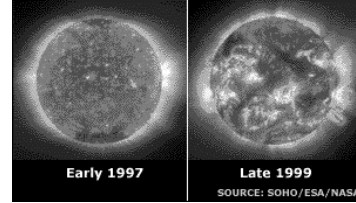
But what of other cosmic “issues,” closer to home in both time and space?

What about our nearest neighbors -- beyond the moon -- upon which all life on Earth’s surface depends?



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The sun approaching solar maximum



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What are “sun eruptions”? Why should we care?
*

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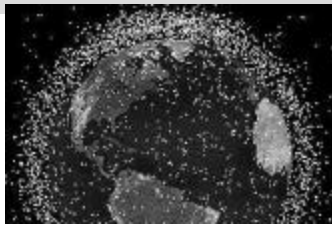
The sun most certainly affects climate -- in ways we do not fully understand.

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What are “sun eruptions”? Why should we care?
*






The sun's "weather" also affects us quite directly in terms of how we communicate and "protect ourselves on earth.




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What are "geological events?"

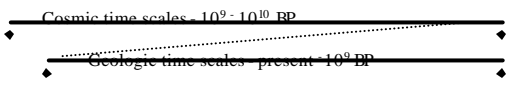



Stuff happens
Volcanoes happen...
Volcanoes often happen near inhabited areas, but have wide-spread and sometimes global impacts. *



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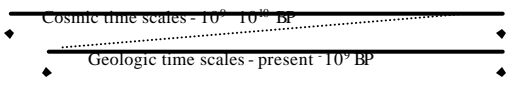
Vastly Different Scales of Time & Space


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Vastly Different Scales of Time & Space



As with "cosmic" time scales and events, so too, we must consider "geological time" scales and events in developing an effective environmental ethic.




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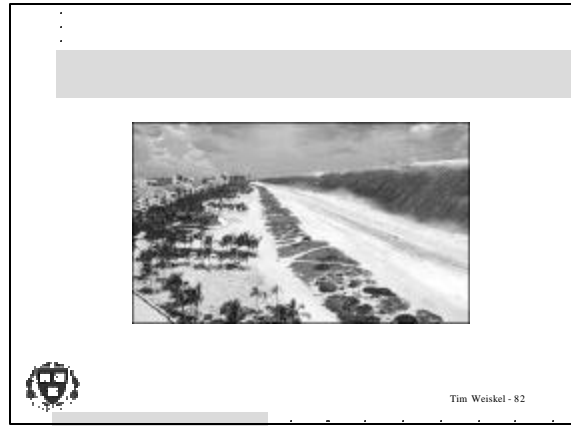
Distant and Invisible Volcanoes...



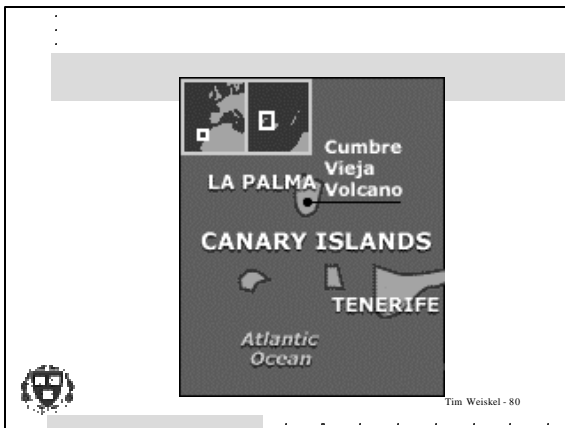
Tsunamis - giant waves or "walls of water" -- can be triggered by submarine volcanoes or earth slides provoked by volcanoes.

Some of these have received recent publicity *

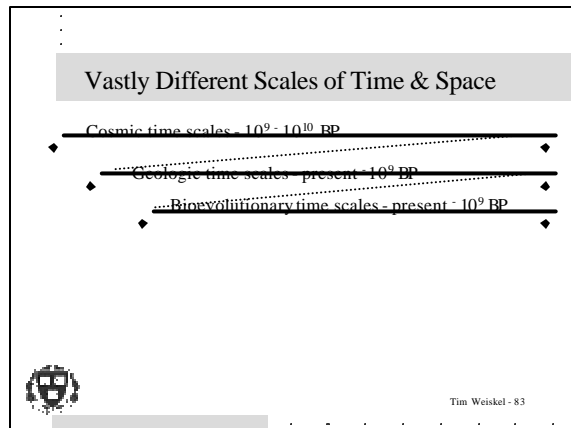
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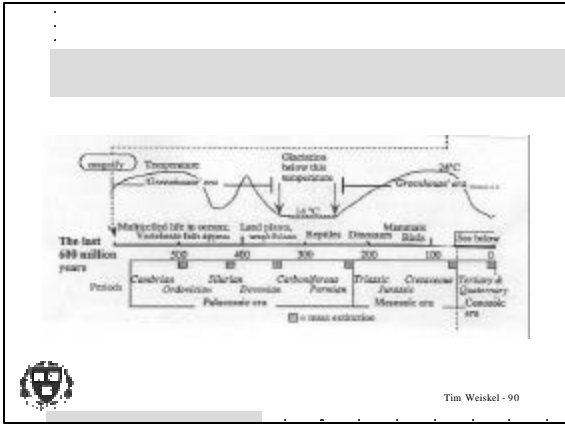
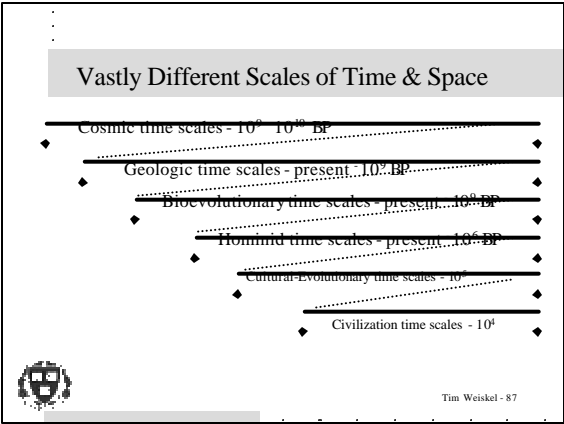
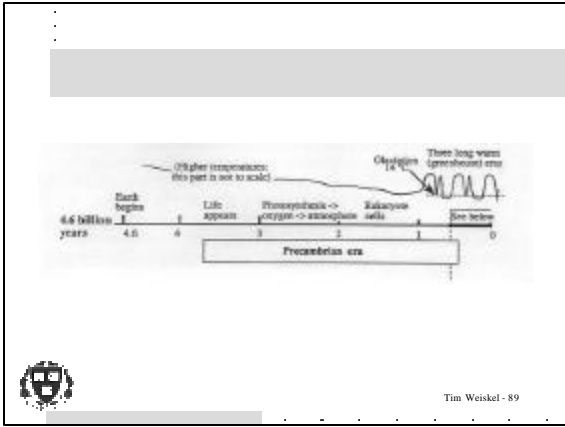
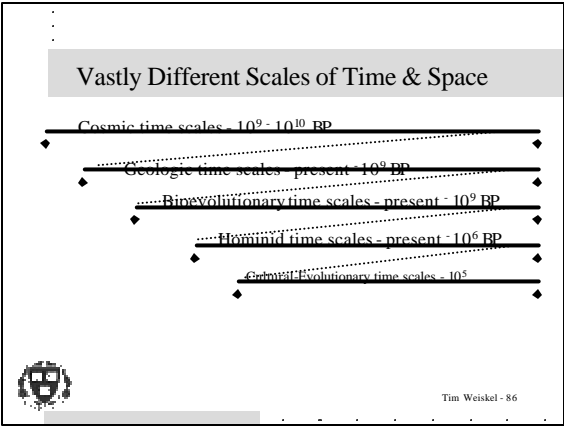
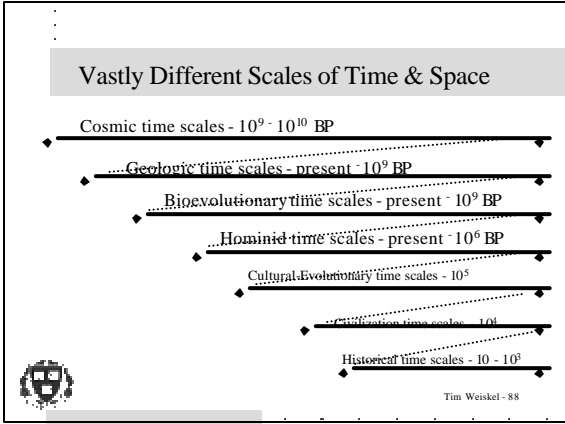
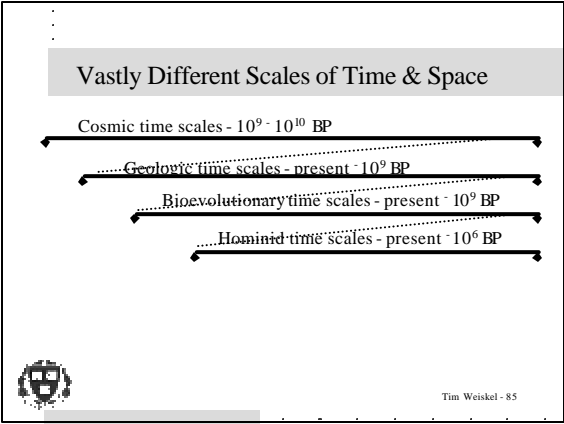


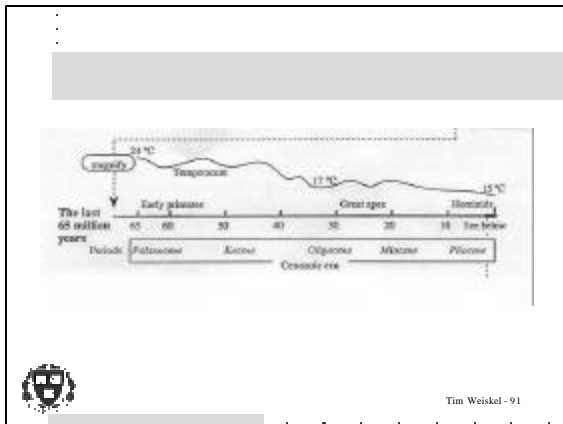
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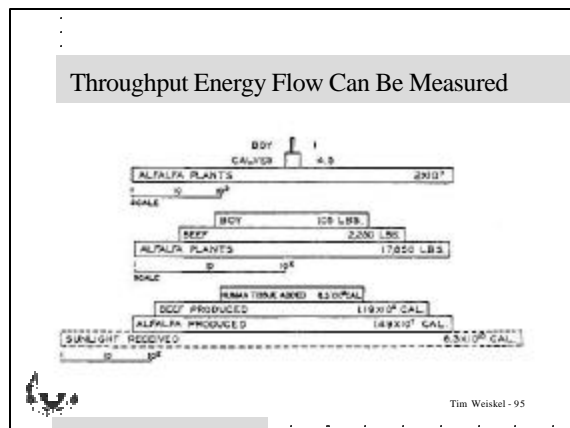
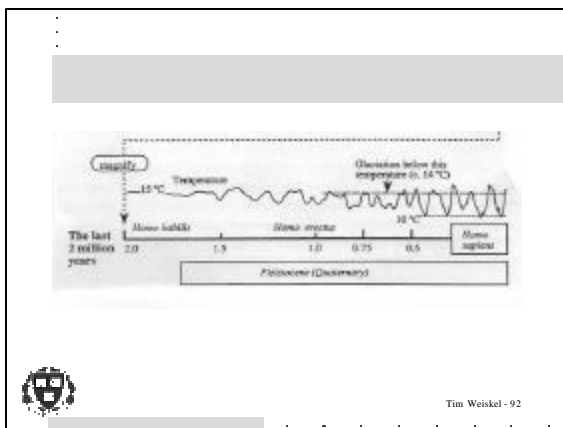




We live in an open energy, closed material system, governed by the second law of thermodynamics.

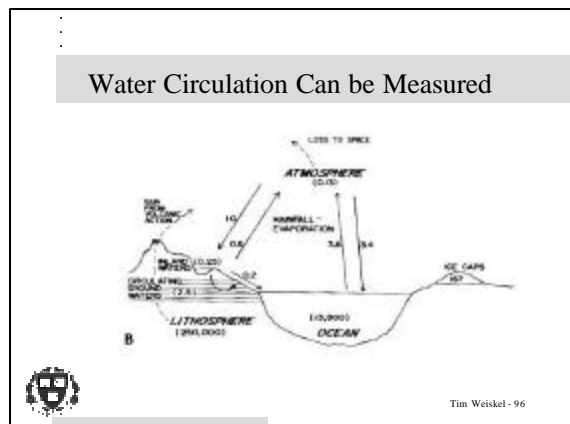
What is our species role in this system?

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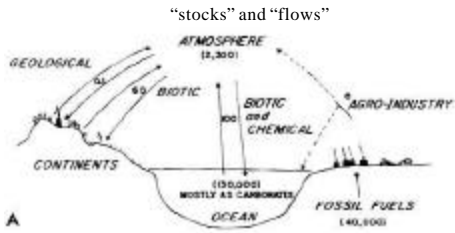


With all the shocks the earth system has experienced, what could a title like **“Planetary Overload”** possibly mean? Is the planet overloaded? In what sense?

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Carbon Circulation Can Be Measured



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Sometimes Humans behave as a "Geological Force"

It is reasonable to talk about not just life, but *human* life as a geological force.

Certainly the impact of humans is visible from space....

And even when our behavior generates emissions are "invisible" they may yet change Earth's delicate balances required for life as we know it. *



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Life as a Geological Force

Dynamics of the Earth



Peter Westbrock

Life has been a "geological force" on Earth for far longer than humans have been part of the biosphere -- the full "committee of life forms."

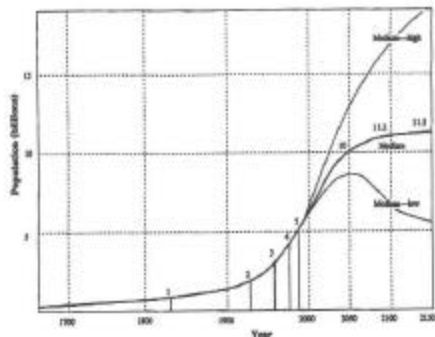
We live in a highly improbable atmosphere made possible by everything from "farting ants" to anaerobic bacteria alive for eons before we emerged as a species

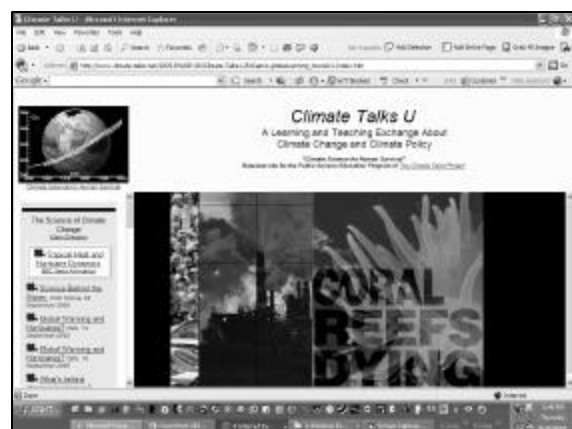
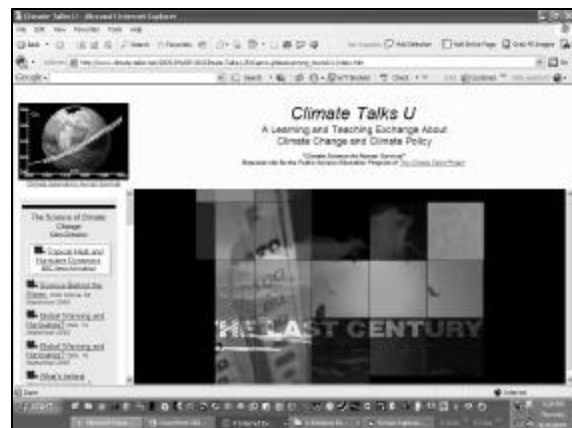
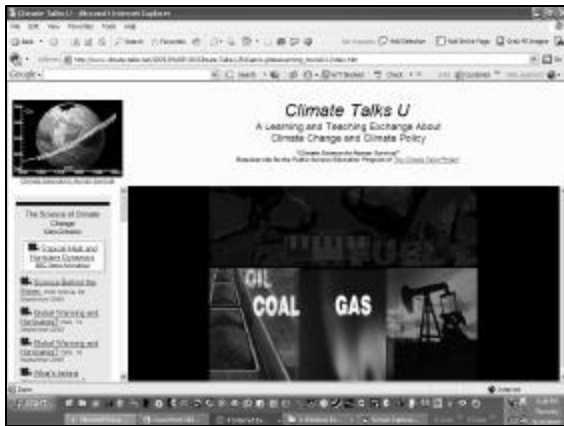
In one respect, however, things are different now that humans have expanded to such massive numbers.

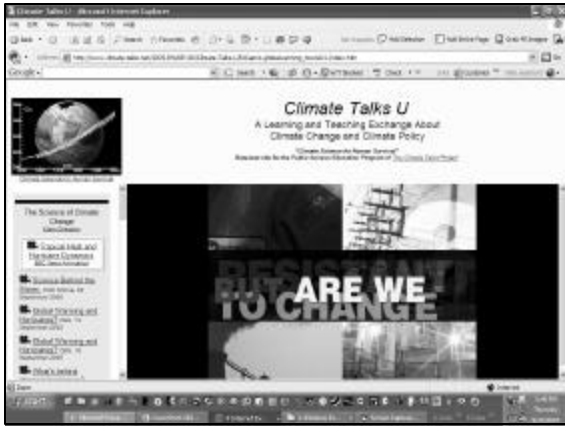
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Human population growth is apparent.
Broad range of alternatives in the future. Hard to predict.








Environmental Ethics = our last, best chance of survival...

We are still assessing the ecological impact of the Viet Nam war and the war in Kuwait a decade ago, and the news is not encouraging.

The question is: Can we survive our own skills of killing and destroying the life support systems we need to survive?

Answer: No, not without a **new** environmental ethic.



An Environmental Assessment Of Kuwait:
Seven Years After the Gulf War
Final Report - August 1998

FOREWORD

On August 2, 1990, Kuwait was invaded by Iraq troops. The nation which was followed by a period of intense diplomatic negotiation. This assessment represents the soil resource particularly cross-boundary for the United States, Kuwait, to assess and protect viability of the whole region is critical for the world.

Tim Weiskel - 110

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