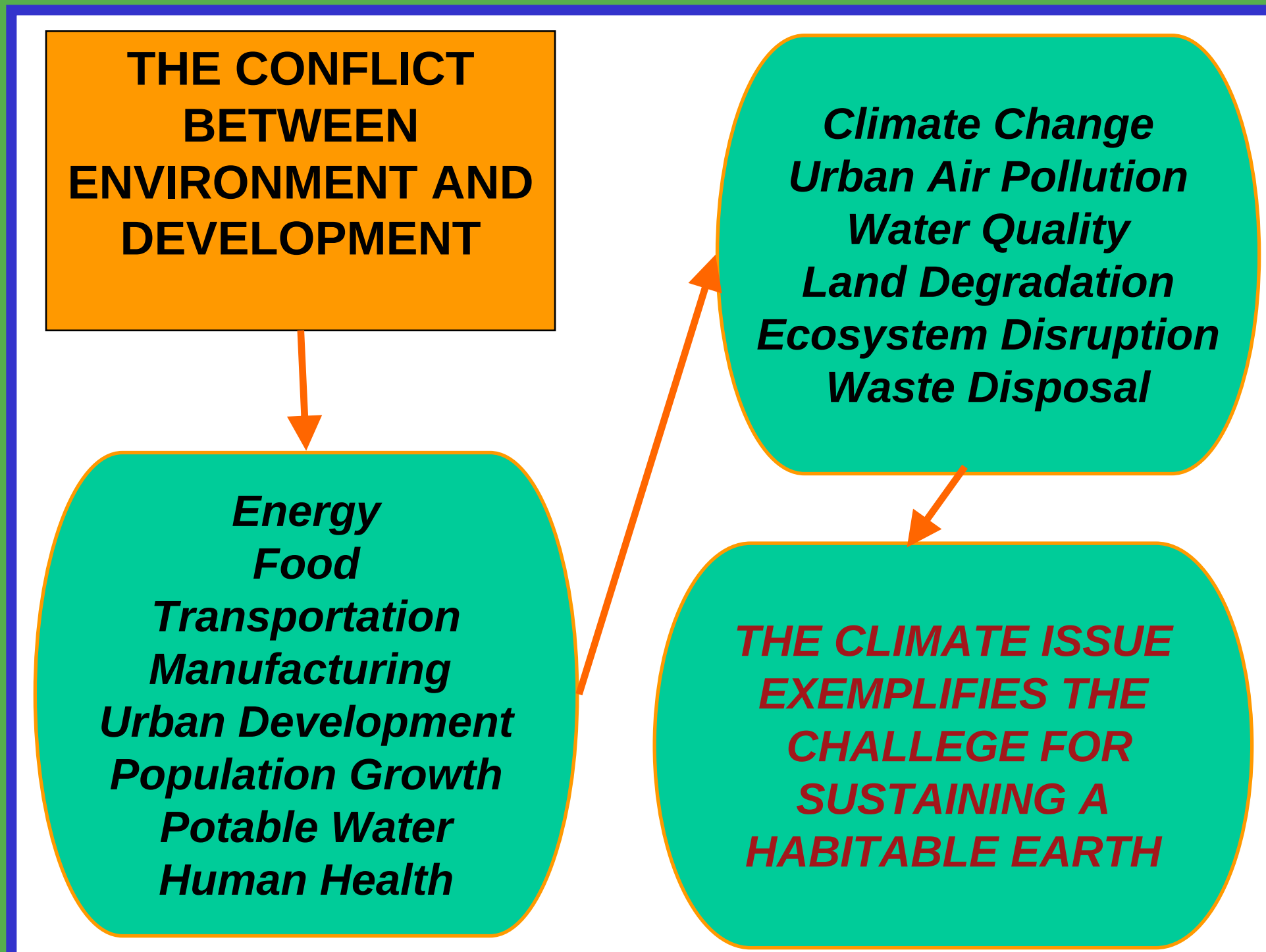
15.023J / 12.848J / ESD.128J Global Climate Change: Economics, Science, and Policy
Spring 2008

15.023 - 12.848 - ESD.128

Global Climate Change: Economics, Science and Policy

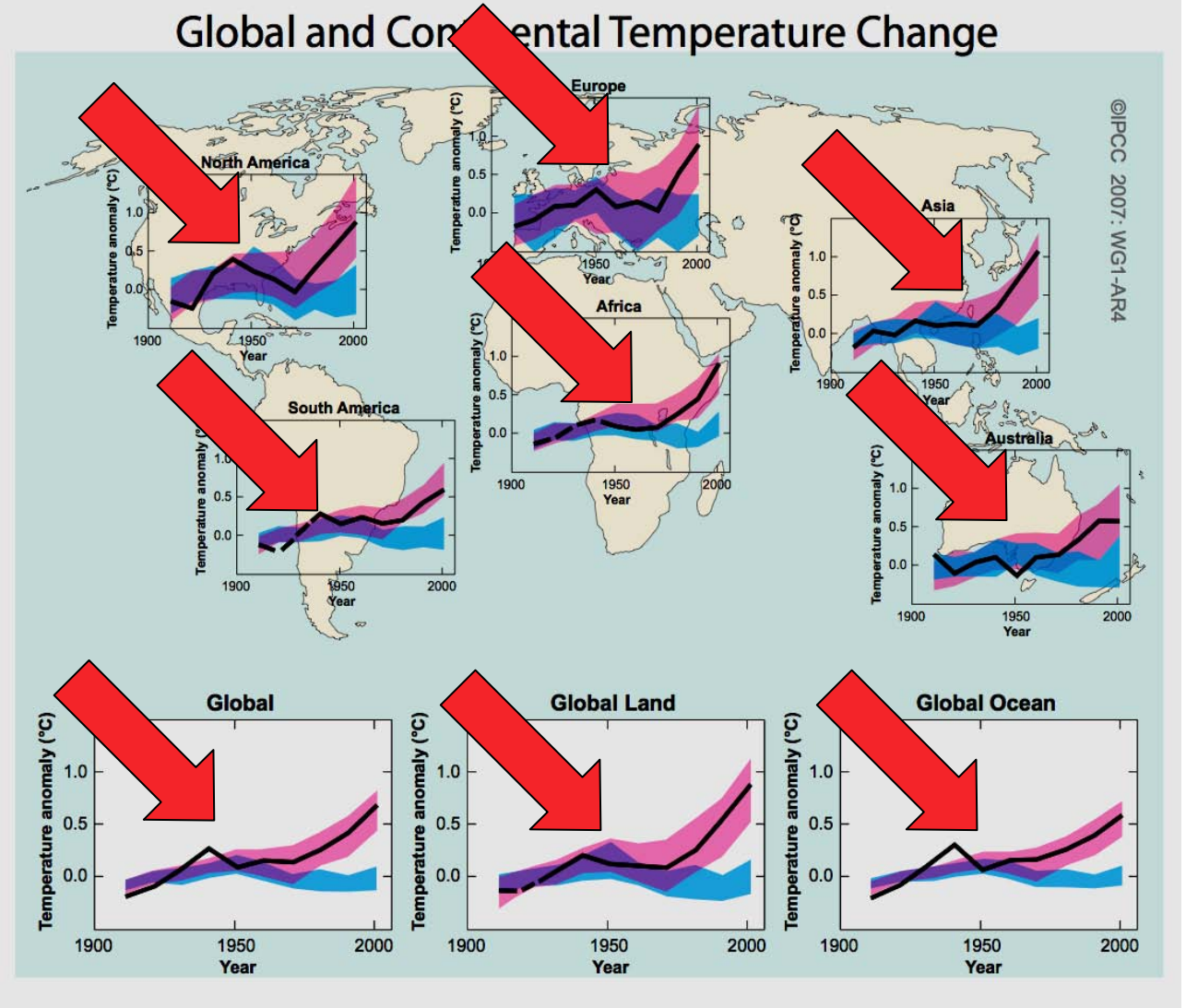
- Introductions
  - Faculty, teaching assistants, administration
  - The class (SSM, ESD, EAPS, other?)
- Why climate . . . & the challenge
- Content & materials
- Course details


THE CONFLICT BETWEEN ENVIRONMENT AND DEVELOPMENT
Energy
Food
Transportation
Manufacturing
Urban Development
Population Growth
Potable Water
Human Health
Climate Change
Urban Air Pollution
Water Quality
Land Degradation
Ecosystem Disruption
Waste Disposal
THE CLIMATE ISSUE EXEMPLIFIES THE CHALLEGE FOR SUSTAINING A HABITABLE EARTH

Why Climate?

- The scale of current & potential change
- The vulnerability of particular societies, sectors, and ecosystems
- The momentum of the economic system producing greenhouse gases
  - Importance policy for many industries
- The intellectual and political challenge

HOW HAVE GLOBAL & CONTINENTAL TEMPERATURES CHANGED OVER THE PAST CENTURY (1906-2005), AND WHY?



Ref: IPCC 4th Assessment, Summary for Policymakers, Feb. 2, 2007

Courtesy of the Intergovernmental Panel on Climate Change. Used with permission. From: Climate Change 2007: The Physical Science Basis. Working Group I Contribution to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press.

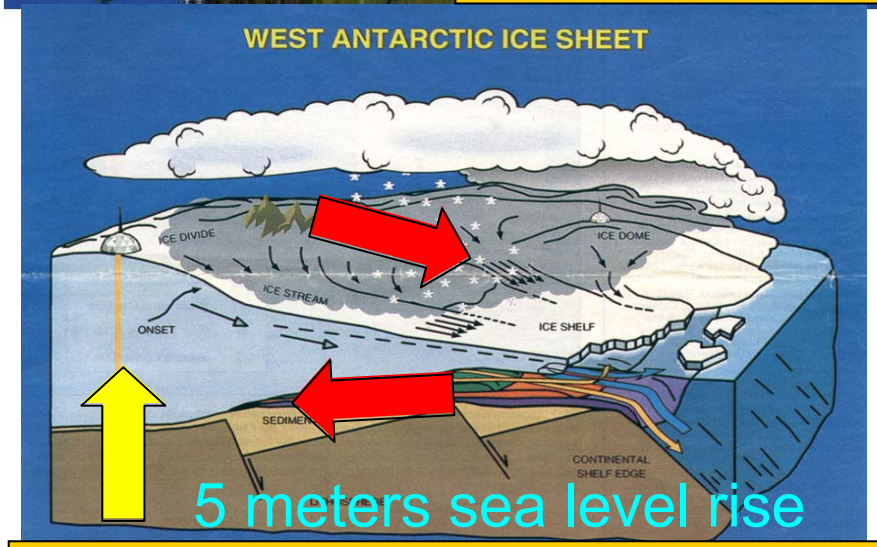
Black lines:observed changes. Blue bands: range for 19 model simulations using natural forcings.
Red bands: range for 51 model simulations using natural and human forcings.

POLAR REGIONS WARM FASTER THAN TROPICS:
WHAT ARE VULNERABLE SYSTEMS AT HIGH LATITUDES?

DEPLETION OF ARCTIC SUMMER SEA ICE

REF: ACIA, Impacts of a Warming Arctic, Climate Impact Assessment Report, 2004

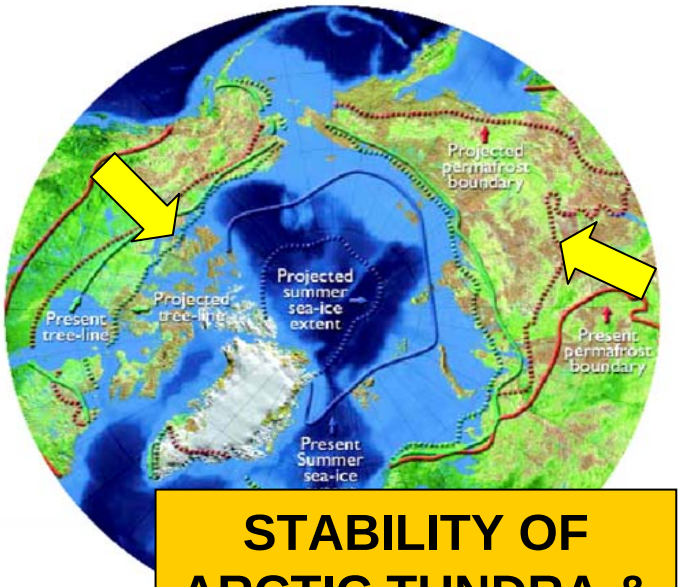
Courtesy of the Arctic Climate Impact Assessment, 2004. Used with permission.



STABILITY OF WEST ANTARCTIC ICE SHEET (Bindschadler et al).

Bindschadler, R. A., R. B. Alley, J. Anderson, S. Shipp, H. Borns, J. Fastook, S. Jacobs, C. F. Raymond, What is happening to the west antarctic ice sheet?, *Eos Trans AGU* 79(22), 257-257, 1998. Copyright [1998] American Geophysical Union. Reproduced/modified by permission of American Geophysical Union.

About 550 billion tons of carbon stored in Arctic tundra & frozen soils (SCOPE 2004)



STABILITY OF ARCTIC TUNDRA & PERMAFROST

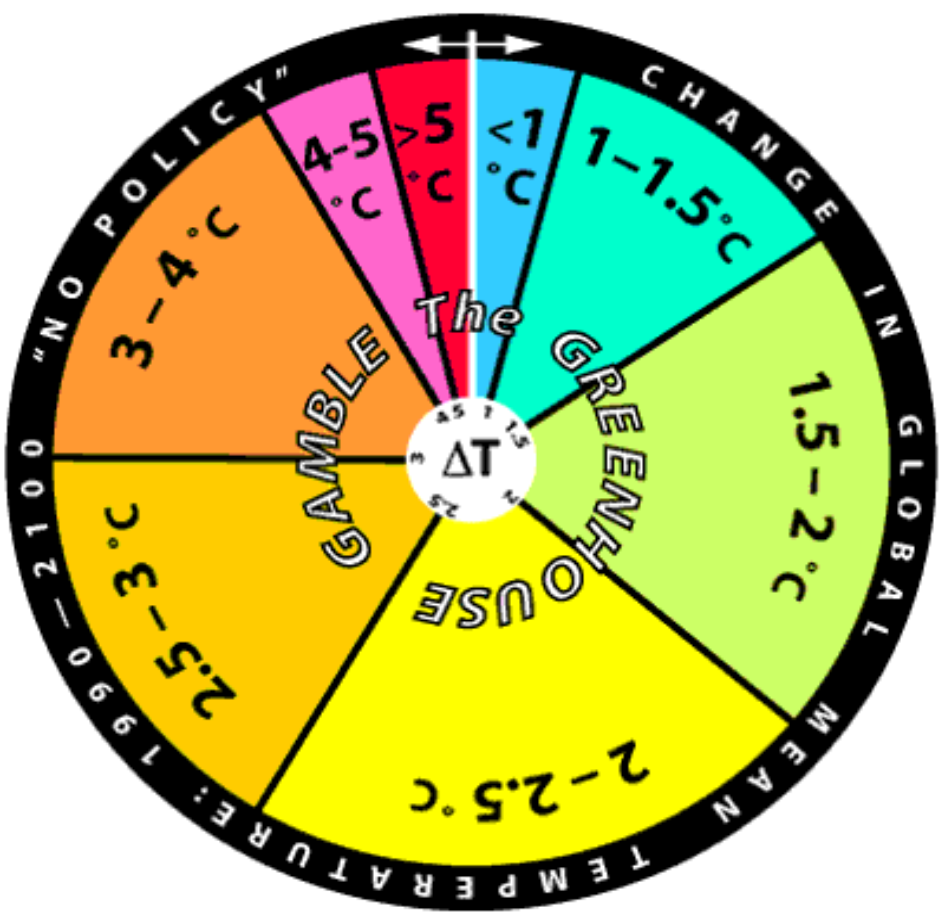
Courtesy of the Arctic Climate Impact Assessment, 2004. Used with permission.

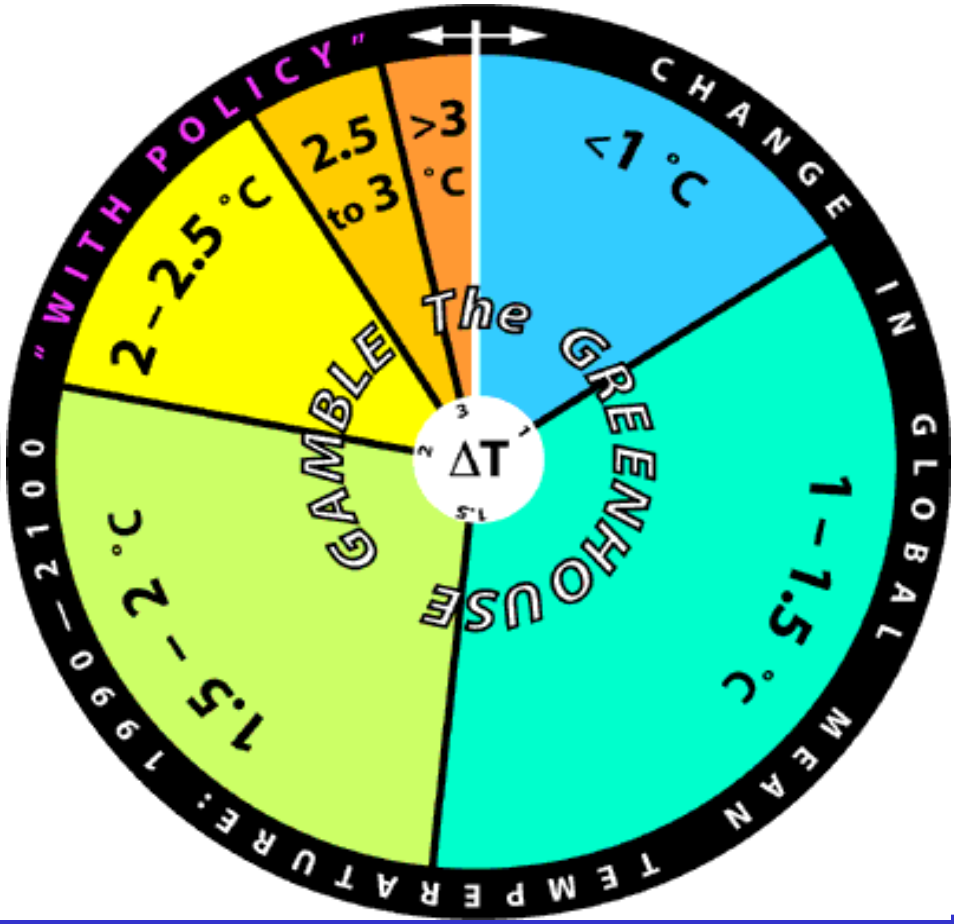
HOW CAN WE EXPRESS THE VALUE OF A CLIMATE POLICY UNDER UNCERTAINTY?

Compared with NO POLICY

What would we buy with STABILIZATION of CO_2 at 550 ppm?

A NEW WHEEL with lower odds of EXTREMES





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The Intellectual and Political Challenge

- Many natural/social/behavioral sciences
- Complexity of the human-climate system
- A many-nation “commons” problem
- Long time horizons & irreversible effects
- Uncertainty (but possible learning)
- Intersection with other issues
  - North-South equity concerns
  - Energy, transport, land use, taxes, trade

Course Content

- Origin and history of the course
  - MIT Joint Program on the Science and Policy of Global Change
  - Materials
  - "Toy" integrated system model
- Homework sets & team project
- Classroom style, and preparation
- Structure of the class sessions
  - Mondays *vs.* Wednesdays
  - Science . . . economics . . . politics

Course Organization

	Monday	Wednesday
2/11	Institutions	Background/science
2/19	Climate - I	Economics
2/25	Climate - II	Enviro. economics
3/3	Econ - I	Int'n negotiations
3/10	Econ - II	Integration (Toy)
3/17	Climate - III	Damage/benefits
3/26	Holiday	
3.31	Econ - III	Trading/tax systems
4/7	Climate - IV	Uncertainty
4/14	Uncertainty analysis	Sea level/storms
4/21	Holiday	Decision analysis
4/28	Deciding near-term effort	Arctic change
5/7	Climate - V	Discussion/questions
5/14	Student presentations	

Materials

- Readings
  - Packet to purchase, E52 Copy Center ($30)
  - Hand-outs
  - Stellar.mit.edu (syllabus, notes, materials)
  - Material on web (http://globalchange.mit.edu/)
  - Keep an eye on the news!
- Computer needs
  - “Toy” IGSM in the Sloan Computer Lab
  - Excel or other worksheet program

Other Details

- Credits: 3-0-6
- Prerequisites . . . & auditors
- Class schedule
  - Mon.: 3:00 to 5:00
  - Wed.: 3:00 to 4:00 (3:00 to 5:00 on May 12)
  - ***WILL*** meet on Wed., March 16 (Sloan trips)
- Grading
- Questions?