The State of the Art in Understanding Potential Climate Impacts and Adaptation

Background

- Past IA modeling efforts have focused on emissions and mitigation scenarios.
- DICE model (Nordhaus, 1994) first attempt to account for climate feedbacks in the context of cost-benefit
- In the limited studies that have followed, climate feedbacks were incorporated for the purpose of
    - Cost-benefit analysis—finding the optimal level of mitigation
    - Assessing the economic cost of climate damages—e.g., the Social Cost of Carbon (SCC)
- Few studies take into account adaptation responses
- No study accounts for the implications of impacts and adaptation for climate stabilization strategies

Omitting Impacts and Adaptation from IAMs: Potential biases

- **Climate feedbacks can limit mitigation options; e.g.,**
    - Shortage of water for hydropower
    - Negative impacts to biofuel crop productivity
- **Omitting adaptation can bias IAM results in a number of ways:**
    - Economic cost of climate impacts will be biased upwards
    - Adaptation could change the baseline, making it more difficult to reach stabilization target (e.g., energy demand for cooling)
    - Investment crowding out—adaptation investment could crowd out mitigation investment.

Empirical disconnect with IAMs

- Common complaint across all these types of models: lack of connection with empirical studies.
- Engineering or natural science process models are often used to provide the empirical basis, but:
    - typically only capture one part of the causal chain
    - similar to IAMs, also need to be parameterized based on empirical evidence
- We feel that this disconnect is key reason for lack of improvement in the representation of impacts and adaptation in IAMs

Empirical disconnect with IAMs (cont.)

- There has been a recent flurry of empirical research (econometric studies) in the economics literature.
- Why hasn't this work made its way into IAMs and/or process models?
  - Econometric models capture more than one part of the causal chain, but are not structural and therefore difficult to incorporate into IAMs or process models
  - Empirical work on impacts and adaptation is typically done at a level of detail (spatial, sectoral) much too rich for IAMs
  - Therefore, heroic efforts needed to translate empirical results into models

Agenda

1:00 PM Energy: Empirical estimates of impacts: Ian Sue Wing (BU)
1:30 PM Water: Process modeling of water: Steve Frolking (UNH)
2:00 PM Water: Pat Reed (Cornell)

2:30 PM DISCUSSION: ENERGY & WATER IMPACTS

3:30 PM Adaptation for city infrastructure: Paul Kirshen (UNH)
4:00 PM Sea Level and Extreme Events: Bob Kopp (Rutgers)

4:45 PM DISCUSSION: Cities, Sea Level, and Extreme Events

Wednesday:

8:30 AM Agriculture: Empirical estimates of impacts: Wolfram Schlenker (Columbia)
9:00 AM Agriculture: Empirical estimates of adaptation: Rob Mendelsohn (Yale)
9:30 AM Agriculture: Process models of impacts/adaptation: Allison Thomson (PNNL)

10:00 AM DISCUSSION: Agriculture

11:00 AM OPEN DISCUSSION

Climate Impacts and Adaptation Responses in IAMs